



#InvestEUresearch

# Horizon 2020 Work Programme for Research & Innovation 2018-2020

54<sup>th</sup> - ESSC, plenary meeting  
Oberpfaffenhofen  
23 November 2017

DG GROW – Internal Market, Industry  
Entrepreneurship and SMEs  
GROW/I1 - Space Policy and Research Unit  
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Research and  
Innovation



## SUMMARY

1. Horizon 2020
- ~~2. Horizon 2020 focus areas~~
3. Horizon 2020 rules for participation
4. Space research in Horizon 2020
5. Horizon 2020 Space Work Programme 2018-2020
6. Space in European Innovation Council (EIC) pilot
7. Space in Access to Risk Finance (ARF) - ISEP
8. Summary of Guidance Documents
9. Work Programme 2018-2020 Implementation calendar

# 1 HORIZON 2020

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

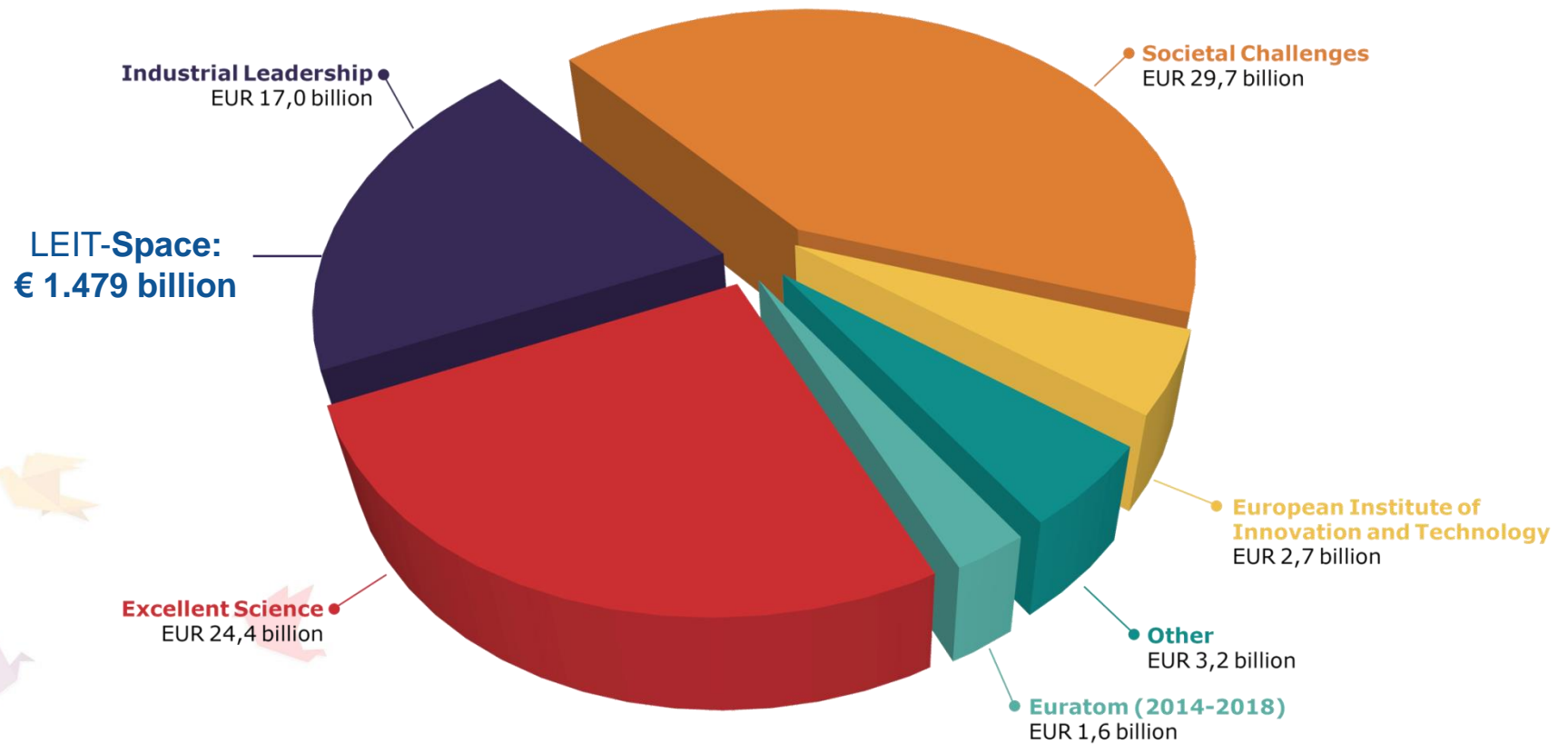
## WHAT IS NEW IN HORIZON 2020?

