#InvestEUresearch

Horizon 2020 Work Programme for Research & Innovation 2018-2020

HORIZON 2020 Space

ESSC plenary meeting
Amsterdam, 9 May 2019

DG GROW – Internal Market, Industry Entrepreneurship and SMEs

GROW/I1 - Space Policy and Research Unit

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Research and Innovation

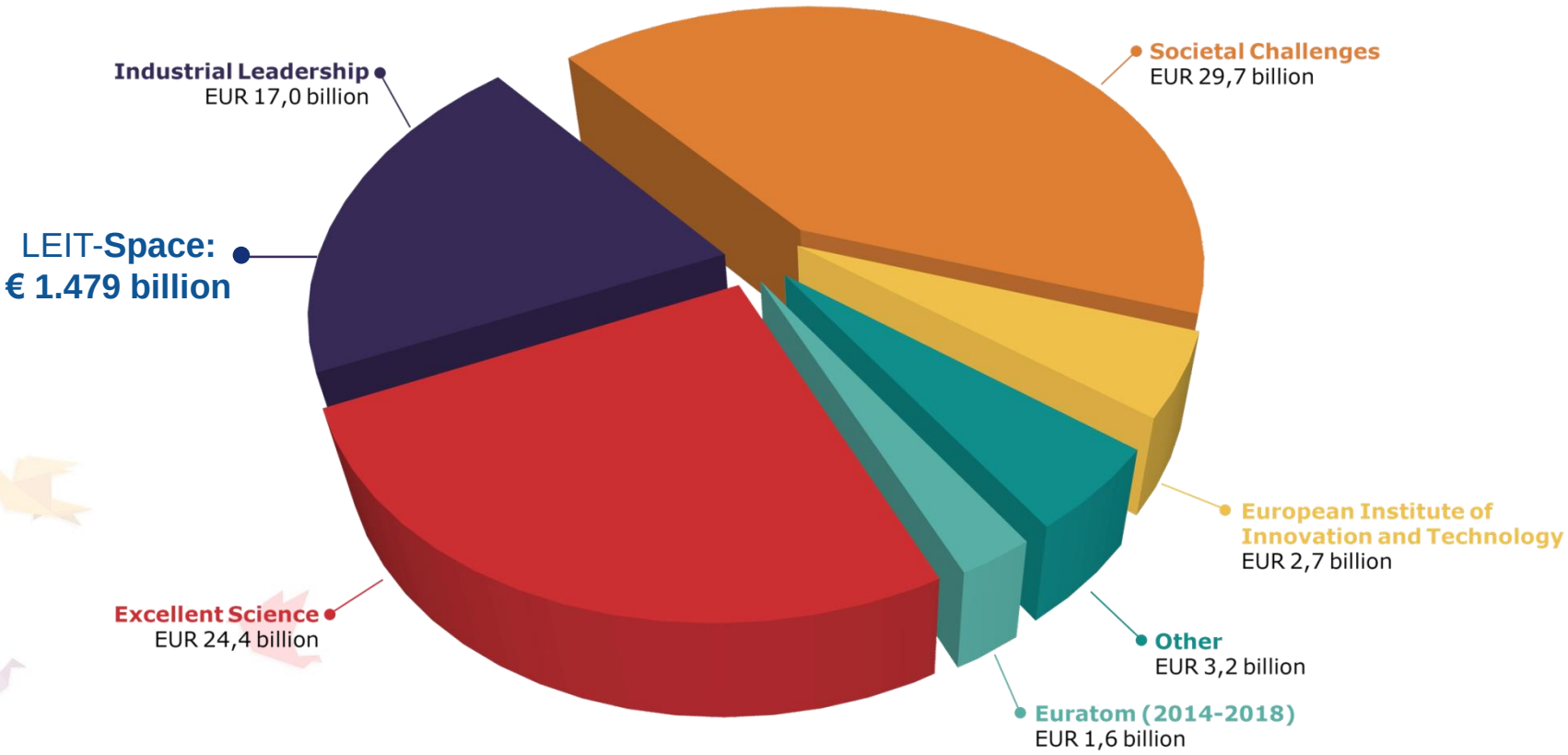
HORIZON 2020

European Union programme
for research and innovation
for 2014-2020

European Commission

SPACE IN H2020

Horizon 2020 budget (in current prices): € 79 billion



European Commission

Work Programme implementation

EU AGENCIES

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

TASKS include: Handling of calls and submission of proposals, evaluation process, grant agreement preparation, grant agreements signature, handling submission of reports, reviews, payments, audits…

ESA

- Delegation agreement (indirect management)
  - EGNSS infrastructure R&D
  - IOD/IOV of technologies/experiments
- Coordination of activities
  - JTF – Joint Task Force on Critical Technologies
  - SRCs – strategic research clusters on Electric Propulsion and Space Robotics

European Commission

WP 2018-2020 BUILDING BLOCKS

Maximising benefits of space for society and EU economy

SPACE-EO

- EO market uptake
- Copernicus mission and services evolution

SPACE-EGNSS

- EGNSS market uptake
- EGNSS infrastructure, mission and services evolution

SPACE-BIZ

- Support to space hubs
- Space outreach and education
- EIC Horizon Prize on "Low cost Space Launch"
- InnovFin Space Equity Pilot (ISEP)
- SME-instrument
- FTI – Fast Track to Innovation

Globally competitive and innovative space sector

SPACE-TEC

- Technologies for European non-depend. and competitiveness
- Strategic research clusters
- Generic space technologies
- EO and SatCom technologies
- In-orbit validation/demonstration

SPACE-SCI

- Scientific instrumentation and technologies for exploration
- Scientific data exploitation

Access to space & Secure and safe space environment

SPACE-TEC

- Access to space

SPACE-SEC

- Space weather
- Exploring concepts for space traffic management
- Space Surveillance and Tracking (SST)
- Near Earth Objects (NEOs)

+ under "other actions": ESA engineering support, REA/GSA project monitoring, studies & communication and support to the Space NCPs network

European Commission

INDICATIVE BUDGET BREAKDOWN (2018-2020)

