



**Space in**  
**Horizon 2020 (2014-2020)**  
**Horizon Europe (2021-2027)**

**ESSC Plenary meeting**  
**"On-Line" 15 May 2020**

**Space Research, Innovation and Start-ups, DG DEFIS/B2**

# HORIZON 2020

*European Union programme  
for research and innovation  
for 2014-2020*

## LINKS TO OTHER H2020 PARTS

### Priority 1

#### Excellent science

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

### 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

### 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

# H2020 PRIORITY 2: INDUSTRIAL LEADERSHIP

## SPACE RESEARCH

### 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-dependence and competitiveness
- Space robotics
- Electric propulsion
- Generic space technologies
- EO and SatCom technologies

#### SPACE-SCI

- Scientific instrumentation and technologies for exploration
- Scientific data exploitation

### Access to space & Secure and safe space environment

#### SPACE-TEC

- Access to space
- In-Orbit-Demonstration/Validation (IOD/IOV)

#### SPACE-SEC

- Space weather (SWE)
- Space traffic management (STM)
- Space Surveillance and Tracking (SST)
- Near Earth Objects (NEOs)

# H2020 PRIORITY 2: INDUSTRIAL LEADERSHIP

## SPACE RESEARCH BUDGET IN HORIZON 2020

2014-2020

Science & Exploration other

Copernicus

Enabling Space Tech

1.479bn€

Access-to-space & IOD/IOV

SWE & NEO

SST

Space entrepreneurship

Galileo/EGNOS

Galileo/EGNOS	29%
Enabling Space Tech	20%
Copernicus	16%
Space entrepreneurship	11%
Access-to-space & IOD/IOV	9%
SST	8%
Science & Exploration	4%
SWE & NEO	2%
other	1%

# HORIZON 2020

*Opportunities in Priority 1*  
*Excellent Science*



European Research Council

Established by the European Commission

# The ERC offers...



European Research Council

Established by the European Commission

INDIVIDUAL RESEARCHERS  
FROM ALL OVER THE WORLD

# LONG TERM GRANTS

TO HIGH-RISK/HIGH-GAIN PIONEERING PROJECTS  
IN ANY FIELD OF FRONTIER RESEARCH



Life Sciences



Physical Sciences and Engineering



Social Sciences and Humanities



European  
Commission

Horizon 2020  
European Union funding  
for Research & Innovation

# Who can apply?

## Researchers (PIs)

- of any nationality
- of any age (>2 yrs. from Ph.D.)
- from any current working place in the world
- on any topic (bottom-up)
- requirement - letter of support from a Host Institution (HI) based in EU or associated countries (exc. 1 PI in SyG)

### Only selection criterion: Excellence

→ research project and principal investigator

**Highly competitive:** overall success rate tending to 12%

→ “flat” across degree of professional seniority and topics





# Evaluation Panel Structure

Panel structure (and panel descriptors) do not represent ERC scientific priorities

Each panel: Panel Chair  
and 10-16 Panel Members

## Life Sciences

- LS1 Molecular Biology, Biochemistry, Structural Biology and Molecular Biophysics
- LS2 Genetics, 'Omics', Bioinformatics and Systems Biology
- LS3 Cellular and Developmental Biology
- LS4 Physiology, Pathophysiology and Endocrinology
- LS5 Neuroscience and Neural Disorders
- LS6 Immunity and Infection
- LS7 Applied Medical Technologies, Diagnostics, Therapies and Public Health
- LS8 Ecology, Evolution and Environmental Biology
- LS9 Applied Life Sciences, Biotechnology and Molecular and Biosystems Engineering

## Physical Sciences & Engineering

- PE1 Mathematics
- PE2 Fundamental Constituents of Matter
- PE3 Condensed Matter Physics
- PE4 Physical and Analytical Chemical Sciences
- PE5 Synthetic Chemistry and Materials
- PE6 Computer Science and Informatics
- PE7 Systems and Communication Engineering
- PE8 Products and Processes Engineering
- PE9 Universe Sciences
- PE10 Earth System Science