- **A single programme** bringing together three separate programmes/initiatives\*
- **Coupling research to innovation** – from research to retail, all forms of innovation
- **Focus on societal challenges** facing EU society, e.g. health, lean energy and transport
- **Simplified access**, for all companies, universities, institutes in all EU countries and beyond

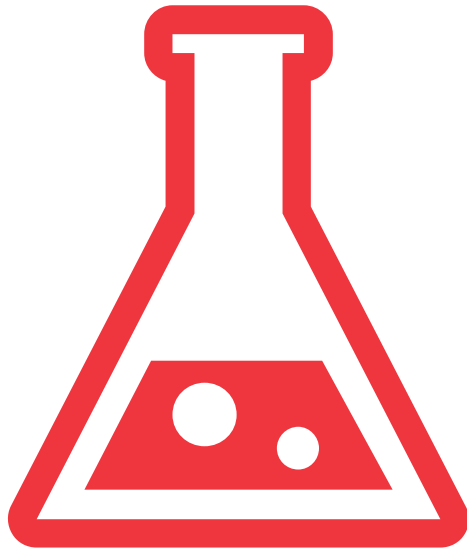
*\* The 7<sup>th</sup> Research Framework Programme (FP7), innovation aspects of Competitiveness and Innovation Framework Programme (CIP), EU contribution to the European Institute of Innovation and Technology (EIT)*

## HORIZON 2020 BUDGET (IN CURRENT PRICES)

€ 79 billion from 2014 to 2020



2013 figures



## *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



## 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 SME's**

### 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

## 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



# 4 EUROPEAN UNION SPACE PROGRAMMES

## MULTIANNUAL FINANCIAL FRAMEWORK

2014-2020



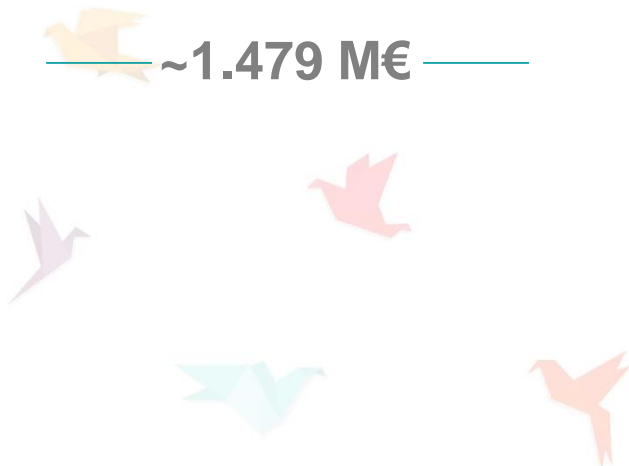
~1.479 M€



~4.291 M€



~7.071 M€



- 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

## EU AGENCIES INVOLVED

- 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...

*Full detailed description can be found in the General Annexes 20 – part D of the Work Programme 2018-2020: <http://xxxx>*

