Space R&I under Horizon Europe

Horizon Europe,
a programme of the
European Union

Space in Horizon Europe

EU Space R&I

Horizon Europe • Pillar 1

Frontier Research, Science & Basic Technologies

ERC

- Systems and communications engineering (PE7)
- Products and processes engineering (PE8)
- **Universe sciences (PE9)**
- **Earth system science (PE10)**
- Materials Engineering (PE11)
- Computer Science and Informatics (PE6)
- Medical and bio-technologies (LS7, LS9)
- ERC Synergy Grants

MSCA

- Doctoral Networks
- Postdoctoral Fellowships

Horizon Europe • Pillar 2

EU Space Programmes R&I

- EGNSS Evolution
- EGNSS Market uptake
- GOVSATCOM Infrastructure evolution
- GOVSATCOM Applications & data services
- Copernicus Evolution
- Copernicus Market uptake
- SSA Infrastructure evolution
- SSA Applications & data services
- IRIS² Infrastructure evolution
- IRIS² Applications & data services

Space Technologies, Capabilities, Applications & Pathfinder Missions

- Launch Systems & Services
- In-Space Operations & Services
- Enabling Technologies
- Critical Space Technologies for EU non-dependence
- Science & Exploration
- Pathfinder Missions

R&I Booster

- Education and Skills
- CASSINI & Space Entrepreneurship
- IOD/V Service
- International Cooperation

Horizon Europe • Pillar 3

Game-changing Innovations & Market Uptake

Pathfinder · Transition · Accelerator

- Innovative In-Space Applications & Sustainability
- Innovative Space Technologies & Systems
- Exploration

- Prizes
- EIC Business Accelerator

EDF

Space

- Earth Observation for ISR applications
- Space Situational Awareness and early warning
- Space data processing
- Positioning, navigation, timing, navigation warfare
- Secure and robust communication
- Responsive space systems

Pillar I – ERC grants

Life Sciences

- LS1 Molecules of Life: Biological Mechanisms, Structures and Functions
- LS2 Integrative Biology: From Genes and Genomes to Systems
- LS3 Cell Biology, Development, Stem Cells and Regeneration
- LS4 Physiology in Health, Disease and Ageing
- LS5 Neuroscience and Disorders of the Nervous System
- LS6 Immunity, Infection and Immunotherapy
- LS7 Prevention, Diagnosis and Treatment of Human Diseases
- LS8 Environmental Biology, Ecology and Evolution
- LS9 Biotechnology and Biosystems Engineering

Physical Sciences & Engineering

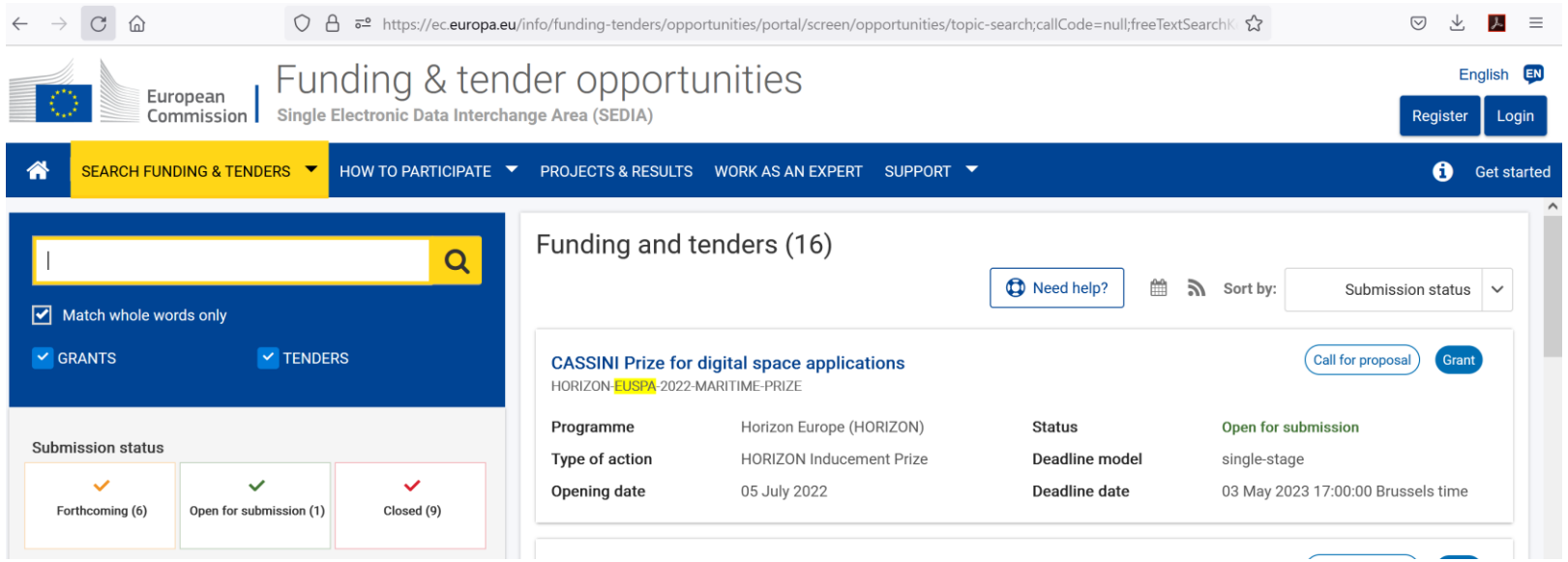
- PE1 Mathematics
- **PE2 Fundamental Constituents of Matter**
- PE3 Condensed Matter Physics
- PE4 Physical and Analytical Chemical Sciences
- PE5 Synthetic Chemistry and Materials
- **PE6 Computer Science and Informatics**
- PE7 Systems and Communication Engineering
- PE8 Products and Processes Engineering
- **PE9 Universe Sciences**
- **PE10 Earth System Science**
- PE11 Materials Engineering

Social Sciences and Humanities

- SH1 Individuals, Markets and Organisations
- SH2 Institutions, Governance and Legal Systems
- SH3 The Social World and Its Interactions
- SH4 The Human Mind and Its Complexity
- SH5 Texts and Concepts
- SH6 The Study of the Human Past
- SH7 Human Mobility, Environment, and Space
- SH8 Studies of Cultures and Arts

Pillar II

- Publication (HaDEA & EUSPA calls) on the EU Funding & Tender Portal at https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/home



- Funding rates
  - Research and Innovation Actions (RIA): 100%
  - Innovation Actions (IA): up to 70%
  - Coordination and Support Actions (CSA): 100%

- Consortia: must include min 3 entities from min 3 countries (countries: see https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-euratom_en.pdf)

WP 2023-2024 – Cluster Digital, Industry, Space – Destination 5 Space

"Strategic autonomy in developing, deploying and using global space-based infrastructures, services, applications and data"

Implemented through:

1. Calls from HaDEA
   - ~~Call HORIZON-CL4-2023-SPACE-01: will open on 22 Dec 2022, with deadline 28 March 2023~~
   - **Call HORIZON-CL4-2024-SPACE-01**: will open on **21 Nov 2023**, with deadline 21 March 2024
2. Calls from EUSPA
   - **Call HORIZON-EUSPA-2023-SPACE**: will open on **24 Oct 2023**, with deadline 14 Feb 2024
3. Tenders from ESA
4. Tenders from the European Commission

Published at: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-7-digital-industry-and-space_horizon-2023-2024_en.pdf

HaDEA call HORIZON-CL4-2024-SPACE-01

1- Competitiveness

The **Future EU Space Ecosystem** is a highly automated, flexible, sustainable and economically viable space infrastructure enabling growth of innovative applications and competitive services

Resilience of space assets

- ✓ Establishment of services for maintenance & upgrade
- ✓ Enhanced flexibility, security and scalability

Non-dependence on technology & capability

- ✓ Key technology maturation
- ✓ Support to game-changing approaches and solutions
- ✓ Contribution to standardisation activities

Sustainability & protection of the space environment

- ✓ Reduction of space debris and use of resources
- ✓ Active debris removal
- ✓ Promotion of re-usability

Competitiveness

- ✓ Support to customer-drive ideas and NewSpace actors
- ✓ Creation of confidence in & visibility for EU actors
- ✓ Fostering of new commercial and value-added services

2 – Access to Space

- Access to space is **strategic for Europe**
- (Micro-) Launcher are a globally **ultra-competitive environment**
- Necessity to support a cost-efficient, responsive and **flexible access to space**
- Horizon Europe programme has **four R&I priorities**:
  - **Innovation for launcher competitiveness** – targeting initial operational capability by 2030
  - **Disruptive concepts for access to space** – starting at low technological readiness levels
  - Fostering and enabling **new commercial space transportation** solutions
  - Modern, flexible and efficient European **test, production and launch facilities**, means and tools

Rapidly improve launch competitiveness, in terms of cost and increased flexibility

Stimulate the development of new space transportation solutions, including through the emergence of new launch systems

© PLD technologies

3 – Quantum

- Quantum theory explains the nature and behaviour of matter and energy **on the atomic and subatomic levels**
- **"Atom interferometry"** can be used to make highly sensitive gravity detectors, accelerometers and gyroscopes
- A whole **range of applications has emerged** in science but also for our daily life like laser, electronics and medical imagery
- The EU must seize this opportunity and **make the best and most strategic use of quantum technologies for space**
- Promotion of developments for
  - Secure communication, time and frequency services
  - Earth sensing and observation
  - Use of quantum computing for space data processing and mission planning

Support the EU space policy and the EU Space Programme

Reinforce EU non-dependence for the development of EuroQCI (the EU Quantum Comm. Infrastructure)

Build a dynamic and innovative industrial ecosystem in Europe

"Europe should invest massively in quantum technologies. This is a matter of technological sovereignty. Quantum could have important applications in the space domain like in encryption or in the mapping from space of the underground landscape."

Commissioner T. Breton, 22 January 2020

3 – Quantum

Quantum Space Gravimetry

- Satellite gravity missions provide **unique observations** not yet covered by other Earth observation missions
- Quantum technology is a **game-changer to monitor the Earth** and predict climate change and future disasters
- HE project CARIOQA develops an engineering model of the **atomic accelerometer** for a future mission

Quantum Key Distribution

- European Quantum Communication Infrastructure (QCI) develops a terrestrial and space segment
- The **space segment based on satellites** to overcome the limitations of ground-based segments
- Objective is to mature the new technologies and perform the qualification for space and ground

HORIZON-CL4-2024-SPACE-01-64: Quantum Space Gravimetry Phase-B study & Technology Maturation

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
14,20	~14,00	1	RIA	6/7	N/A	Yes

Expected outcomes:

- Support the EU space policy and the EU Green Deal by **assessing the feasibility of a quantum space gravimetry pathfinder mission**.
- Ensure EU sovereignty and non-dependence for the development of capacities leading to the availability of quantum space gravimetry.
- Enhance the TRL of the critical components necessary to build quantum gravimetry for space

Scope: The final objective of this call is to prepare the next phases of the implementation of a Quantum Space Gravimetry pathfinder mission. To achieve this objective, one proposal for a phase B study (Up to PDR) will be selected. This activity will cover both the **quantum space gravimetry payload and satellite platform**. This activity will also include the implementation measures that will **enhance the technological readiness of the critical components leading to TRL 6/7 at the end of the project**.

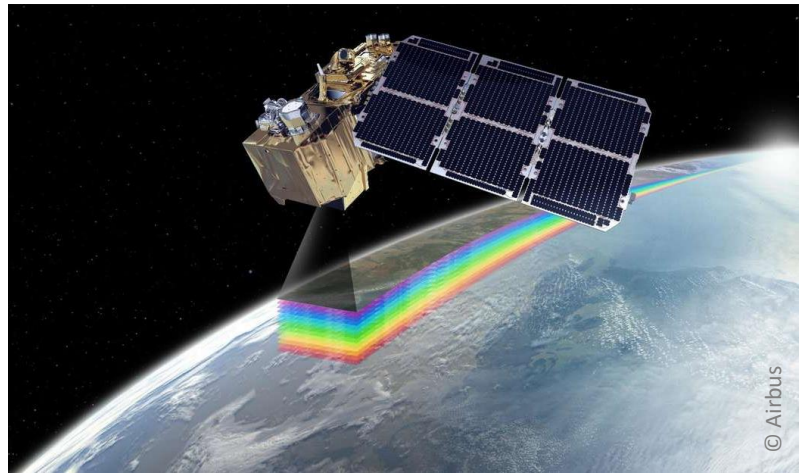
Participation restriction: Participation is limited to legal entities established in Member States, Norway, Iceland and the United Kingdom. The eligibility of entities established in the United Kingdom to participate is conditional upon: (i) the UK is associated to Horizon Europe, and (ii) the UK's equivalent space calls are published and open to the EU entities on a reciprocal basis."

4 – Copernicus Services

- Through Earth Observation (EO) satellites the **status of and changes in Earth's systems** can be monitored and assessed
- Copernicus serves as an independent and powerful European EO solution with services to **benefit all European citizens**
- Its own fleet of Earth observation satellites (Sentinels) **provides global data free of charge**
- Additionally, the commercial market demand for EO products is expected to grow quickly in the next years with a focus on
  - Advanced, very high-resolution satellite imagery and
  - Affordable, high-resolution, high-revisit products

Preparing the evolution and expansion of Copernicus to address EU policy and user needs

Underpin competitiveness and contribute to the integration of space into society and the economy



HORIZON-CL4-2024-SPACE-01-35: Copernicus for Land and Water

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
4,00	1,50 to 2,00	2	RIA	5/6	Lump sum	No

Expected outcomes:

- **Enhanced quality and efficiency of the Copernicus Land Monitoring service** to respond respectively to several Green Deal policy and/or user requirements.
- **Development of efficient and reliable new products chains,** calling for new paradigms in data fusion, data processing and data visualisation to handle more high-volume satellite data sets and product sets.
- **Development of efficient and reliable integrated products chains**, calling with a holistic approach for better land use planning and hydrological monitoring and forecasting, combining and assimilating the current Copernicus service products, and the potential development of new state of the art products complementing the existing ones.
- **Development of a common leading-edge approach across services**, and in the area of hydrological modelling serving the interests of various applications. The development should consider cross services approaches.
- **Development of new algorithms and processing chains** preparing the use of the new types of space observation data (being from new Sentinels or other contributing missions) in order to allow development of new products or the improvement of existing products.