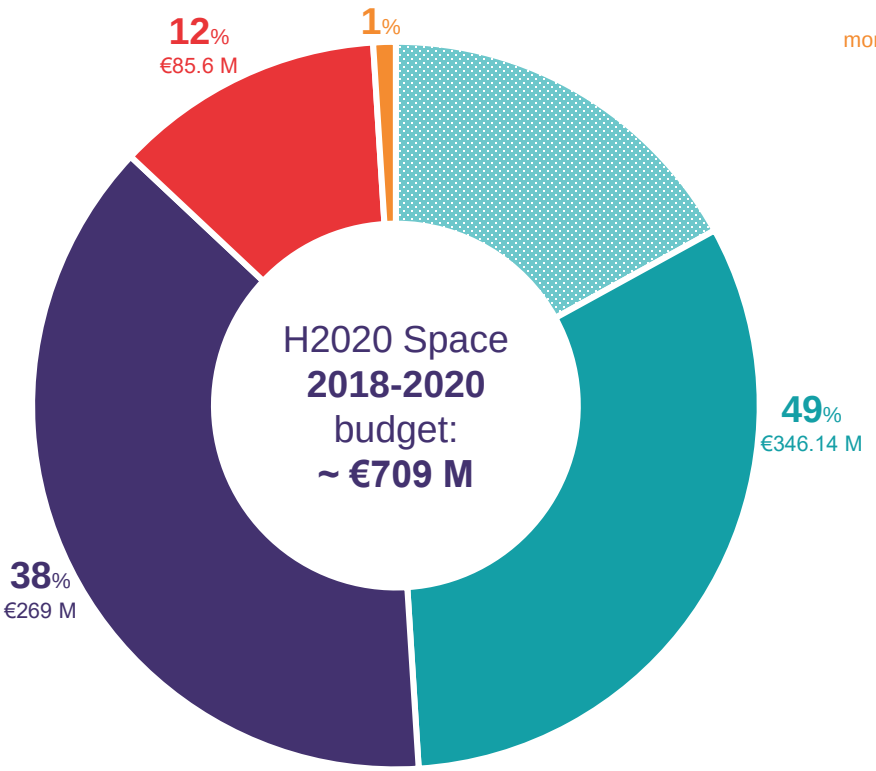
Security

SEC (€85.6 M) I 12.0%

Technology and science

TEC (€250 M) I 35.3%

SCI (€19 M) I 2.7%



Miscellaneous (1%)

*Miscellaneous: Proposal evaluation, project monitoring, support to the NCP network; studies and communication activities

Flagships, Entrepreneurship

EGNS (€122 M) I 17.2%

EO (€88 M) I 12.4%

BIZ (€136.14 M) I 19.2%

European Commission

EARTH OBSERVATION

Space call 2020: € 35 million;
(2018-2020: € 88 million)

Probable next deadline: 5 March 2020

Publication of 2020 calls: end-June 2019

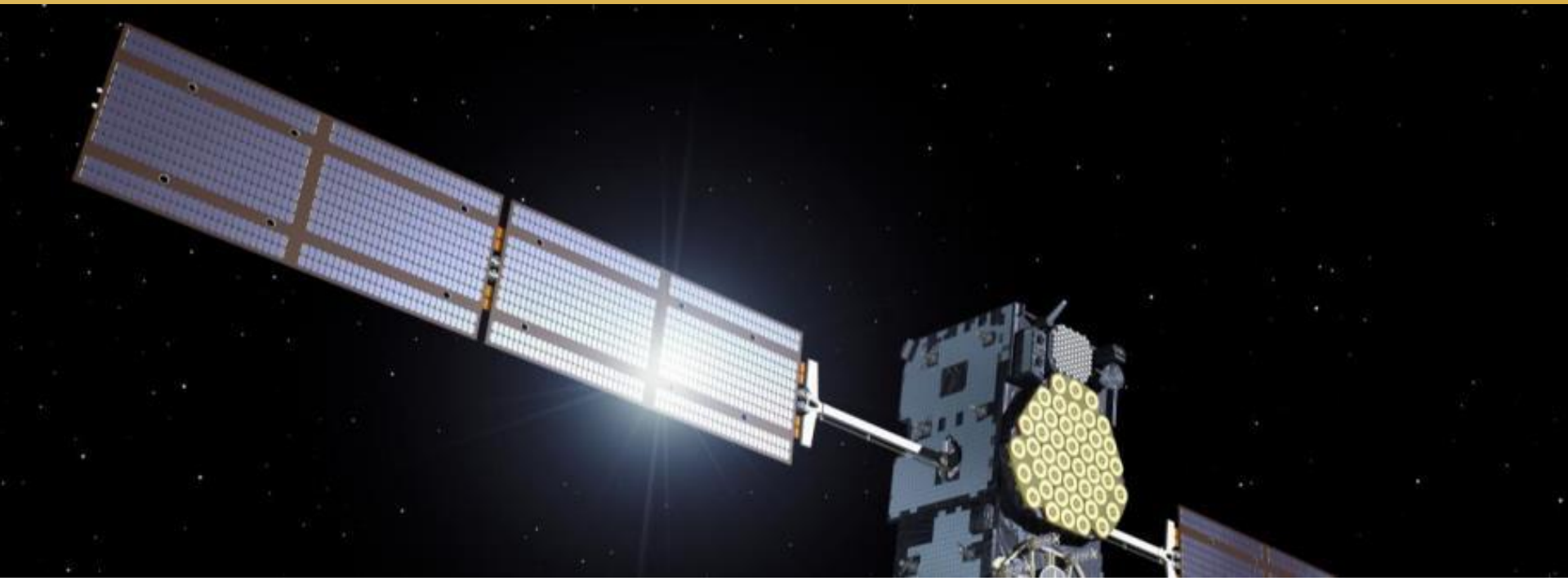
European Commission

EARTH OBSERVATION

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
DT-SPACE-01-EO-2018-2020: **Copernicus market uptake**	**IA**	**9.0**	**9.0**	**9.0**
LC-SPACE-02-EO-2018: **Copernicus evolution – Mission exploitation concepts**	**CSA**	**8.0**		
LC-SPACE-03-EO-2018: **Copernicus evolution – preparing for the next generation of Copernicus Marine Service ocean models**	**RIA**	**5.0**		
LC-SPACE-04-EO-2019-2020: **Copernicus evolution – Research activities in support of cross-cutting applications between Copernicus services**	**RIA**		**8.0**	**8.0**

EARTH OBSERVATION

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
LC-SPACE-05-EO-2019: **Copernicus evolution –a gap analysis to prepare future activities for Copernicus data and information validation and quality enhancement**	**CSA**		**2**	
Topic on CO2 monitoring moved to "other actions" (identified beneficiary action CHE consortium)	**RIA**		**9.0**	
LC-SPACE-06-EO-2019: **International Cooperation Copernicus – Designing EO downstream applications with international partners**	**RIA**		**5.0**	
LC-SPACE-24-EO-2020: **Copernicus evolution – Mission exploitation concepts**	**RIA**			**8.0**
LC-SPACE-25-EO-2020: **Copernicus big data algorithm factory**	**RIA**			**10.0**