**6 HORIZON 2020  
SPACE WORK PROGRAMME  
2018-2020**

## 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

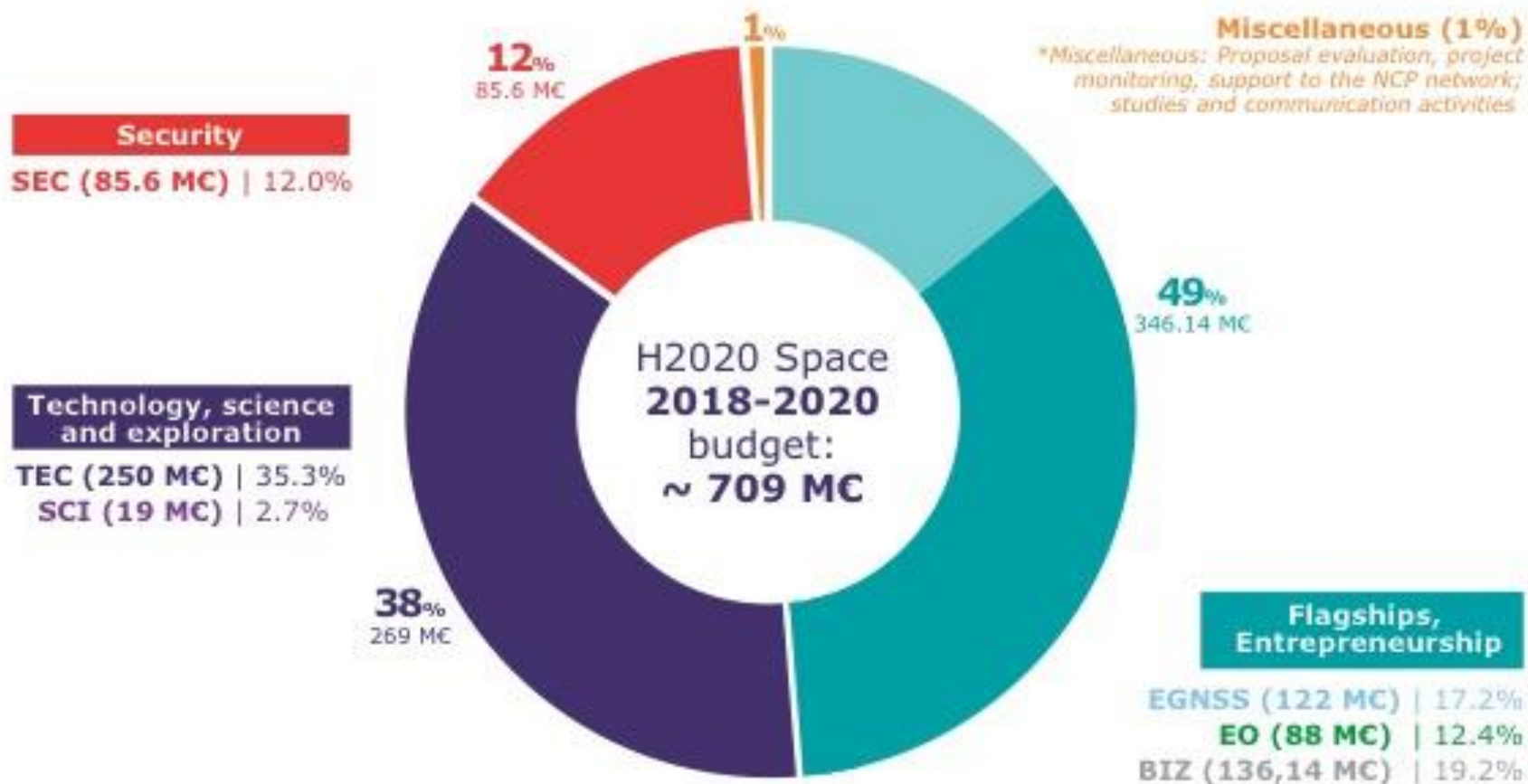
- Access to space

#### 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

## INDICATIVE BUDGET BREAKDOWN (2018-2020)





## EARTH OBSERVATION



**Space call 2018: € 22 million;**  
(2018-2020: € 88 million)

Deadline: 6 march 2018



## EARTH OBSERVATION

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

## EARTH OBSERVATION

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
LC-SPACE-05-EO-2019: <b>Copernicus evolution – Research activities in support to a European operational monitoring system for fossil CO2 emissions</b>	<b>RIA</b>		<b>9.0</b>	
LC-SPACE-06-EO-2019: <b>International Cooperation Copernicus – Designing EO downstream applications with international partners</b>	<b>RIA</b>		<b>5.0</b>	
LC-SPACE-24-EO-2020: <b>Copernicus evolution – Mission exploitation concepts</b>	<b>RIA</b>			<b>8.0</b>
LC-SPACE-25-EO-2020: <b>Copernicus big data algorithm factory</b>	<b>RIA</b>			<b>10.0</b>