Scope: a proposal should address only one area among:

1. Innovative methods to integrate the current land products into land surface, land use and cover change.
2. Integrated product provision system using innovative methods and observations (e.g.; SWOT mission) to improve the portfolio of the current inland and coastal/shore hydrological satellite observation products.

HORIZON-CL4-2024-SPACE-01-36: Copernicus for Security

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
8,00	~4,00	2	RIA	5/6	Lump sum	Yes

Expected outcomes:

- Enhanced fitness of the current services to better respond to evolving policy and user requirements.
- Enlargement of current service scope through the inclusion of new, complementary elements and extended communities of users.
- Significant technological enhancement in detection capabilities, timely access to data or delivery of information, narrowing the gap between capabilities and the more stringent security observation requirements.
- Significant improvement in integration of non-space data along end-user intelligence supply chains, bringing added value at operational level also at regional at local levels, or in support to field campaigns.
- Development of processing chain(s) to handle an increasing volume of satellite data, keeping abreast with technology developments and include new paradigms in data fusion, processing, automation, as well as added-value information access and visualisation.
- Integration of the Geospatial Artificial Intelligence (GeoAI) and Earth Observation data analytics with a variety of other application-specific data sources like data from remote sensors accessed through IOT, as well as crow-sourced data, high velocity transnational data and social media posts.

Scope: Support an increase in service performance, outreach and scope, aiming particularly at fostering:

1. Innovative methods and technologies to explore new and enlarged data sets and the development of applications addressing requirements not currently tackled by the current services.
2. Actions in support to the evolution and scope of the security services, namely increasing user reach, responding to specific regional needs and increasing service added value in user operational scenarios.

5 – Space science & technological non-dependence

- Space increasingly represents an **invaluable asset in many sensitive and high-stakes matters**
- COVID-19 pandemic has shown the necessity to **strengthen Europe's industrial base**
- Space-grade electronic devices and other space systems are **often subject to restrictive trade rules**
- To be non-dependent with a resilient and flexible supply chain, Europe has to develop its **own domestic production of critical technologies**

Achieving strategic autonomy while preserving an open economy is a key objective of the EU and calls for developing EU autonomy in the space sector.

(EU Council conclusions, EUCO 13/20 Oct 2020)

Reduce the dependence on critical technologies and capabilities

Develop or regain in the medium term the EU capacity to **operate independently** in space

Enhance the technical capabilities and overall competitiveness of European space industry

Open new competition opportunities for European manufacturers

Improve the overall European space technology landscape and complement and create synergies

HORIZON-CL4-2024-SPACE-01-73: Space technologies for European non-dependence and competitiveness

Expected Outcomes:

- To reduce the dependence on critical technologies and capabilities from outside EU for the EU space programme components (i.e. Galileo/EGNOS, Copernicus, Govsatcom and SSA) and other space applications;
- To develop or regain in the mid-term the European capacity to operate independently in space;
- To enhance the technical capabilities and overall competitiveness of European space industry vendors on the worldwide market;
- To open new competition opportunities for European manufacturers by reducing dependency on export restricted technologies that are of strategic importance to future European space efforts;
- To improve the overall European space technology landscape and complement and/or create synergy with activities of European and national programmes either in the space or non-space fields.

Indicative budget: 20.1 million EUR
EU contribution per project: 2 to 3 million EUR
Type of Action: RIA
TRL: varies from 5 to 8

Eligibility: Participation is **limited to legal entities established in Member States, Iceland and Norway**

Scope: A proposal should address only one of the following technology areas:

1. Low shock non-explosive actuators (NEA) for smallslats (target TRL 7)
2. High data rate (12,5 to 28 Gbps or higher 56 Gbps), low consumption, short range links (target TRL 7)
3. Power laser sources in the eye-safe region (target TRL 6)
4. Enhanced performance and space qualified detectors – visible range (target TRL 7-8)
5. Ultra deep submicron technology for next generation space integrated circuits: ASICS, FGPA and microprocessors (target TRL 5)
6. Discrete power devices (200V normally-off GaN) (target TRL 7)
7. Photonics components (target TRL 7)

+ Please refer to the **technical guidance document to be published with the call for further specifications**

Specificities:

1) Already in the proposal, applicants are asked to:

   - **Describe the technologies and/or technology processes to be used and show that they are free of any non-EU legal export restrictions or limitations**, such as those established in the International Traffic in Arms Regulations (ITAR), Export Administration regulation (EAR) such as EAR99 or equivalent instruments applicable in other jurisdictions;
   - Set up a suitable technology development process aiming at **avoiding export restrictions of non-EU states** and assess vulnerabilities of the supply chain.

2) As per WP 2023, companies that have a multinational nature will be requested to provide guarantee of absence of foreign control through the **OCA procedure**.

3) Legal obligation: For a period of up to 4 years after the end of the project, **access rights to the use of products and/or processes generated by the project shall be given to European entities**, in compliance with the signed Grant Agreement and with no legal restrictions and limitations stemming from International Traffic in Arms Regulations (ITAR), EAR99 or equivalent instruments applicable in other jurisdictions.

6 – SSA (Identified beneficiary = EUSST)

- HORIZON-CL4-2024-SSA-SST-MS - New & improved EUSST Missions and Services
- HORIZON-CL4-2024-SSA-SST-AE - SST & STM system architecture and evolutions
- HORIZON-CL4-2024-SSA-SST-SB - Space-based SST (mission, system and sensors network)
- HORIZON-CL4-2024-SSA-SST-SP - SST Sensors and Processing
- HORIZON-CL4-2024-SSA-SST-SD - SST Networking, Security & Data sharing

HORIZON-CL4-2024-SSA-SST-MS - New & improved EUSST Missions and Services

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
6,00		TBD	RIA	6/7 TBD	N/A	Yes

Expected outcomes:

- **Keep EU knowledge and capabilities in the Space Surveillance and Tracking domain at the leading edge**.
- Adapt, improve and evolve the current EUSST initial services portfolio in line with future user needs and the space environment.
- Improve the overall performance of the EUSST services and ensure, in the long-term, a high level of performance and appropriate autonomy at Union level.
- Identify and define new missions and services,
- Explore the implementation of new services, in complementation to the three existing ones.
- Support pre-developments and end-to-end early demonstration of new SST services.