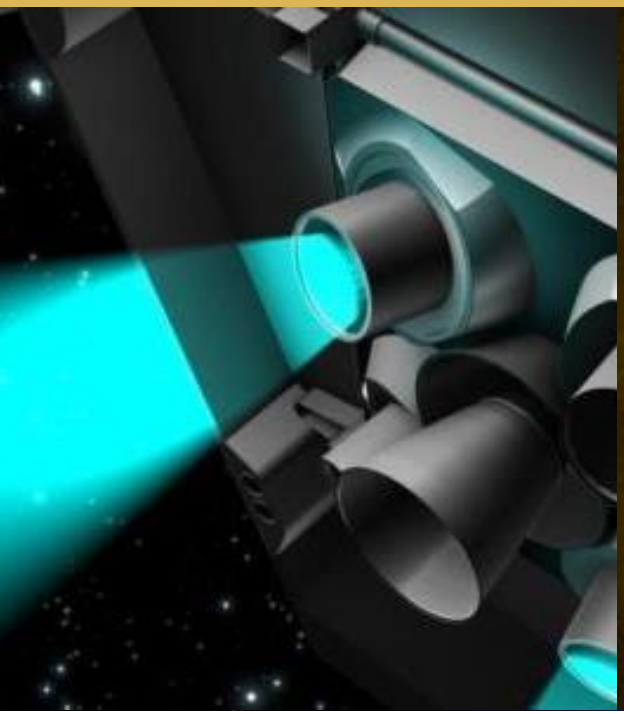
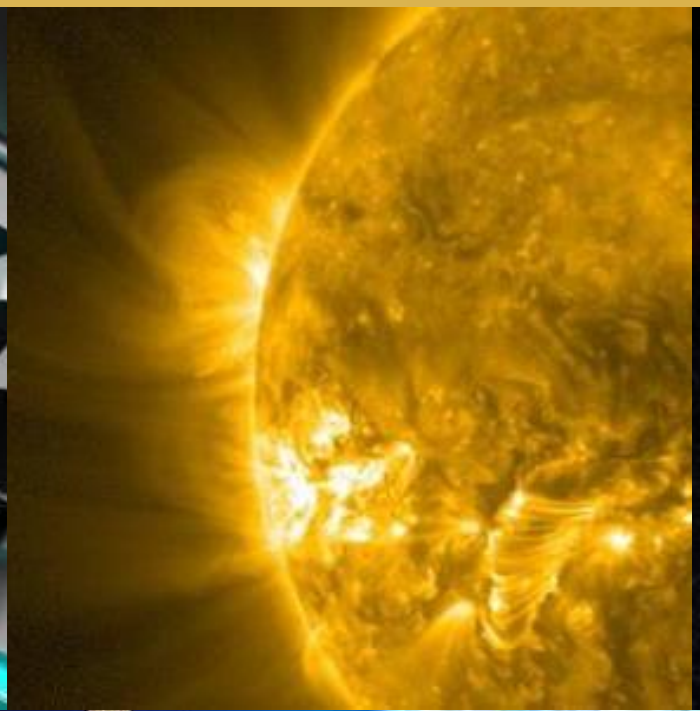
SATELITE NAVIGATION — GALILEO AND EGNOS

Space call 2019: 20 M€;
2018-2020: 123 M€

Probable next deadline: 5 March 2020

Publication of 2020 calls: end-June 2019

European Commission


COMPETITIVENESS OF THE EUROPEAN SPACE SECTOR TECHNOLOGY AND SCIENCE

Space call 2020: ~67 M€;
2018-2020: 269 M€

Probable next deadline: 5 March 2020

Publication of 2020 calls: end-June 2019

European Commission

SPACE TECHNOLOGIES, SCIENCE AND EXPLORATION

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
SPACE-10-TEC-2018-2019-2020: **Technologies for European non-dependence and competitiveness**	**RIA**	**12.0**	**12.0**	**12.0**
SPACE-11-TEC-2018: **Generic space technologies**	**RIA**	**11.0**		
SPACE-12-TEC-2018: **SRC – Space Robotics Technologies**	**RIA**	**18.0**		
SPACE-13-TEC-2019: **SRC – In-Space electrical propulsion and station keeping**	**RIA**		**10.0**	
LC-SPACE-14-TEC-2018-2019: **Earth observation technologies**	**RIA**	**8.0**	**8.0**	
SPACE-15-TEC-2018: **Satellite communication technologies**	**RIA**	**9.0**		
SPACE-16-TEC-2018: **Access to space**	**RIA**	**10.0**		
SPACE-17-TEC-2019: **Access to space**	**RIA**		**9.0**	

SPACE TECHNOLOGIES, SCIENCE AND EXPLORATION

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
SPACE-27-TEC-2020: **SRC – Space Robotics Technologies**	**RIA**			9.0
SPACE-28-TEC-2020: **SRC – In-Space electrical propulsion and station keeping**	**RIA**			24.0
SPACE-29-TEC-2020: **Satellite communication technologies**	**RIA**			9.0
SPACE-20-SCI-2018: **Scientific instrumentation and technologies for exploration**	**RIA**	**10.0**		
SPACE-30-SCI-2020: **Scientific data exploitation**	**RIA**			9.0

H2020 work programme 2020 update

Space technologies, science and exploration (DRAFT)

- **SPACE-30-SCI-2020: Scientific data exploitation**
  - Support the data exploitation of European missions and instruments, in conjunction, when relevant, with international missions.
  - All acquired and available data provided by space missions in their operative, post-operative or data exploitation phase and by space-related ground based investigations.
  - International cooperation is encouraged

- **Indicative budget: 9M€**

SAFE AND SECURE ENVIRONMENT

Space call 2020: 1.50 M€;
2018-2020: 94.6 M€

Probable next deadline: 5 March 2020

Publication of 2020 calls: end-June 2019

European Commission

SECURE AND SAFE SPACE ENVIRONMENT

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
SU-SPACE-21-SEC-2020: **Exploring concepts for space traffic management**	**CSA**			**2.0**
SU-SPACE-22-SEC-2019: **Space Weather**	**RIA**		**9.0**	
SU-SPACE-23-SEC-2019: **NEO**	**RIA**		**6.0**	
SU-SPACE-31-SEC Network of governmental users for secure satellite communications	**CSA**		**3**	