## Social Sciences and Humanities

- SH1 Individuals, Markets and Organisations
- SH2 Institutions, Values, Environment and Space
- SH3 The Social World, Diversity, Population
- SH4 The Human Mind and Its Complexity
- SH5 Cultures and Cultural Production
- SH6 The Study of the Human Past



European  
Commission

# Marie Skłodowska- Curie Actions



# MSCA: the different actions

**ITN:** *host-driven, early-stage researchers*

*network recruiting ~PhD candidates*

**IF:** *individual, experienced researchers*

*incoming & outgoing ~post-docs*

**RISE:** *exchange of all types of research staff*

*with non-European entities and/or private sector*

**COFUND:** *co-funding e.g. national schemes*

*for doctoral or post-doctoral training*

**European Researchers' Night**

*science festival, outreach*

**€6.2 billion  
2014-2020**

**65000+  
researchers**

# Space research in MSCA

Keywords	MSCA-IF	MSCA-ITN	MSCA-RISE	Sum:
Aerospace engineering	46	30	4	80
Astronomy (including astrophysics, space science)	55	3	3	61
Earth observations from space/remote sensing	81	4	11	96
Space Sciences	3			3
Space weather	4			4
Unique projects (not sum!)	184	37	18	239
Budget (EUR million)	34.7	118.2	18.9	171.8

*You can do your own project search (keywords, filters) in Cordis:*

<https://cordis.europa.eu/projects/en>



# **EU Space Programme & Horizon Europe**

**2021-2027**

# Commission Space related proposals for next MFF (2021-2027)

- **EU Space Programme 2021-2027: 16 B€**
- **Horizon Europe: 100 B€.**
- **InvestEU: 38 B€**

**Proposals of the Commission**

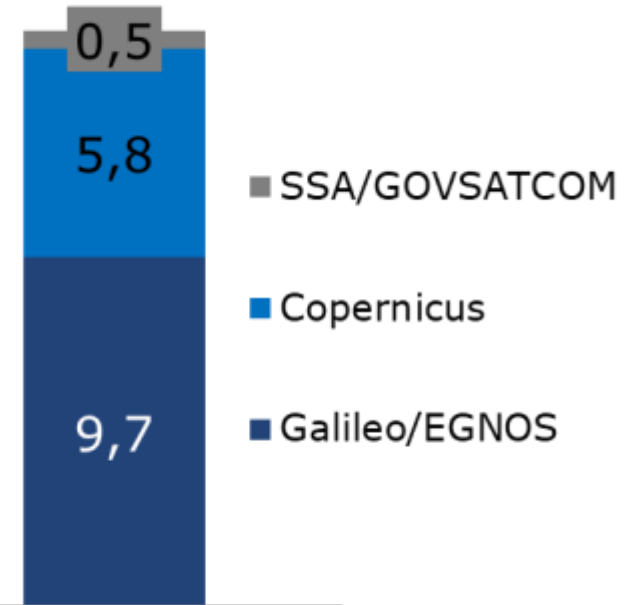
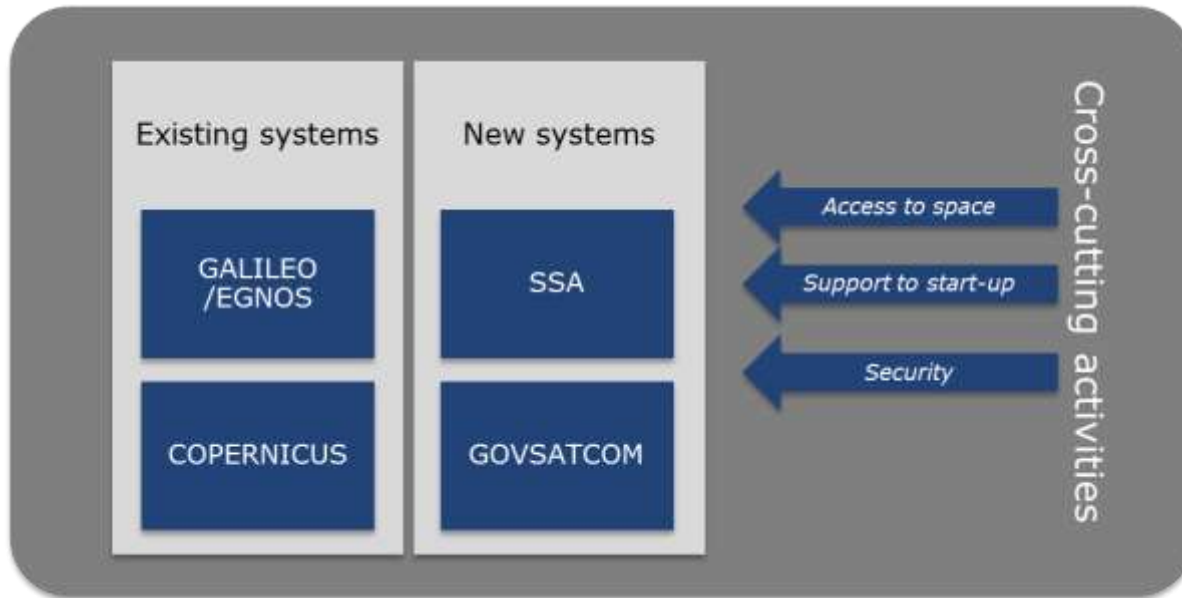