Scope:

- R&I on evolution of the Collision Avoidance service towards a higher responsiveness in case of risks, and in all phases of the spacecraft life;
- R&I on evolution of the EUSST system for debris mitigation in order to reduce the generation of space debris;
- R&I on evolution of the EUSST system for space debris remediation by managing existing space debris.
- R&I on evolution of the EUSST Service Provision Portal in line with the evolution of existing services (CA, RE, FG) and the inclusion of new ones.

This Space Surveillance and Tracking (SST) topic contributes to ensuring full and optimal capacity of the EUSST Partnership once the latter is set up. Its outcomes and scope are expected to build on previous and ongoing actions and aim at achieving full capacity of the EUSST Partnership by end 2024.

HORIZON-CL4-2024-SSA-SST-AE - SST & STM system architecture and evolutions

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
6,00		TBD	RIA	6/7 TBD	N/A	Yes

Expected outcomes:

- The environment in which the EUSST system performs its mission and delivers its services is constantly evolving due to e.g. technological or political factors changing the way in which space is used, orbital environment, etc.
- EUSST system architecture engineering & evolutions: **the analysis of the EU SST system architecture needs to continuously progress to determine how the system has to evolve in the medium- and long-term at network level, data processing level and services level**. Other aspects like data flows, security constraints, interconnectivity and complementarity between EU assets as well as cooperation with other non-European SST systems need to be considered as well.

Scope: R&I activities include:

- EUSST architecture engineering.
- Improve the future EUSST architecture and the associated development roadmap.
- Contribute to technical standardisation activities in these areas.

This Space Surveillance and Tracking (SST) topic contributes to ensuring full and optimal capacity of the EUSST Partnership once the latter is set up. Its outcomes and scope are expected to build on previous and ongoing actions and aim at achieving full capacity of the EUSST Partnership by end 2024.

HORIZON-CL4-2024-SSA-SST-SB - Space-based SST (mission, system and sensors network)

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
10,00		TBD	RIA	6/7 TBD	N/A	Yes

Expected outcomes:

- With a growing orbital population and the need to observe smaller objects in order to be able to better protect EU space assets, the need for and added-value of developing Space-Based Space Surveillance (SBSS) missions in complementation to ground-based SST sensors should be studied in Europe
- **Projects are expected to contribute to the following outcomes:**
  - **Study and assess several technical solutions for the development of future European SBSS capabilities.**
  - **Explore the use of small satellite solutions** to reduce capital expenditures CAPEX and operational expenditures OPEX.
  - In the medium-term, **develop European capacities to operate SBSS independently**.
  - **Reduce dependence on critical SBSS technologies and capabilities** from outside Europe.

Scope: Study various mission configurations and payload definition to maximize the number of catalogued objects and associated accuracy. Analyse EUSST gaps and solutions to fill them with best value for money.

This Space Surveillance and Tracking (SST) topic contributes to ensuring full and optimal capacity of the EUSST Partnership once the latter is set up. Its outcomes and scope are expected to build on previous and ongoing actions and aim at achieving full capacity of the EUSST Partnership by end 2024.

HORIZON-CL4-2024-SSA-SST-SP - SST Sensors and Processing

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
27,50		TBD	IA (45%)	6/7 TBD	N/A	Yes

Expected outcomes: Supporting the upgrade and development of on-ground assets, in particular radars and telescopes as well as data processing.

- SST radiofrequency & optical sensors (radars, telescopes, etc.) technological research and innovation
- SST data processing research and innovation (e.g. Artificial Intelligence)

Scope: R&I activities which needs to be addressed include:

1. Adapt and improve technologies already in use in SST sensors such as radars, telescopes and lasers.
2. Specify, develop, test and pre-integrate improved sensors.
3. Develop innovations for detection of smaller objects and higher processing capabilities. Develop new detection strategies to cope with an increased number/size of objects in the sensors' Field of Regard/Field of View.
4. Explore new technologies and/or processing algorithms and techniques to develop and implement potential new services developed in HORIZON-CL4-2024-SSA-SST-MS New & Improved EUSST Missions and Services topic.
5. Improve algorithms: for a more agile and accurate cataloguing of the growing space objects population and increasing services provision; for data fusion for a more efficient use of data and information coming from different sensors on the same object.
6. Other, please refer to WP text.

This Space Surveillance and Tracking (SST) topic contributes to ensuring full and optimal capacity of the EUSST Partnership once the latter is set up. Its outcomes and scope are expected to build on previous and ongoing actions and aim at achieving full capacity of the EUSST Partnership by end 2024.

HORIZON-CL4-2024-SSA-SST-SD - SST Networking, Security & Data sharing

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
7,00		TBD	RIA	6/7 TBD	N/A	Yes

Expected outcomes:

- Support the upgrade, development and security issues of the EUSST infrastructure based on the European network of assets.
- Concrete aspects of the EUSST network (e.g. pooling of data from multiple sensor sources; exchange between multiple operations centres of Member States) shall be considered in highly detailed case studies, modelling.
    - SST networking of sensors & operation centres (EU SST network Command & Control)
    - Research on EUSST network hardening against external threats

Scope:

- Update operation centres to improve current services (Collision Avoidance; Fragmentation; Re-entry) adapted to future user needs and the space environment.
- Update operation centres to new missions and services.

This Space Surveillance and Tracking (SST) topic contributes to ensuring full and optimal capacity of the EUSST Partnership once the latter is set up. Its outcomes and scope are expected to build on previous and ongoing actions and aim at achieving full capacity of the EUSST Partnership by end 2024.

EUSPA call HORIZON-EUSPA-2023

7 – Applications for Galileo, EGNOS and Copernicus, including Galileo PRS & GOVSATCOM

- R&I is necessary to **strengthen and evolve** European space assets and value-added services using their synergies
- Activities target **innovative applications** in

Agriculture: Optimisation of fertiliser, fuel, pesticide and water use, assurance of food security and traceability

Security and emergency: Provision of crucial information and assistance in disaster mitigation, prepardness & recovery,

Digital innovation: Applications supporting smart cities, urban planning, smart waste management

Climate change: Monitoring Earth's changes and support the supply of clean, affordable and secure renewable energy

Health: Forecasting UV radiation or air pollution levels enable the use of autonomous robots in support of humans

Provide Europe with cutting-edge space-based services

Evolve and improve to continue responding to today's evolving challenges and market needs

Build a dynamic and innovative downstream ecosystem in Europe

7 – Applications for Galileo, EGNOS and Copernicus, including Galileo PRS & GOVSATCOM