OTHER ACTIONS FOR 2018-2020 (SUB-SET)

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
Activity 5 – **Improving the Performance of SST at European Level**	**SGA - RIA**		**4.9**	**65.7**

SPACE BUSINESS AND ENTREPRENEURSHIP

Publication of 2020 calls: end-June 2019

Indicative budget 2018-2020: 136 M€;
Space call: 2 M€

Next deadline: 5 March 2020

European Commission

Space research and guidance documents
http://ec.europa.eu/growth/sectors/space/research/horizon-2020/

Published work programme 2018-2020
http://ec.europa.eu/info/funding-tenders/opportunities/portal/

European Commission

Space R&I Funding beyond 2020: Horizon Europe

ESSC Plenary meeting
9 May 2019
Amsterdam

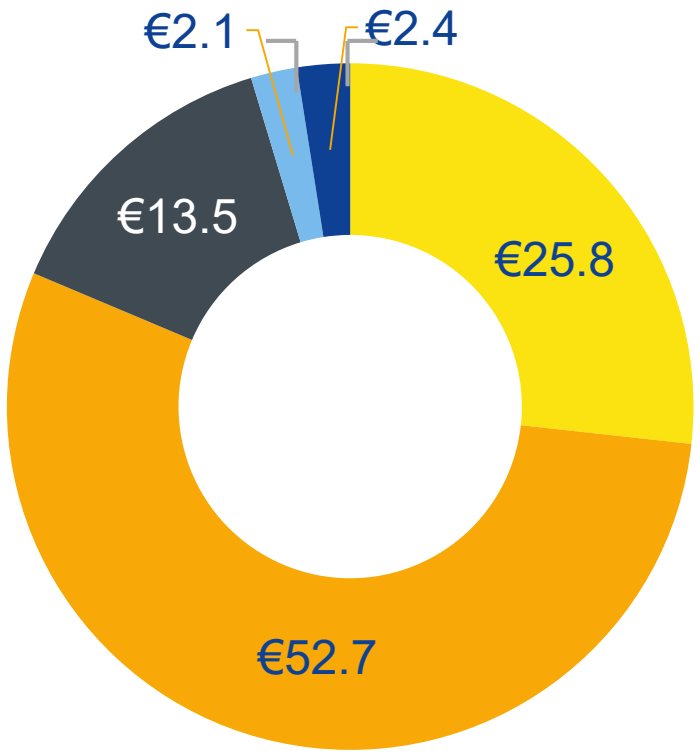
Mats Ljungqvist

Unit I1 Space policy and research

DG GROW

Horizon Europe

Budget: €100 billion*



€ billion
In current prices

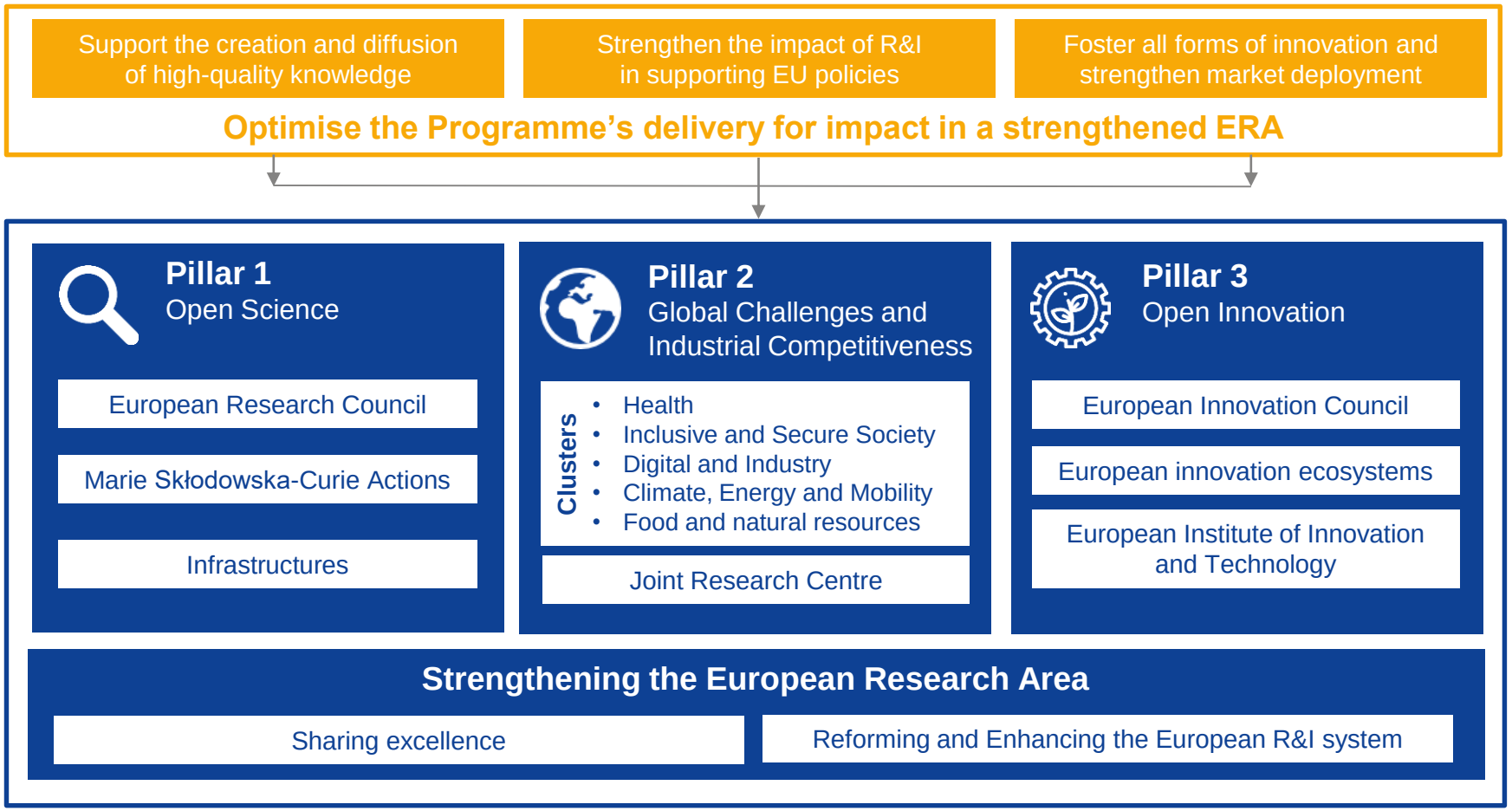
- Open Science
- Global Challenges & Ind. Competitiveness
- Open Innovation
- Strengthening ERA
- Euratom

* This envelope includes EUR 3.5 billion allocated under the InvestEU Fund.