# EU Space Programme

[https://europa.eu/rapid/press-release\\_IP-18-4022\\_en.htm](https://europa.eu/rapid/press-release_IP-18-4022_en.htm)

# EU SPACE PROGRAMME

Allocation of the  
€16 billion



4 components – 3 horizontal activities

MFF 21-27





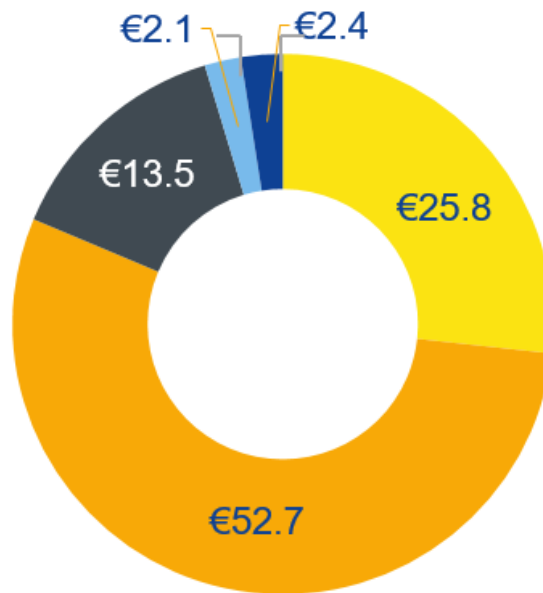
# Horizon Europe

#HorizonEU

[https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme\\_en](https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en)