## SPACE BUSINESS AND ENTREPRENEURSHIP

Indicative budget: 136 M€;  
Space call: 4 M€

Deadline: 6 march 2018

## SPACE BUSINESS, ENTREPRENEURSHIP, OUTREACH AND EDUCATION

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
SPACE-07-BIZ-2018: <b>Space hubs for Copernicus market uptake</b>	<b>CSA</b>	<b>2.0</b>		
SPACE-08-BIZ-2018: <b>Space outreach and education</b>	<b>CSA</b>	<b>2.0</b>		
SPACE-09-BIZ-2019: <b>Space hubs – support to start-ups</b>	<b>CSA</b>		<b>2.0</b>	
SPACE-26-BIZ-2020: <b>Space hubs – support to start-ups</b>	<b>CSA</b>			<b>2.0</b>



## SPACE BUSINESS, ENTREPRENEURSHIP, THROUGH THE EIC/ARF

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
<b>EIC Horizon prize "Low cost space launch"</b>	<b>Inducement Prize</b>			<b>10.0</b>
<b>InnovFin Space Equity Pilot (ISEP)</b>	<b>Financial Instrument</b>	<b>20.0</b>	<b>15.0</b>	<b>15.0</b>
<b>SME Instrument</b>	<b>Grants</b>	<b>57.93</b>		
<b>Fast-track to innovation</b>	<b>Grants</b>	<b>3.37</b>	<b>3.37</b>	<b>3.37</b>

# 7 SPACE IN THE EUROPEAN INNOVATION COUNCIL (EIC) PILOT

## EIC PREPARATORY PHASE — WP 2018-20

- **Future & Emerging Technologies (FET-Open)**
  - To develop breakthrough technologies from research base
  - No predefined topics, collaboration required (> 3 partners)
  - Grants ~€3 million
- **SME instrument**
  - SMEs with business plans to roll out marketable innovations
  - 13 topics, no required collaboration, must comply with SME definition
  - Phase 1 (€50K lumpsum); Phase 2 (<€2 million grant)
- **Fast Track to Innovation (FTI)**
  - Accelerate market uptake of innovations
  - Small consortia (3-5, majority private)
  - ~ €2 million grant
- **Prizes**
  - Recognition Prizes (iCapital ~ €1.5 million, Women Innovators ~ €0.35 million)
  - EIC Prizes ~ €30 million

## FET-OPEN

- FET-Open supports high-risk/interdisciplinary collaborations to explore radically new technologies that may become future game-changers
- Offers an Innovation Launchpad (CSA) to propel promising results forward and explore their market potential
- Participants will get access to the assistance, networking and financing possibilities offered by EIC
- Corresponding texts in EIC and FET Open WP parts.
- Scope, orientation and governance of FET-Open remain unchanged (interdisciplinary, high-risk, radically new, future technologies, TRL 1-3 for FET-Open)
- Evaluation criteria revised: attention for the future market-creating potential



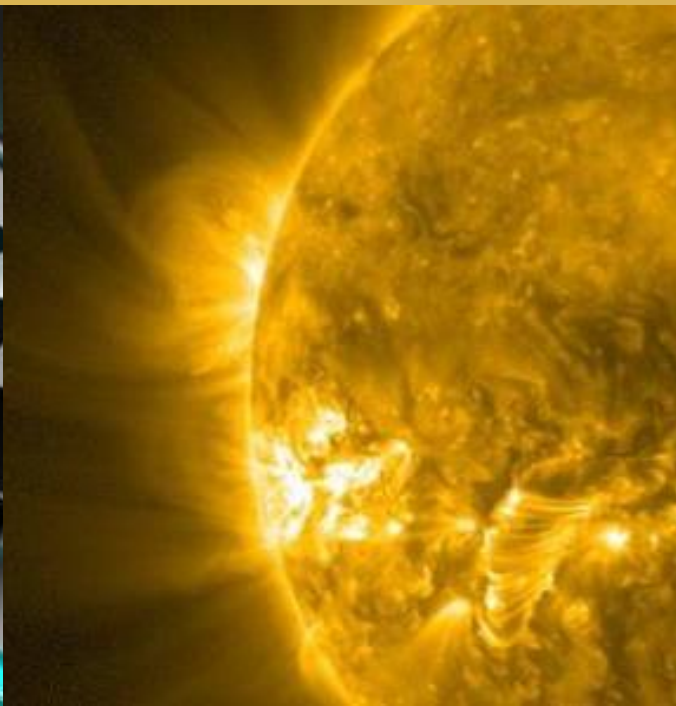
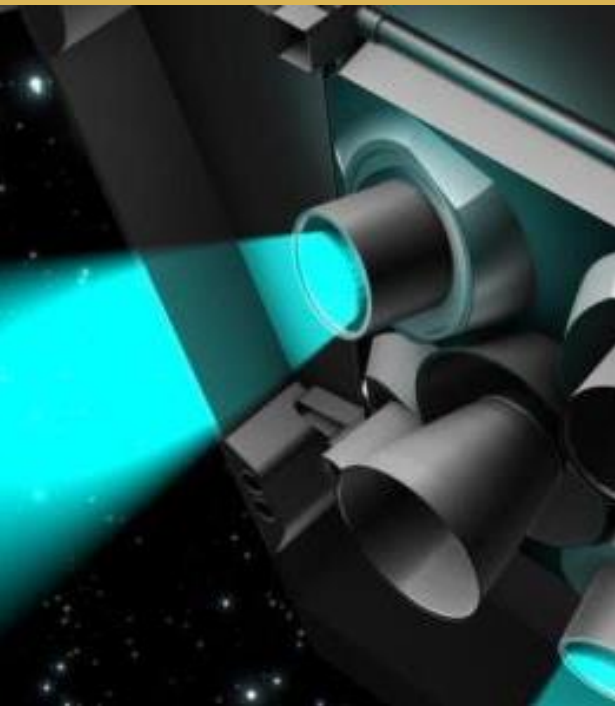