European Commission

Structure

Specific objectives of the Programme



European Commission

Pillar 2
Global Challenges & Industrial Competitiveness:

Boosting key technologies and solutions underpinning EU policies & Sustainable Development Goals

Clusters implemented through usual calls, missions & partnerships	Budget (€ billion)
Health	*€ 7.7*
Inclusive and Secure Societies	***€ 2.8***
Digital and Industry	***€ 15***
Climate, Energy and Mobility	***€ 15***
Food and Natural Resources	***€ 10***
Joint Research Centre supports European policies with independent scientific evidence & technical support throughout the policy cycle	€ 2.2

Digital and Industry (and Space)

Clusters	Areas of intervention	
Health	* Health throughout the life course * Non-communicable and rare diseases * Tools, technologies and digital solutions for health and care	* Environmental and social health determinants * Infectious diseases * Health care systems
Inclusive and Secure Societies	* Democracy * Social and economic transformations * Protection and Security	* Cultural heritage * Disaster-resilient societies * Cybersecurity
Digital and Industry	* Manufacturing technologies * Advanced materials * Next generation internet * Circular industries * Space	* Key digital technologies * Artificial intelligence and robotics * Advanced computing and Big Data * Low carbon and clean industry
Climate, Energy and Mobility	* Climate science and solutions * Energy systems and grids * Communities and cities * Industrial competitiveness in transport * Smart mobility	* Energy supply * Buildings and industrial facilities in energy transition * Clean transport and mobility * Energy storage
Food and Natural Resources	* Environmental observation * Agriculture, forestry and rural areas * Food systems * Circular systems	* Biodiversity and natural capital * Sea and oceans * Bio-based innovation systems

Intervention Area Space

- **Broad lines**
  - Galileo and EGNOS: innovative applications, global uptake including international partners. Next generation systems
  - Copernicus: innovative applications, global uptake and international partners. Earth observation data techniques. Next generation systems.
  - Space Situational Awareness: robust EU capacity to monitor and forecast state of the space environment e.g. space weather, space debris and near Earth objects
  - Secure Satellite Communications for EU governmental actors: solutions for the widest possible range of governmental users
  - End-to-end Satellite Communications for citizens and businesses: cost-effective, advanced satellite communications to connect assets and people in underserved areas

Intervention Area Space

- **Broad lines (continued)**
  - Non-dependence and sustainability of the supply chain: increased technology readiness levels in satellites and launchers;
  - Space ecosystem:
    - in-orbit validation and demonstration services;
    - space demonstrators e.g., hybrid, smart or reconfigurable satellites, in-orbit manufacturing and assembly, launcher reusability, in-orbit servicing and micro-launchers;
    - breakthrough innovations, and technology transfer, in areas such as recycling, green space, artificial intelligence, robotics, digitisation, cost-efficiency, miniaturisation
  - Space science: exploitation of scientific data delivered by scientific and exploration missions, combined with the development of innovative instruments in an international environment

Timeline

Ongoing — Parliament and Council negotiations on Union budget 2021-2027, including budget for Horizon Europe

From 7 June — Parliament and Council negotiations on the basis of the Commission proposal for Horizon Europe

2nd half 2018/2019 — Strategic planning to prepare first work programmes under Horizon Europe, including co-design of missions and setting up of partnerships

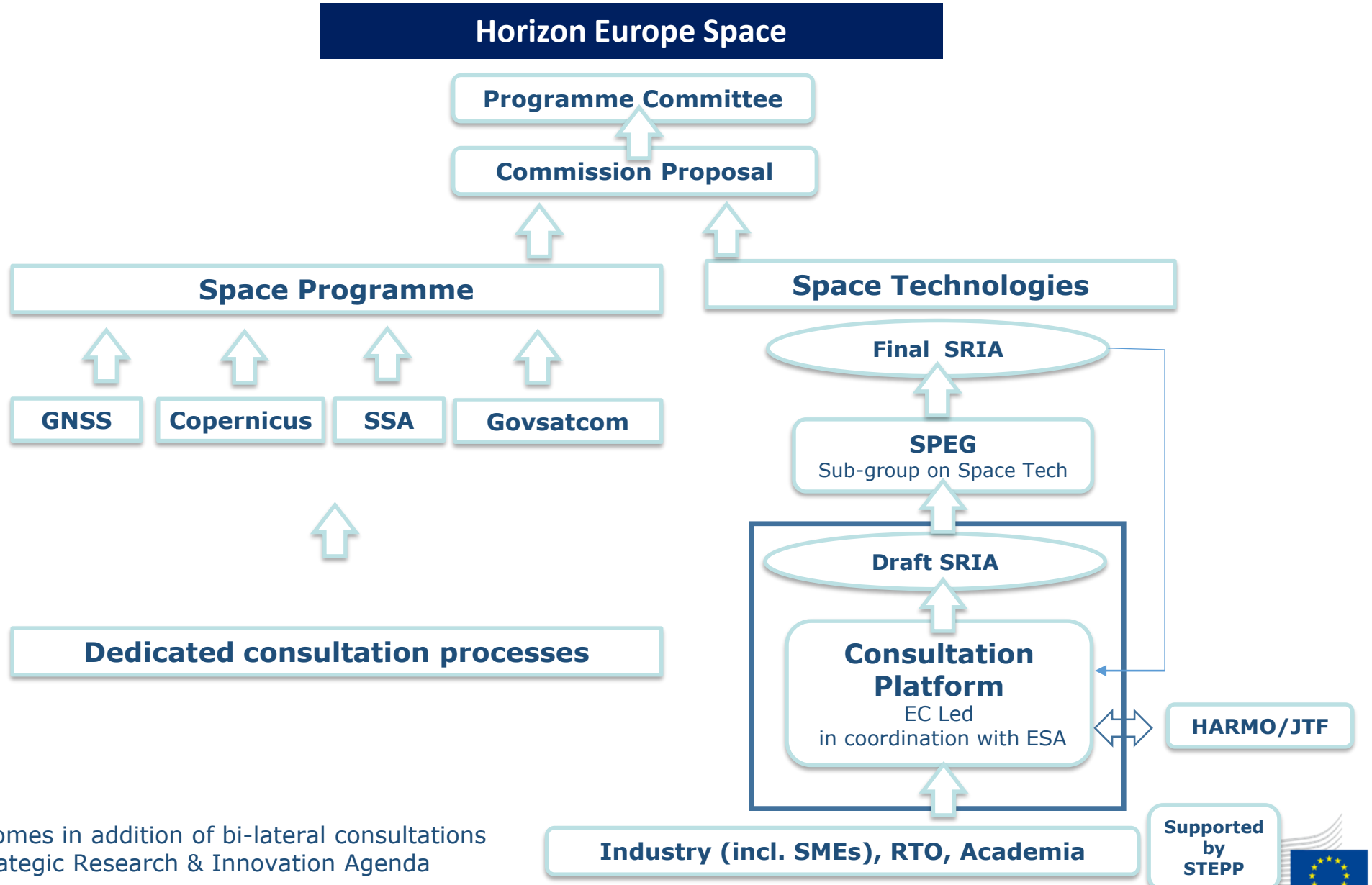
1 January 2021 — Envisaged start of Horizon Europe