- **HORIZON-EUSPA-2023-SPACE-01-41: EGNSS - Transition towards a green, smart and more secure post-pandemic society**
- **HORIZON-EUSPA-2023-SPACE-01-42: EGNSS - Closing the gaps in mature, regulated and long lead markets**
- **HORIZON-EUSPA-2023-SPACE-01-43: Copernicus-based applications for businesses and policy-making**
- **HORIZON-EUSPA-2023-SPACE-01-46: Designing space-based downstream application with international partners**
- **HORIZON-EUSPA-2023-SPACE-01-61: EU GOVSATCOM for a safer and more secure EU**
- **HORIZON-EUSPA-2023-SPACE-01-44: The Galileo PRS Service for governmental-authorised use cases**
- **HORIZON-EUSPA-2023-SPACE-01-45: Joint test activities for Galileo PRS services**

HORIZON-EUSPA-2023-SPACE-01-41: EGNSS - Transition towards a green, smart and more secure post-pandemic society (1/2)

Expected Outcomes:

- Stimulate the development, validation and use of efficient & resilient commercial downstream solutions based on synergies between the different EU space programme components and cutting-edge digital technology.
- Foster the development and validation of space technologies that improve the quality of life in Europe, toward environmentally-friendly and energetically-efficient communities.
- Create new space-based commercial opportunities by exploiting digitalisation and the adaptation of business processes in the post-pandemic environment in order to improve prospects of businesses.

Indicative budget: EUR 3.50 million
EU contribution per project: EUR 1.50 million to 2.50 million
Type of Action: Innovation actions
TRL: 7-9

HORIZON-EUSPA-2023-SPACE-01-41: EGNSS - Transition towards a green, smart and more secure post-pandemic society (2/2)

Scope:

Proposals should **leverage EGNSS services** including their differentiators (OSNMA, HAS, RLS, CAS, etc.) to develop technologies that focus on commercial exploitation in one of the following priority areas:

1. Improving the **quality of life in cities** by addressing efficient mobility, energy efficiency and environmental friendliness, including the green, safe and digital transition of the construction industry. They can also cover solutions for personal assistance, healthcare, support to the elderly and city dashboards.

2. Addressing the challenge of **higher reliance on existing infrastructure**, the increased use of remote resources and the associated cyber-threats. Proposals may cover applications for claims assessment (insurance), timestamping of transactions (finance), as well as commodities trading and risk assessment, including solutions for the certification of GNSS based timing equipment. Ideas from the energy sector could emphasise increasing the share of electricity from renewables (e.g. monitoring and forecasting of electricity generation from wind and solar power).

In addition to synergies with EGNOS and Copernicus, applications may also consider the integration of future GOVSATCOM services into their commercial solutions and the use of data models for transforming the Galileo signal to a proper geodetic reference frame.

HORIZON-EUSPA-2023-SPACE-01-42: EGNSS - Closing the gaps in mature, regulated and long lead markets (1/2)

Expected Outcomes:

- Broaden the reach of EGNSS by supporting its adoption in long lead markets including rail, maritime inland waterways, fisheries and aquaculture, road and automotive, and aviation
- Development of industry-accepted certification and standardization schemes that exploit the use of EGNSS and its differentiators for operational services

Indicative budget: EUR 8 million
EU contribution per project: EUR 1.50 million to 2.50 million
Type of Action: Innovation Actions
TRL: 7-9

HORIZON-EUSPA-2023-SPACE-01-42: EGNSS - Closing the gaps in mature, regulated and long lead markets (2/2)

Scope: one of the following areas:

- **Rail safety critical applications** that support the rail network efficiency and cost reduction, converging towards a pan-European EGNSS-based solution adoption. Addressed activities can include the amendment of the European Rail Traffic Management (ERTMS) technical specifications for interoperability to support the use of EGNSS, and synergy with Copernicus / GOVSATCOM / other sensors for infrastructure monitoring.
- EGNSS-supported operations **in coastal, harbour and maritime areas** (including for energy production), inland waterways, fisheries and aquaculture, addressing potential standardization and certification bottlenecks and assisting a diverse pool of stakeholders.
- Certification bottlenecks for the use of EGNSS for **road and automotive market** safety-related applications (e.g. connected and autonomous cars, emergency assistance), liability applications (e.g. insurance telematics) and fleet management systems. Areas requiring further consolidation: Galileo Emergency Warning System (WES), Galileo HAS in the deployment of 5G high accuracy networks, reduction of congestion charging in cities, road maintenance.
- **Aviation**: consolidation of standardization and certification for efficient and green operations supported by EGNSS, EGNSS timing for 4D trajectory operations, EGNSS timing for System Wide Information Management (SWIM), integration of Dual Frequency Multi-constellation (DFMC) SBAS in avionics/aircraft and integration of Copernicus data into current aviation systems, and supporting airport operations via DFMC and the Galileo ARAIM. Proposals may also include applications **for drones' urban air mobility**, e.g. urban air deliveries trough EGNSS data and services for the navigation operations, supported by EO data with provision of meteorological data and obstacle information.

Proposals could explore **synergies with Copernicus and/or GOVSATCOM**, addressing the certification and regulatory aspects that their use might bring.

HORIZON-EUSPA-2023-SPACE-01-43: Copernicus-based applications for businesses and policy-making (1/2)

Expected Outcomes:

- Enhance existing applications or develop new applications and products relying on Copernicus data and services, making an impact on users, businesses and/or answering needs from public authorities, e.g. support policy making and implementation such as for the Green Deal, Destination Earth or the Horizon Europe missions
- Increase the integration and uptake of Copernicus data, services and applications in the European economy, in particular the European data economy

Indicative budget: EUR 7 million
EU contribution per project: EUR 1.00 million to 2.00 million
Type of Action: Research and Innovation Actions
TRL: ~~2~~ 5-7

HORIZON-EUSPA-2023-SPACE-01-43: Copernicus-based applications for businesses and policy-making (2/2)

Scope:

- **Emergency service** downstream applications for better preparedness to extreme events, geohazards, prediction insurances, resilience to climate change, local emergency management and short-term recovery
- **Security service** downstream applications or exploiting the combination of Sentinels with national missions or new space services to support resilience to major pan-European crises like pandemics
- **Marine service** downstream applications with special focus on biodiversity conservation, maritime spatial planning, local and demersal fisheries, coastal to shore services, new sources of pollution from land and blue carbon farming. The applications shall build on existing infrastructure and services
- **Climate change service** downstream applications, e.g. forecast and preparedness to counteract extreme climate events and/or Sentinel Data integration in decision-support systems
- **Land service** downstream applications for better land use and/or natural resources planning, as well as citizen awareness and reporting of environmental and biodiversity protection issues
- **Atmosphere monitoring service** downstream applications that tailor, refine and combine the products for serving users particularly in the areas of air quality, health, biodiversity, wildfires monitoring and greenhouse gases.

A proposal should address **only one area**, which should be clearly indicated.