# HORIZON EUROPE 2021-2027

## Budget: €100 billion\*



€ billion  
In current prices

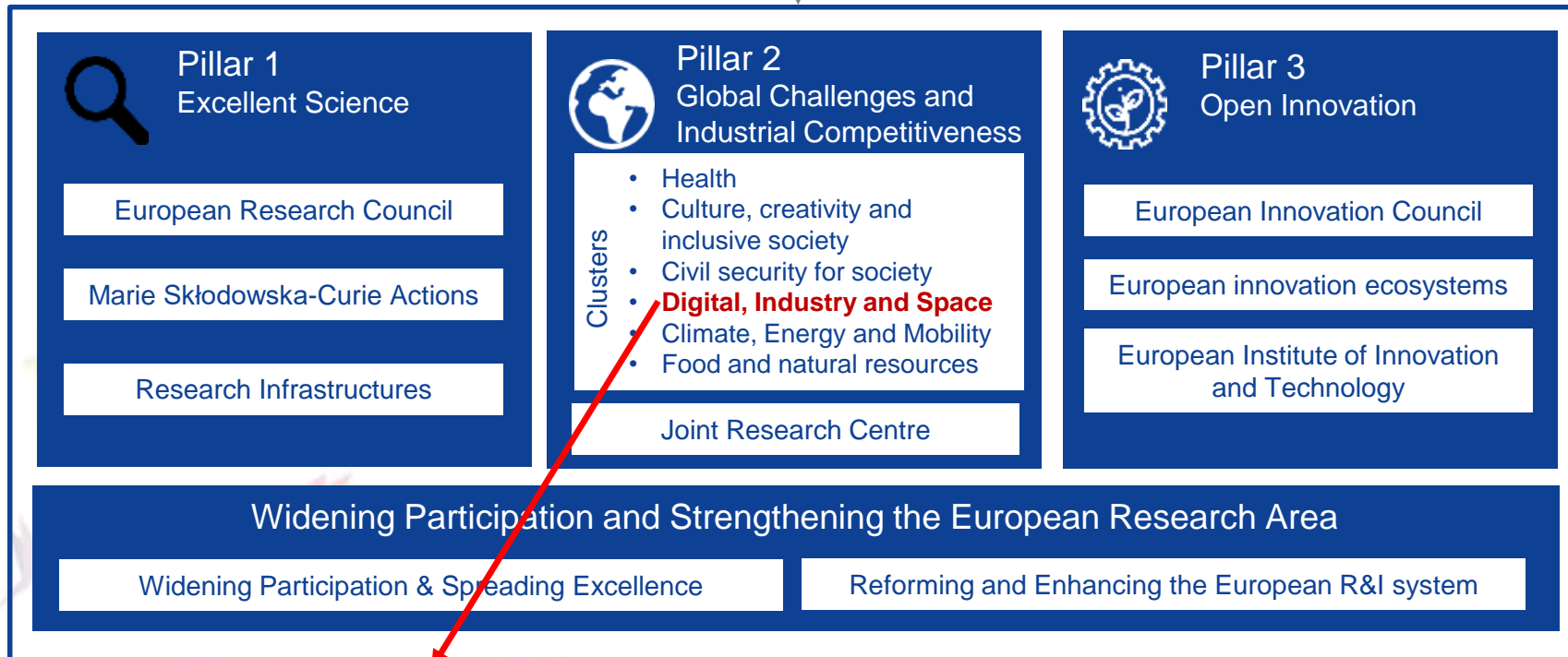
- Open Science
- Global Challenges & Ind. Competitiveness
- Open Innovation
- Strengthening ERA
- Euratom

H2020: 80\* bEur  
Space € 1.5 billion  
\* Current prize

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

# HORIZON EUROPE

## Specific objectives of the Programme



- 1) Manufacturing Technologies
- 2) Key Digital Technologies
- 3) Advanced Materials
- 4) Emerging Enabling Technologies
- 5) Artificial Intelligence and Robotics
- 6) Next Generation Internet
- 7) Advanced Computing and Big Data
- 8) Circular Industries
- 9) Low-carbon and Clean Industries
- 10) Space