Strategic Research and Innovation Agenda Outline

DG GROW

Unit I1 Space policy and research

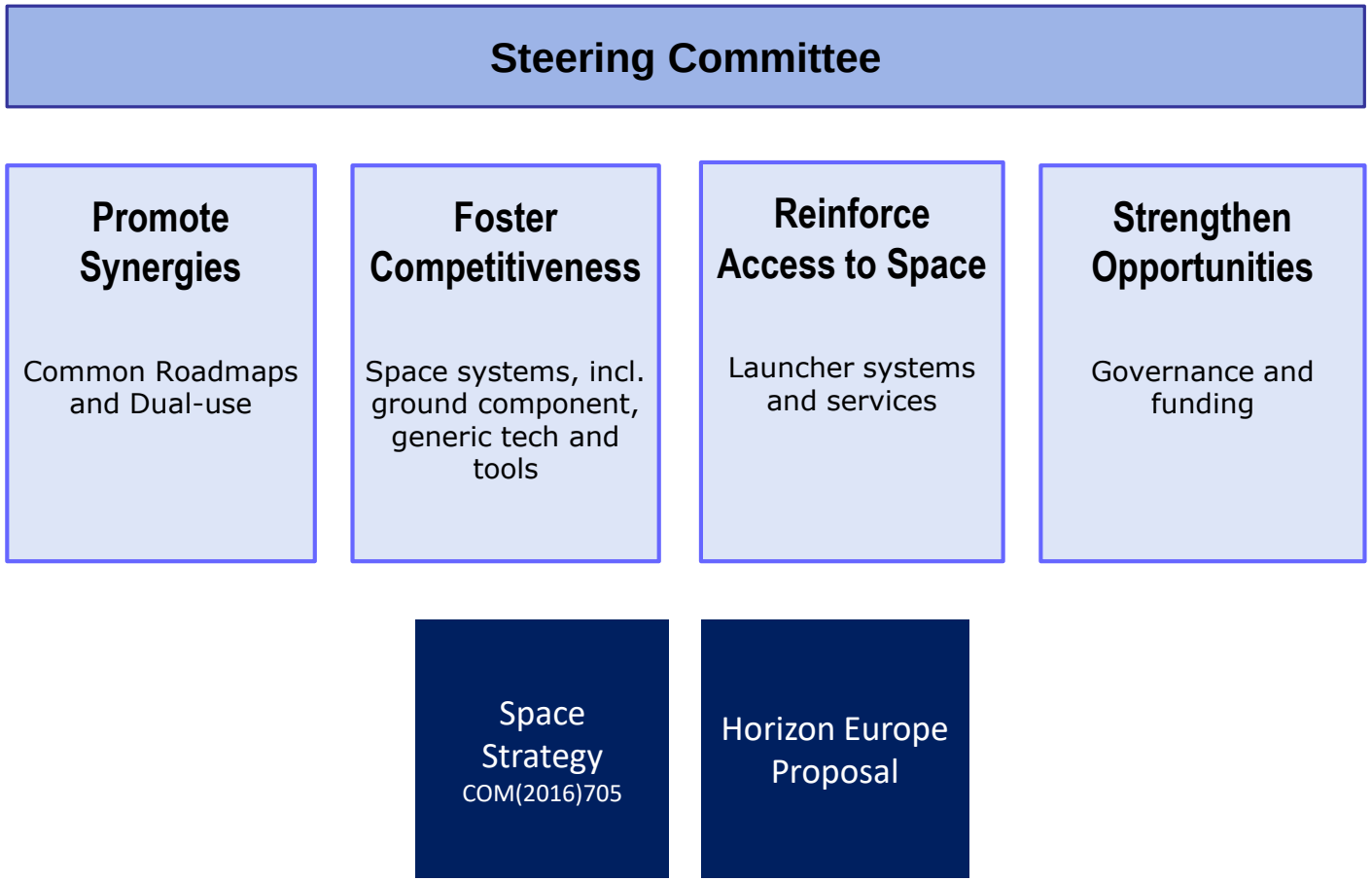
The consultation process



This process comes in addition of bi-lateral consultations
SRIA: Strategic Research & Innovation Agenda

European Commission

Space TEC Consultation Platform



Stakeholders in the platform:

Manufacturing industry and SMEs - Innovation Actors - Research and Technology Organisations – Academia - Space agencies

Introduction

Space Strategy

Contribution of Space to the EU policy and the EU citizens

- Maximize benefits for EU society and economy
- Global competitive and innovative sector
- Reinforce autonomy in accessing and using space
- Strengthen Europe as a global actor

- GNSS for transport
- Earth monitoring for land, marine, atmosphere and climate

Importance of the sector

- Launch and satellite manufacturing: 43 000 jobs
- Estimated total EU space economy: 230 000 professionals

- In 2017: 1/3 of the mass was launched for private customers ww
- Over the last 7 years: 43% of spacecraft launched are below 10kg

Strategic Research and Innovation Agenda

- Guidance and recommendations for Horizon Europe
- Consultation of a broad base of stakeholders

Vision

- Foster competitiveness of space systems
- Reinforce access to space

- Recommendations for synergies, instruments for implementation and funding opportunities

Foster Competitiveness

Foster Competitiveness of end to end systems and new services

Top-Down, application driven, 3 to 5 years to market

- Telecommunication Systems
- Earth Observation
- Ground Segment
- Data Chain

Future space ecosystems: on-orbit operations, new system concepts

Preparing the future, 3 to 15 years to market

- New services incl. de-orbiting, active debris removal
- On-orbit servicing, assembly, manufacturing
- New systems concepts incl. modularity