HORIZON-EUSPA-2023-SPACE-01-46: Designing space-based downstream application with international partners (1/2)

Expected Outcomes:

- Use of EGNSS and sharing of expertise with public and/or private entities to introduce EU-space based solutions leveraging in particular Galileo differentiators and European know-how.
- The use of Copernicus data, to develop jointly algorithms, services and/or products, which serve local user needs and/or enhance the Copernicus global product quality.
- The combined use of EGNSS and Copernicus to develop innovative downstream applications.

Participation: Legal entities established in countries that have signed an administrative cooperation arrangement on Copernicus data access and Earth observation data exchange are exceptionally eligible for Union funding: United States, Australia, Ukraine, Chile, Colombia, Serbia, African Union member states, India and Brazil.

Indicative budget: EUR 6.00 million
EU contribution per project: EUR 0.80 million to 1.00 million
Type of Action: Research and Innovation Action
TRL: 3-4

HORIZON-EUSPA-2023-SPACE-01-46: Designing space-based downstream application with international partners (2/2)

Scope:

- Proposals should target one of the three expected outcomes:
  1. Use of EGNSS and sharing of expertise with public and/or private entities to introduce EU-space based solutions leveraging in particular Galileo differentiators and European know-how.
  2. The use of Copernicus data, to develop jointly algorithms, services and/or products, which serve local user needs and/or enhance the Copernicus global product quality.
  3. The combined use of EGNSS and Copernicus to develop innovative downstream applications.

✓ Actions should focus on technical developments of EU-space based solutions, dissemination, awareness-raising, as well as provide opportunities for the creation of business-oriented partnerships between European industry and international partners in order to demonstrate the advantages of the differentiators.

✓ It is important to exploit the value-added of integration of EO data (both satellite, airborne and ground-based) with positioning data and ICT (e.g. cloud computing) from international partner countries.

✓ Proposals dealing with EGNSS are encouraged to involve relevant organisations on the European side (e.g. EASA, ESSP, EMSA).

✓ When dealing with Copernicus-based applications, participation of at least one partner from a country that has signed a Copernicus Cooperation Arrangement is required.

✓ Proposals are encouraged to use the Copernicus DIAS and integrate third-party data.

HORIZON-EUSPA-2023-SPACE-01-61: EU GOVSATCOM for a safer and more secure EU (1/2)

Expected Outcomes:

- Identification, assessment and development of one or more suitable use cases in the area of surveillance, crisis management and key infrastructure;
- Support the development and/or improvement of GOVSATCOM demonstration terminals enabling end-to-end validation of the first services provided by the GOVSATCOM HUB
- Elaborate the definition of the GOVSATCOM validation strategy and a user engagement plan
- Foster the identification/definition of GOVSATCOM tools required for the development of the GOVSATCOM terminals
- Develop the application necessary to enable end-to-end demonstration of the selected use case(s) using services provided by the EU GOVSATCOM Hub and operational terminals
- Perform extensive in-field activities and a final demonstration aimed at verifying the suitability of the solution, involving the relevant user communities

Indicative budget: EUR 10.00 million
EU contribution per project: EUR 3.00 million to 4.00 million
Type of Action: Innovation Actions
TRL: 7-9

Eligibility: at least one public entity must participate as member of the consortium selected for funding as the public entities are the main users of GOVSATCOM

HORIZON-EUSPA-2023-SPACE-01-61: EU GOVSATCOM for a safer and more secure EU (2/2)

Scope:

- Proposals should select at least one GOVSATCOM use case and support the adaptation of one or more existing SATCOM terminals in order to carry out the demonstration and ensure engagement of relevant user communities
- Proposals focusing on the following areas are encouraged:
  1. Disaster response or Emergency services / ambulances (for Civil Protection)
  2. Rail traffic management to improve the limitations linked to geographical barriers (e.g. valleys, cities)
  3. Telemedicine for humanitarian aid
- The projects should improve one or more operational terminals to demonstrate the access of the respective users to an early EU GOVSATCOM service, showcasing the benefits and fostering users' uptake
- The equipment should support demonstration activities of the early developed services

8 – Cassini (see https://www.cassini.eu/cassini-initiative and www.cassini.eu)

The **CASSINI Actions** covers the whole entrepreneurship cycle:

- **Cassini Facility** deploys a 1€ B investment for Venture Capital funds interested in investing in EU-based companies in the space sector (up- and downstream)
- **CASSINI Matchmaking** supports start-ups, scale-ups and SMEs by connecting them with potential investors and/or corporate partners
- The **IOD/IOV** service enables new technologies to be tested in orbit
- **CASSINI Business Accelerator** seeds grant and six months of business acceleration for space-based start ups
- **CASSINI Prizes** trigger entrepreneurs to develop close-to-market digital applications based on EU space data
- EU-wide **CASSINI Hackathons**: an opportunity to stimulate entrepreneurship and to develop ideas for digital applications building on space data

The **EIC Actions** identifies & develops breakthrough technologies:

- The EIC Pathfinder & Transition programmes support **research teams exploring bold ideas at low TRLs** for radically new & emerging breakthrough technologies, with grants of up to 4€ M
- Providing **grant funding and equity investments** for individual start-ups and small companies with TRLs above 5 to develop and scale up innovations

Implemented by ESA

Registration page:
https://esastar-emr.sso.esa.int/

To view all open tenders:
https://esastar-publication-ext.sso.esa.int/ESATenderActions/filter/open

9 – Space Weather & NEO

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
5,70		TBD	Delegated to ESA	TBD	N/A	No

Space Weather:

- Research and innovation activities will deal with "**development of certain technology elements for promising precursor services including development, testing and validation of physics-based space weather models**" and "**exploratory space weather payloads studies**". They shall be complementarity to Space Weather services developed through the Space Situational Awareness component of the EU Space Programme.

Near Earth Objects:

- Research and innovation activities will study "**precursor services / European hot-redundant Minor Planet Centre backup**" and "**Increase networking of national assets**".