## Intervention Area Space

### ■ Broad lines

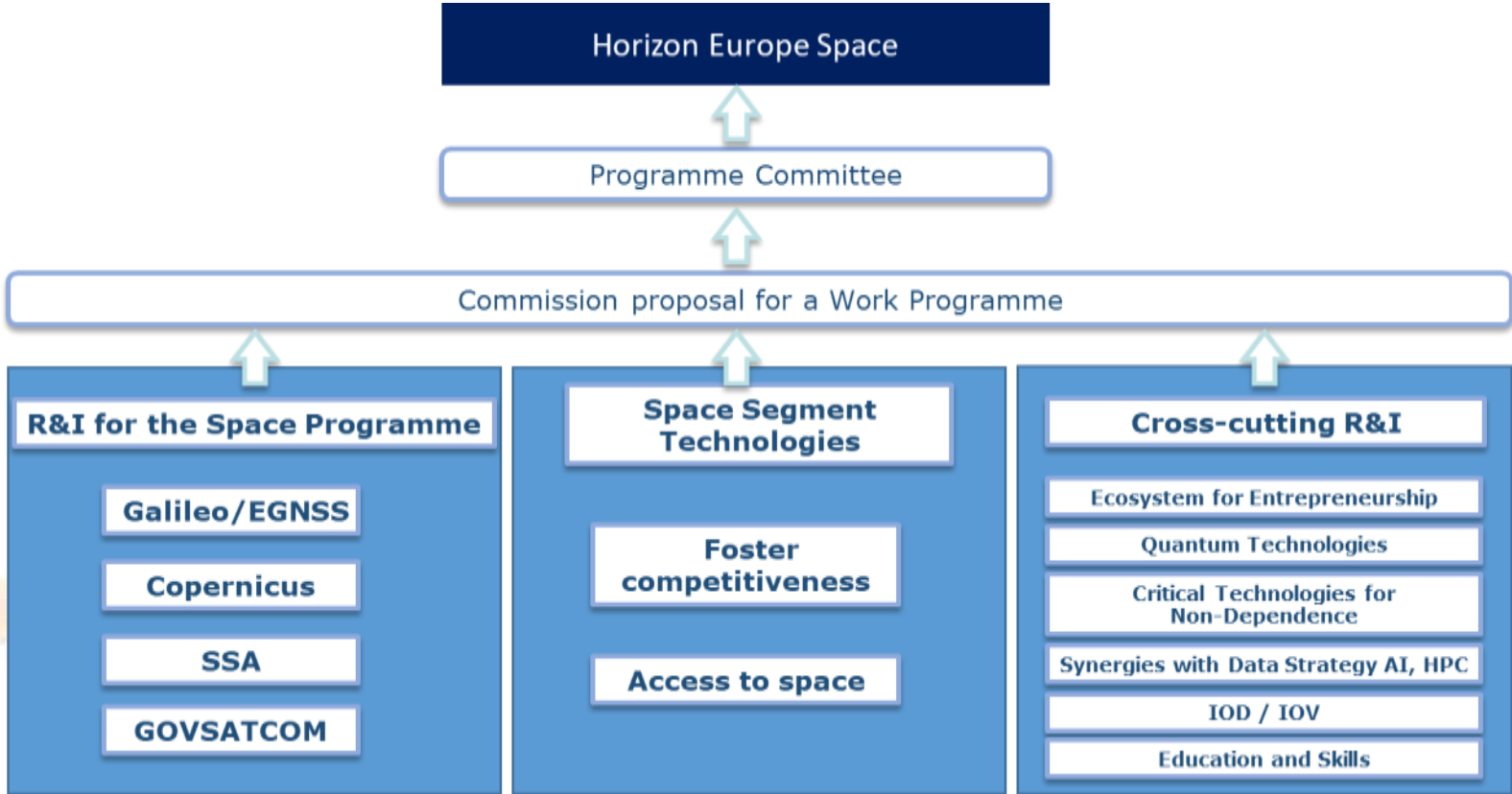
- **Galileo and EGNOS**: innovative applications, global uptake including international partners. Next generation systems
- **Copernicus**: innovative applications, global uptake and international partners. Earth observation data techniques. Next generation systems.
- **Space Situational Awareness**: 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

# HORIZON EUROPE



# Foster Competitiveness

## Foster Competitiveness of end to end systems and associated 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 Testing)

## 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
- Development of advanced planetary robotic exploration techniques
  - Early development work for potential scientific missions

# Indicative timeline

2019 – early 2020

- Development of a Strategic Research and Innovation Agenda, with stakeholders (industry associations, research establishments/associations)
- Orientation towards Horizon Europe strategic plan

Now – July:

- Elaboration of the Horizon Europe Strategic Plan
- Further consultations with stakeholders for WP 2021-2022
- Meetings with Member States

Q3 – Q4: Finalisation of Work Programme 2021-2022 with MS

2021: Publication of Work Programme 2021-2022





**Thank you  
for your attention**

[mats.ljungqvist@ec.europa.eu](mailto:mats.ljungqvist@ec.europa.eu)