New industrial processes and production tools

- Digitalisation and automation
- MAIT at larger scale
- Lean qualification processes

(MAIT: Manufacturing, Assembly, Integration and Testting)

Enabling technologies

Cross mission, space and ground, bottom-up

- Disruptive technologies and concepts
- Technology Maturation in the view of qualification
- In-orbit demonstration and validation

Contribution to space science

- Exploitation of mission and science data
- Cutting-edge scientific instrumentation in support of missions
- Early development work for potential scientific missions

Reinforce Access to Space

Innovation for competitiveness, targeting initial operational capability by 2030

- Reusability concepts including required technologies
- New or optimized low cost, high performance and green propulsion concepts, technologies and propellants
- Smart technologies

Disruptive concepts for access to space

From low TRL to TRL5/6
Bottom up

Fostering and enabling new commercial space transportation solutions

- New space transportation services and concepts
- New technologies for improved versatility cost reduction and flexibility
- Standardisation
- Promoting the use of Commercial Off-The-Shelf (COTS) components

Modern, flexible and efficient European test, production and launch facilities, means and tools

- Digitalisation and advanced data management
- Innovations in existing Europe's spaceport
- Flexibility and configurability of launch systems
- Promote the use of existing facilities for new actors and concepts.

Promote synergies

Technology non-dependence

- Coordinated long-term road mapping and end-to-end development plans
- Market and needs observatories
- Supply chain sustainability

Dual use and synergies with defence

Standardisation and certification approaches

- Support uptake and enhancement of space standards
- Qualification and certification mechanisms

Technology transfer

- Spin-in
- Spin-off
- Synergies
- Proof of concept project based on demonstrators and from labs to industry approach

Building on common technology roadmaps

- SRIA-driven high-level roadmaps
- Harmonisation roadmaps at technology level

Strengthen Opportunities

Governance schemes to increase cooperation within the space sector

- Collaborative research and innovation
- Roadmap-based research and innovation
- European Partnership Initiatives
  - Co-funded Partnerships
  - Co-Programmed Partnerships
  - Institutionalised Partnerships
    - Joint Undertaking
    - Knowledge and Innovation Community (KIC)

Exploiting different sources of funding at EU and national levels and leveraging on private investments

Forms of funding

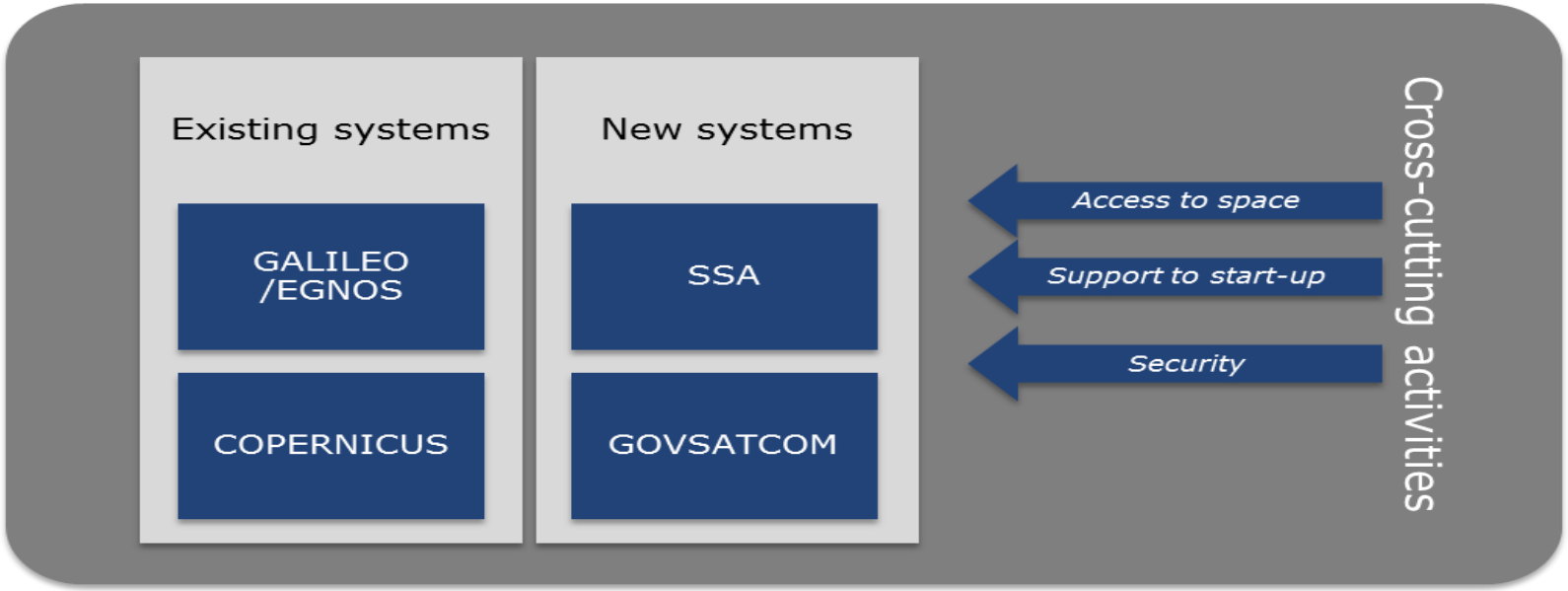
- Grants, Prize, Financial instruments and Procurement with respect to policy objectives (e;g. to stimulate space start-ups from early stage up to scale up; to leverage private investment for space infrastructure; to promote excellence and build capacity across the EU)