Image Credits: ESA

# COMPETITIVENESS OF THE EUROPEAN SPACE SECTOR TECHNOLOGY AND SCIENCE

Space call 2018: 78 M€;  
2018-2020: 269 M€

Deadline: 6 March 2018



## SPACE TECHNOLOGIES, SCIENCE AND EXPLORATION

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

## SPACE TECHNOLOGIES, SCIENCE AND EXPLORATION

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
SPACE-18-TEC-2019-2020: <b>In-orbit validation/demonstration – Mission integration and implementation</b>	RIA		<b>20.0</b>	<b>18.0</b>
SPACE-27-TEC-2020: <b>SRC – Space Robotics Technologies</b>	RIA			<b>9.0</b>
SPACE-28-TEC-2020: <b>SRC – In-Space electrical propulsion and station keeping</b>	RIA			<b>24.0</b>
SPACE-29-TEC-2020: <b>Satellite communication technologies</b>	RIA			<b>9.0</b>
SPACE-20-SCI-2018: <b>Scientific instrumentation and technologies for exploration</b>	RIA	<b>10.0</b>		
SPACE-30-SCI-2020: <b>Scientific data exploitation</b>	RIA			<b>9.0</b>

## SPACE TECHNOLOGIES

- **Roadmap-based approach** to support the identification of technology actions: COM-ESA-EDA JTF for critical space technologies; SRCs; other European roadmapping processes, as for instance the ESA Space Technology Harmonization
- Planning and sequencing of the calls for proposals mainstreaming **appropriate TRL levels**
- **Synergies** with other parts of the WP: Key Enabling Technologies; Future Emerging Technologies, especially at low TRLs



## SPACE-12-TEC-2018

SRC Space robotics technologies

Orbital Robotics Track

### a) Orbital Support Services

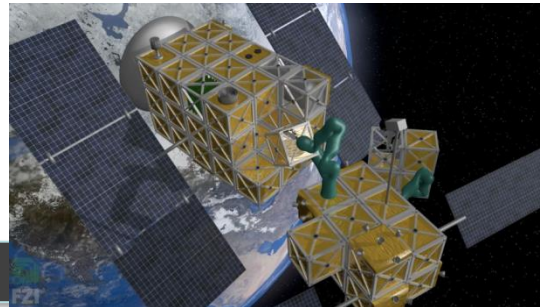
- Techniques of satellite servicing
- Release, grasping, berthing and manipulation
- Refueling in Orbit

### b) Modular Robotized Assembly

- Assemble large structure
- Full integration modular Robotic System
- Set of functional modules
- Standard Interfaces

### c) Satellite Re-configuration

- Active modules able to modify the functionality
- adding/replacing modules
- reconfiguration of functionalities
- Standard Interfaces



- Modular Robotic systems
- Standard interfaces
- Active modules
- Re-configuration
- Robotic Assemble
- Inspection
- Refueling