10 – EGNSS Upstream

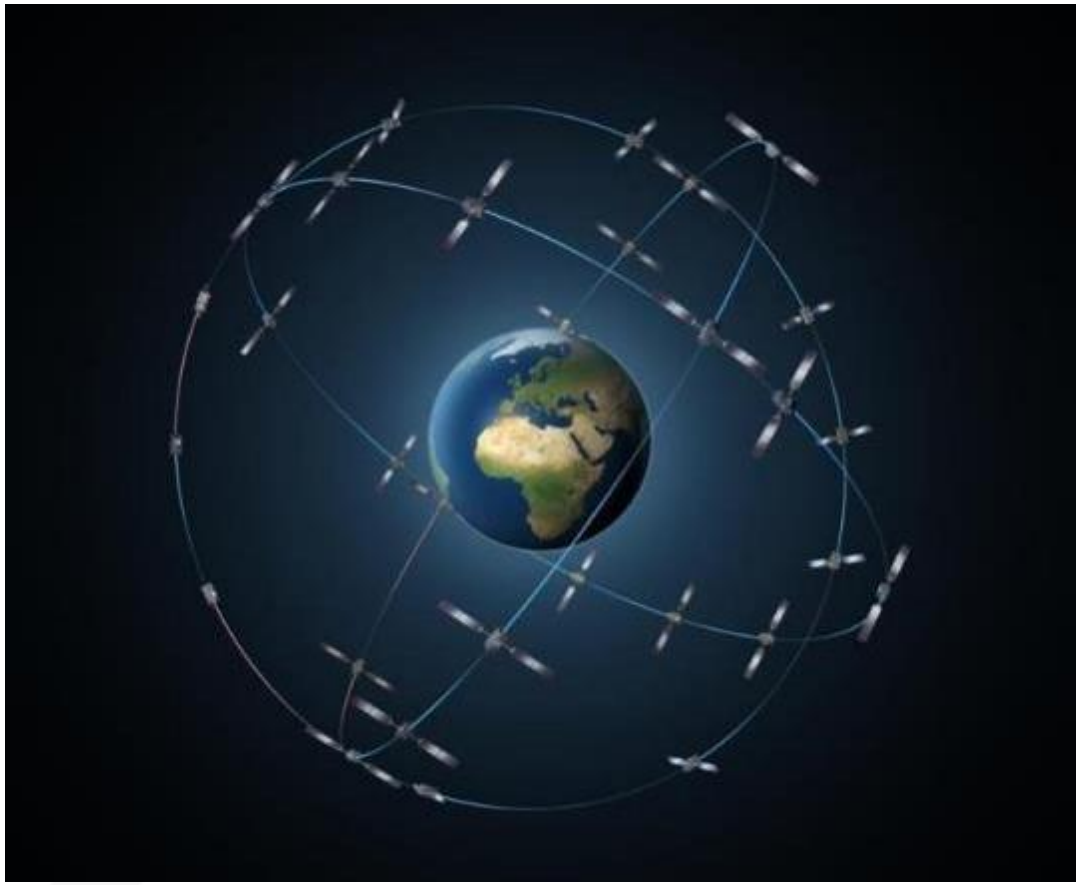
- Today, the use of a Global Navigation Satellite System (GNSS) **is deeply ingrained in our everyday lives**
- The European GNSS encompasses
  - **Galileo**, a state-of-the-art global satellite navigation system
  - **EGNOS**, a regional satellite-based augmentation system
- Both services create **extensive socio-economic benefits** through a range of applications spanning numerous markets
- The Galileo infrastructure evolves with the arrival of the second generation of Galileo (G2G) satellites
  - **Enabling diversification** of downstream applications
  - **Strengthening the robustness** with frequency diversity, increased power, signal encryption & authentication features
  - **Increasing the accuracy** in time and position

Preparing the new generations on a user-driven basis, considering the technological progress

Addressing the vulnerability of the European supply chain by supporting the R&I of critical space components and technologies

10 – EGNSS Upstream

GALILEO TODAY



– 28 satellites in orbit

– Remarkable performance

– Strong link with users, market and industry

– Modernization on-going

10 – EGNSS Upstream

EGNSS UPSTREAM R&D IN SUPPORT OF EGNSS PROGRAMMES

- The modernization of the Galileo mission and infrastructure (G2G) has been supported by a strong and efficient R&D activity funded by the Horizon 2020 / Horizon Europe programmes.
- Activities covers the full spectrum of EGNSS Upstream:
  1. **Assessment of viability for new mission concepts or new services**
     - direct management by EC
  2. **Technology and architecture**
     - delegated to ESA
  3. **Improvement of operations and service provision**
     - delegated to EUSPA

10 – EGNSS Upstream

- Other Actions: Mission and Services (implemented by the EC)
- Other Actions: Technology and Infrastructure

EGNSS Mission and Services

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
~~2023 – 2,5~~ 2024 – 2,5	n/a	TBD	COM Public procurement	N/A	N/A	TBD on a case-by-case basis

- The objective is to **study potential new user needs**, as well as the resulting enhancement of services, and determine whether and **how the EGNSS programmes Galileo and EGNOS shall evolve** to answer these new user needs. This includes the preparation of contributions and technical analysis supporting the EU position in multilateral and bilateral working groups and meetings.

- The upstream R&D actions in this area will cover the assessment of new mission concepts and of services improvements and of new services or capacities to be introduced based on the user needs, developing the service concept including with international partners when relevant, assessing costs to the programme versus benefits to users and defining the roadmap of activities until an operational service could be provided.

EGNSS Technology and Infrastructure

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
~~2023 – 43~~ 2024 - 43	n/a	TBD	Delegated to ESA	N/A	N/A	TBD on a case-by-case basis

- Actions under this area will address upstream R&D activities. They will cover the **maturing of the existing technologies and the development of new and emerging technologies** (e.g. Low Earth Orbit Positioning, Navigation and Timing EOPNT), the engineering activities for the further evolution of Galileo and EGNOS existing systems, technical studies for the assessment of exploratory system concepts and/or responding to new mission needs and a changing environment, the development and maintenance of state-of-the-art system tools and technical test-beds, the implementation of actions agreed at Programme level to reduce the dependence of the supply chain on non-EU markets, the definition, design, development and implementation of experimental satellite demonstrator, and others.

11 – Secure Connectivity – IRIS²

Why IRIS²?
New satcom needs cannot be fulfilled by current EU assets

Increased level of threats of hybrid nature, incl. cyber

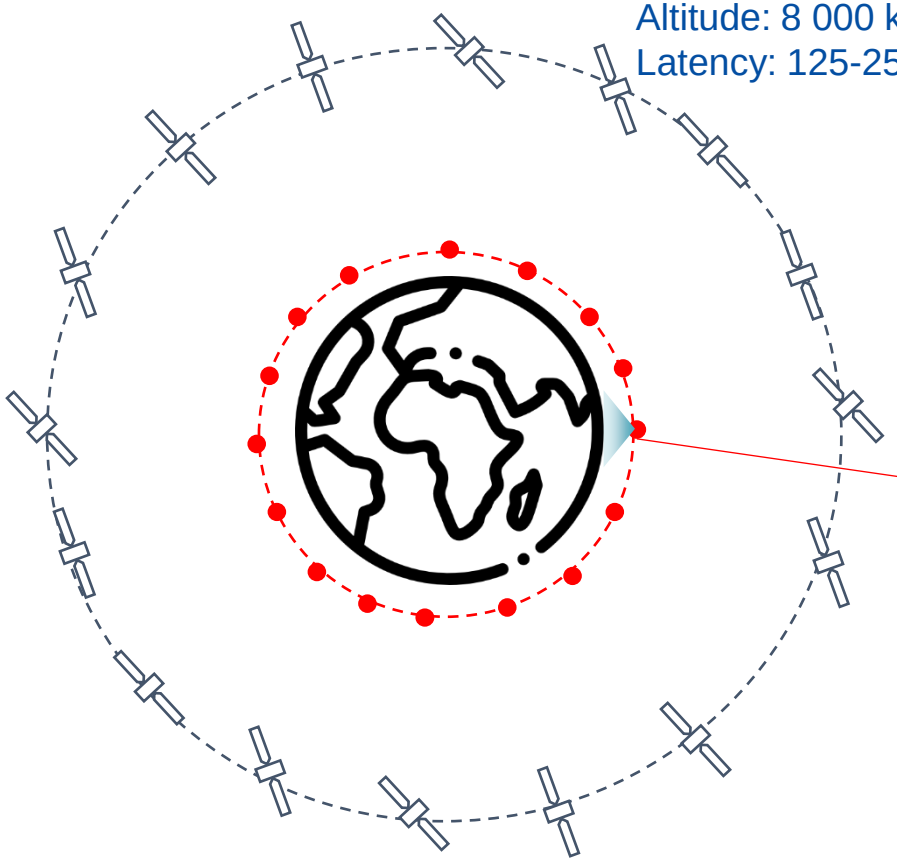
growing governmental satcom needs for secure, reliable and diverse services