Programmes

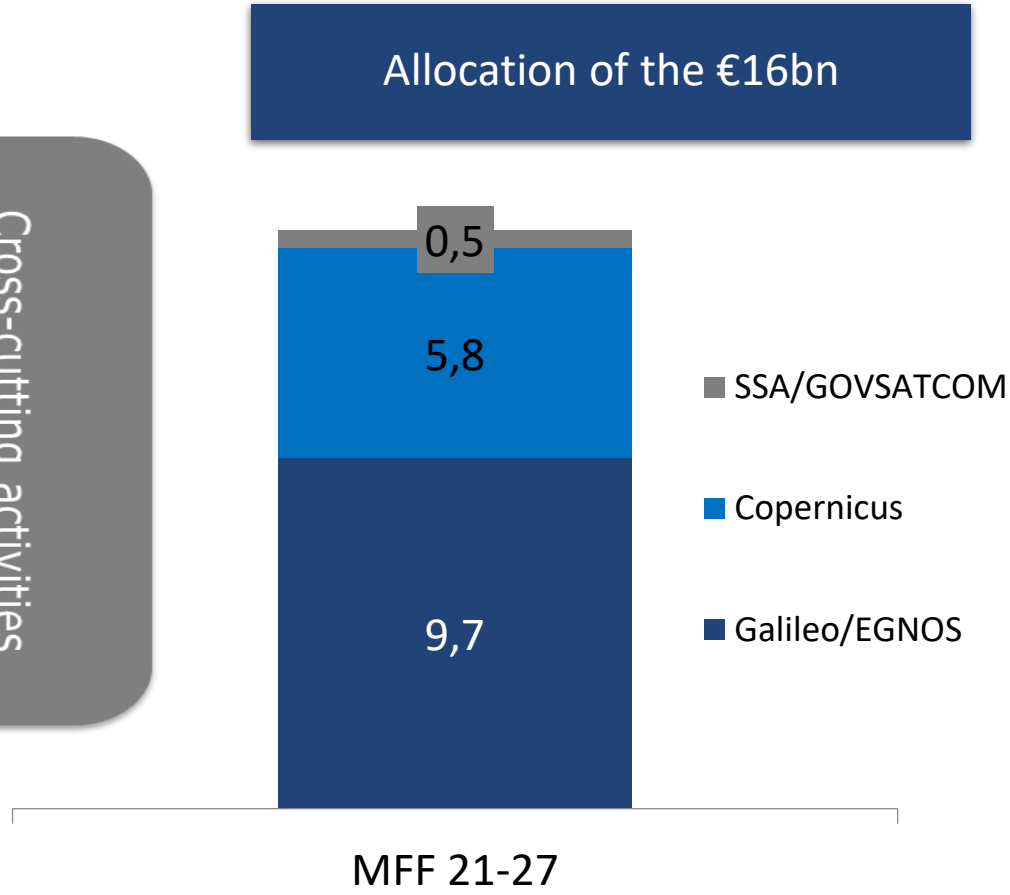
- Synergies between Horizon Europe and ESIF, InvestEU, Space Programme
- Blending opportunities between the InvestEU and the Horizon Europe and Space programmes to de-risk promising technologies and services and with a view to maintaining an autonomous European capacity across the EU

Space Programme 2021-2027

Proposal for a EU Space Programme



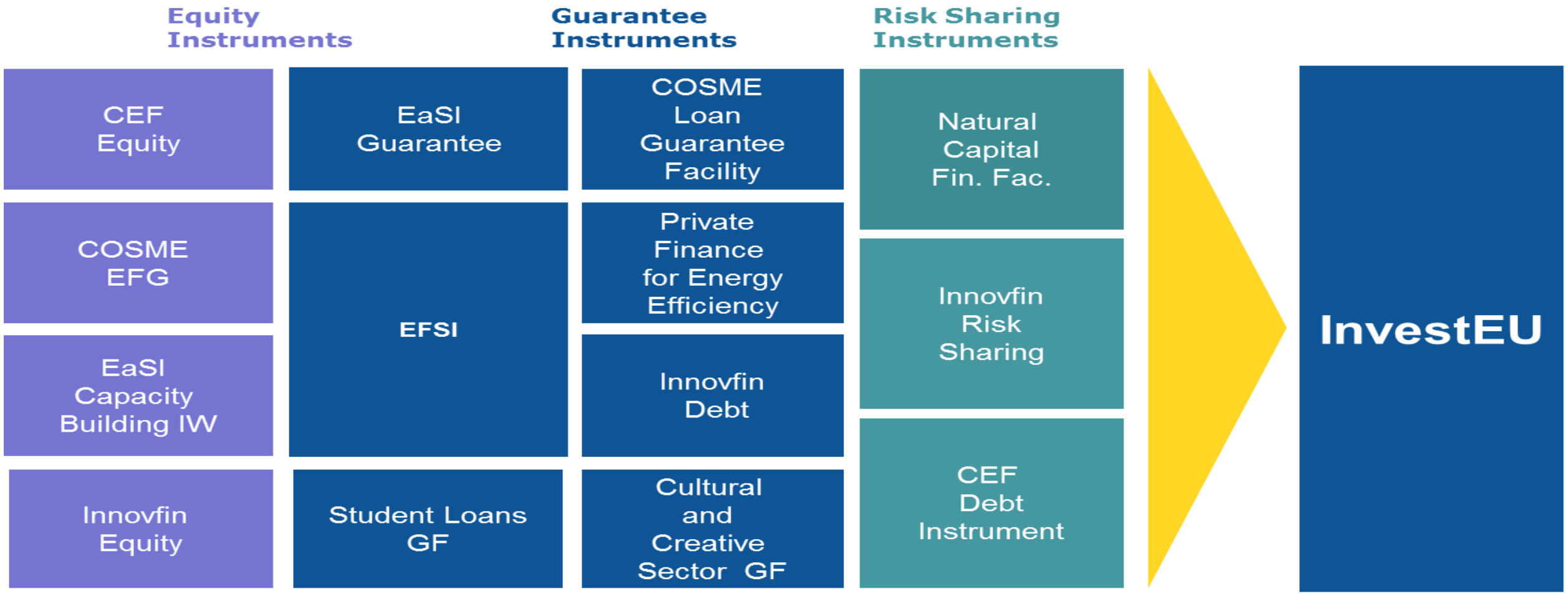
4 components – 3 horizontal activities



European Commission

InvestEU 2021-2027

The programmes replaced



InvestEU indicative proposed budget allocation

Window	Budgetary guarantee	Mobilised investment (estimate)
Sustainable infrastructure	11 500	185 000
Research, Innovation and Digitisation	11 250	200 000
SMEs	11 250	215 000
Social investment and skills	4 000	50 000
TOTAL *(EUR Million, in current prices)*	**38 000**	**650 000**

- **The size of the EU guarantee proposed is EUR 38bn. and the provisioning rate 40 %, i.e. EUR 15.2 bn needed for the provisioning** (EUR 14.2 bn. budg. Allocation + EUR 1bn. from reflows)
- **Budget for InvestEU Advisory Hub, InvestEU Portal and accompanying measures is proposed to be EUR 525m.**
- **InvestEU is expected to mobilise more than EUR 650 billion of additional investment across Europe**