*Recommened project size*  
**Indicative budget**  
*Type of action*

**3 to 4 M€ for sub topics a) to c)**  
**2 to 3 M€ for sub topics d) to e)**

**18 M€**

*Research and Innovation Actions*

Participation of industry, including SMEs, is encouraged

## SPACE-12-TEC-2018

SRC Space robotics technologies

Planetary Robotics Track

### d) Advanced Autonomy

- Long traverse totally autonomous
- Capacity to handle unexpected situations
- Autonomous Decision Making
- reduce risks and seize opportunities autonomously

### e) Advanced Mobility / Robotized Construction

- Extreme terrain mobility
- Multiple topology adaptation
- Coordination of multiple platforms
- Building & manipulating
- team of specialised robots
- robotic arms & end-effectors
- Cooperation



- Autonomous decision making
- Advanced Autonomy
- Rough & harsh terrain
- Coordination & cooperation
- Team of specialized robots
- Manipulation & grasping
- Intelligent decision making

*Reccomended project size*  
**Indicative budget**  
*Type of action*

**3 to 4 M€ for sub  
topics a) to c)**

**2 to 3 M€ for sub  
topics d) to e)**

**18 M€**

*Research and  
Innovation Actions*

Participation of  
industry, including  
SMEs, is encouraged



European  
Commission

## **SPACE-20-SCI-2018**

Scientific instrumentation and technologies  
enabling space science and exploration

Continued collaborative efforts are needed to prepare scientific instruments and technologies that will enable future space science and exploration missions

### *Scope:*

To address early scientific instrumentation and technology development associated to future space science and exploration, including planetary exploration missions

Advances are expected in support to on-site activities such as landing, planetary navigation, sample collection and processing or in-situ analysis

***Recommended  
project size***

**Indicative budget**

*Type of action*

**2 to 3 M€**

**10 M€**

*Research and  
Innovation Actions*

*Participation of industry,  
including SMEs, is encouraged*

## **SPACE-20-SCI-2018**

Scientific instrumentation and technologies  
enabling space science and exploration

*To be kept in mind:*

- Development of new and innovative approaches is encouraged
- Activities should target primarily European and European-led space science and exploration missions or internationally-led missions where the participation of European partners provides demonstrated added value



## **SPACE-30-SCI-2020**

Scientific data exploitation

**[work programme text TBD likely to be similar to 2017 call.]**

***Recommended***

***project size***

**Indicative budget**

*Type of action*

***TBD***

**9 M€**

*Research and  
Innovation Actions*

*Participation of industry,  
including SMEs, is encouraged*

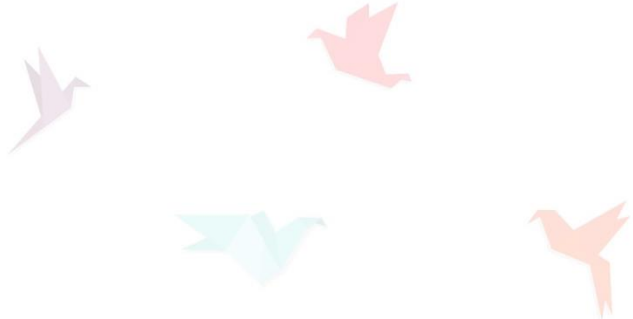






## SAFE AND SECURE ENVIRONMENT

No call in 2018;  
Budget 2018-2020: 85.6 M€



## SECURE AND SAFE SPACE ENVIRONMENT

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
SU-SPACE-21-SEC-2020: <b>Exploring concepts for space traffic management</b>	<b>CSA</b>			<b>2.0</b>
SU-SPACE-22-SEC-2019: <b>Space Weather</b>	<b>RIA</b>		<b>9.0</b>	
SU-SPACE-23-SEC-2019: <b>NEO</b>	<b>RIA</b>			<b>4.0</b>

## OTHER ACTIONS FOR 2018-2020 (SUB-SET)

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
Activity 5 – <b>Space surveillance and tracking SST</b>	<b>Grant to identified beneficiary</b>	<b>1.8</b>	<b>1.9</b>	<b>1.9</b>
Activity 6 – <b>Improving the Performance of SST at European Level</b>	<b>SGA - RIA</b>	<b>15.0</b>	<b>20.0</b>	<b>30.0</b>

**CALL — Space 2018-2020** and other actions for 2018-2020 (sub-set)

## SU-SPACE-22-SEC-2019

Space Weather

Proposals shall address the development of modelling capabilities and/or the delivery of prototype services

The goal is to pave the way for forecasting horizons for space weather events in the order of hours or days and to identify potential indicators of extreme events

Proposals shall include architectural concepts of possible European space weather services



**Recommended  
project size**

**Indicative budget**

*Type of action*

**2 to 3 M€**

**9 M€**

*Research and  
Innovation Actions*

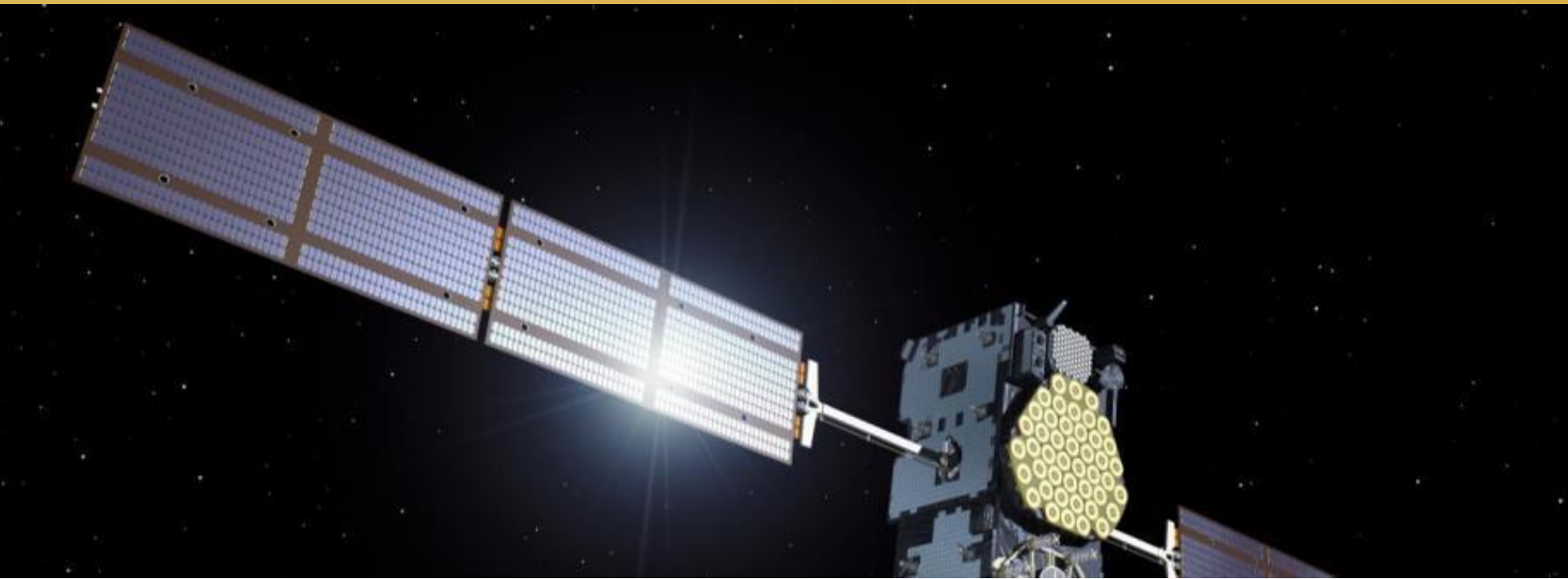
*Participation of industry,  
including SMEs, is encouraged*

## SU-SPACE-22-SEC-2019

*To be kept in mind:*

- Complementary/Use of precursor Space Weather services already available through ESA SSA and take into account the global space weather service developments by the World Meteorological Organisation (WMS)
- Open to cooperation with international partners with relevant expertise
- A guidance document is available





## SATELITE NAVIGATION — GALILEO AND EGNOS

No call in 2018;  
Budget 2018-2020: 123 M€



## CALL — EGNSS MARKET UPTAKE 2019-2020

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
SPACE-EGNSS-1-2019-2020: <b>EGNSS applications fostering green, safe and smart mobility</b>	IA		10.0	10.0
SPACE-EGNSS-2-2019-2020: <b>EGNSS applications fostering digitisation</b>	IA		4.0	5.0
SPACE-EGNSS-3-2019-2020: <b>EGNSS applications fostering societal resilience and protecting the environment</b>	IA		4.0	5.0
SPACE-EGNSS-4-2019: <b>Awareness raising and capacity building</b>	CSA		2.0	

## OTHER ACTIONS FOR 2018-2020 (SUB-SET)

Topics	Type of Action	Indicative budget (€ million)		
		2018	2019	2020
Activity 7 – <b>Galileo Evolution, Mission and Service related R&amp;D activities</b>	Public Procurement		2.6	1.8
Activity 8 – <b>EGNOS Mission and Service related R&amp;D activities</b>	Public Procurement		0.4	0.2
Activity 9 – <b>GNSS evolution, infrastructure-related R&amp;D activities</b>	DA - ESA	36.0	31.0	10.0
Activity 13 – <b>Horizon 2020 project monitoring and audits EGNSS</b>	Expert Contracts		0.5	0.5

CALL — EGNSS market uptake 2019-2020  
and other actions for 2018-2020

# 10 WORK PROGRAMME 2018-2020

*Implementation calendar*

# Work Programme 2018-2020

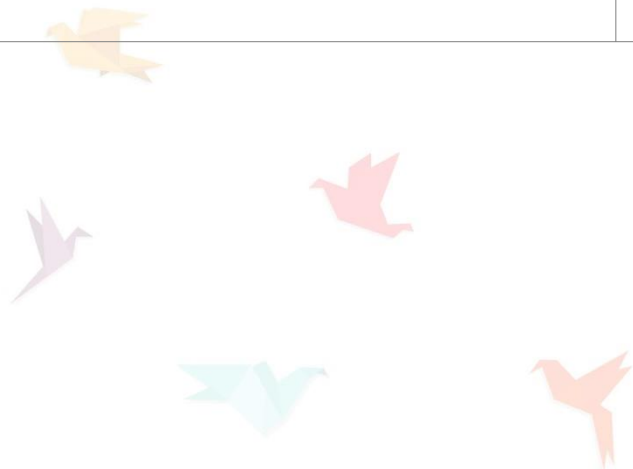
DATE	
27 Oct	Work programme adoption and publication
31 Oct	Space call opening
8-9 Nov	European Space Week, Tallin — <a href="http://www.eusw2017.eu/">http://www.eusw2017.eu/</a>
6 March 2018	Space call deadline
Early 2019 (tentative)	Work Programme update -- full 2020 topics

Important dates



# WP 2018-2020 Implementation calendar

Themes	Opening dates	Deadlines
<b>EO, BIZ, TEC, SCI</b>	31 October 2017	<b>6 March 2018</b>
<b>EO, BIZ, TEC, SEC, EGNSS</b>	16 October 2018	<b>12 March 2019</b> 5 March 2019
<b>EO, BIZ, TEC, SCI, SEC, EGNSS</b>	TBD 2019	<b>TBD 2020</b>





## Space research and guidance documents

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

## Published work programme 2018-2020

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

# ADDITIONAL INFORMATION

## *Future of Space Research*

## WHAT ABOUT THE FUTURE OF EU RESEARCH?

- **Events**

- Round table at the Space week in Tallinn 9 Nov 2017
- EP meeting 21 Nov 2017 on the occasion of the launch of a JTI-pilot on space technology



## WHAT ABOUT THE FUTURE OF EU RESEARCH?

- **"FP9" from 2021:** to run 5 or 7 years?
- **Overall pressure on future EU budget:** impact on research budget?
- **Effect of Brexit:** UK's participation in future EU funded ESA and EU activities?
- **FP9 one single programme:** three pillars: excellent science, challenges, innovation
- **Defence research?**
- **Timeline**
  - FP9 Public consultation end 2017 – early 2018
  - Commission's MFF\* proposal: spring 2018
  - Programme proposals (FP9, Copernicus, Galileo, SST?, GovSatCom?) summer 2018
  - Parliament and Council
  - EP elections in 2019

\* MFF - Multiannual Financial Framework

## WHAT ABOUT THE FUTURE OF SPACE RESEARCH IN EU?

- **Space as a dedicated theme in "FP9"**
  - Elements of continuity with current programme
- **Better access to other parts of the framework programme**
  - Excellent science
  - support to innovation and entrepreneurship
  - Challenges
- **New tools: KIC, PPP/JTI – Joint Technology Initiative for Space (current JTI pilot)**