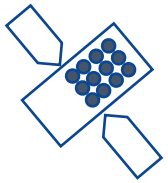
need for EU based available solutions

11 – Secure Connectivity – IRIS²

Why IRIS²?
Complementing existing EU infrastructure

Existing: Medium **E**arth **O**rbit
Altitude: 8 000 km
Latency: 125-250 ms





Existing: Geostationary **E**arth **O**rbit
Altitude: 36 000 km
Latency: 600-800 ms

Low **E**arth **O**rbit
Altitude: 600 - 1 200 km
Latency: 30-50 ms

11 – Secure Connectivity – IRIS²

IRIS² Regulation No 2023/588 of 15 March 2023
Programme objectives

Ensure secure, autonomous, high-quality, reliable & cost-effective satellite governmental communication services to government-authorised users

Enable commercial services, or services offered to government-authorised users based on commercial infrastructure at market conditions

11 – Secure Connectivity – IRIS²

IRIS² Use cases

GOVERNEMENTAL SERVICES

CONNECTING KEY INFRASTRUCTURES

Governmental & institutional secure communications (Embassies, EUROPOL)

—

Management of transport infrastructures (air, rail, road traffic management)

—

Galileo (augmentation), Copernicus (data relay)

—

Command and control of smart grids and M2M (energy, finance, health, data centres)

CRISIS MANAGEMENT AND EXTERNAL ACTION

Civil protection

—

CFSP- CSDP missions and operations

—

Humanitarian aid

—

Maritime emergencies (search and rescue)

SECURITY & SURVEILLANCE

Border and remote areas surveillance

—

Remote Piloted Aircraft systems

—

Maritime surveillance

—

Arctic region coverage

—

Complement to military missions

–

Space surveillance

COMMERCIAL SERVICES

MASS-MARKET

Mobile Broadband

—

Fixed Broadband

—

B2B services

—

Satellite access for transportation – for ships, airplanes, drones, connected cars

—

Cloud based services

11 – GOVSATCOM / Secure Connectivity (IRIS^2)

- Other Actions: GOVSATCOM/Secure Connectivity infrastructure
- ~~Other Actions: GOVSATCOM/Secure Connectivity upstream R&D (2023 only)~~

GOVSATCOM/Secure Connectivity infrastructure: Development and Validation

Budget - € million	Per project - € million	# of projects	Type of action	TRL by end of project	Financial set-up	Country restriction
~~2023 – 28~~ 2024 – 20,6	tbd	TBD	Delegated to ESA	TBD	N/A	TBD on a case-by-case basis

- The Commission has adopted a proposal for a Union Programme for Secure Connectivity. The future satellite-based communication infrastructure should build upon the GOVSATCOM component of the EU Space Programme, which should also take advantage of additional national and European capacities, and develop further the European Quantum Communication Infrastructure (EuroQCI) initiative.

- This action should therefore enable and **support the development and validation actions for the construction of the initial space and ground infrastructure required for the provision of governmental services**. This includes the development and validation of the Quantum Key Distribution (QKD) payload for the EuroQCI 1st generation satellites based on EU technologies.

12 – IOD/IOV

See https://defence-industry-space.ec.europa.eu/eu-space-policy/eu-space-research/orbit-demonstration-and-validation-iodiov_en

- Validating concepts and testing innovative technologies in real conditions **accelerates their entry into the market**
- In-orbit testing is a costly and complex endeavour resulting in the infamous "**valley of death**" for many innovators
- This is why the EU started the **IOD/IOV initiative** enabling new technologies to be tested in orbit
- **1st calls in and 2020, open call since 2023**
  => next cut off date March 15th 2024
  - 100+ proposals from various European entities
  - Technology innovation for EO, PNT, SatCom, STM and more
  - Already 4 missions launched = 10 experiments
  - 13 missions to launch including 9 satellites and 31 aggregated experiments

Ensure the global competitiveness by allowing technologies to be effectively tested in orbit

Provide cost-effective services based on EU solutions

Prepare a generation of European engineers with hands-on experience

UPMSat-2
© UPM

12 – IOD/IOV

Expected outcomes:

- To contribute to reduce the time to market or operational use of new technologies, products, concepts, architectures, and operations techniques;
- To provide a cost-effective service for regular aggregation (if needed), launch and operations in orbit for IOD/IOV experiments, based on EU solutions both for the spacecraft and for the launch services;
- To have at least one opportunity every year during the Horizon Europe implementation period.

Scope:

- The IOD/IOV activities intend to provide a regular and cost-effective service and solution for common flight ticket actions (management, spacecraft design including reuse of existing solutions, assembly, integration and tests, launch and operations) based on EU solutions both for the spacecraft (i.e. platform, experiments aggregation, operations in orbit including preparation and associated Ground Segment) and for the launch services.
- The scope of the activities may include mission design, integration and implementation, for all the necessary tasks to prepare, provide and operate spacecraft(s), together with the related ground segment, which accommodates the selected IOD/IOV experiments as well as the associated launch services.
- Concerning launch aspects, IOD/IOV activities should support the European launcher exploitation policy, therefore relying as far as possible on EU manufactured launcher solutions launched from the EU territory.

Budget:

€15,1 million in 2023 and €13,0 million in 2024

IOD/IOV Service – New Opportunities as of early 2023

For experiments

Permanently open calls for Expression of Interest, with multiple cut-off dates for:

- IOD/IOV Experiments needing aggregation → by COM
- Ready to Fly IOD/IOV satellites (i.e. complete systems) → joint scheme by COM/ESA

See: https://defence-industry-space.ec.europa.eu/funding-and-grants/calls-proposals/orbit-demonstrationvalidation-20232026_en

For EU system integrators

- Procurement of cubesat/ smallsat carriers and associated aggregation services → by ESA

For EU launch service providers

- "Flight Ticket Initiative": Invitation to tender to select a pool of EU launch solutions that will compete for each specific contract → by COM/ESA

See: https://esastar-publication-ext.sso.esa.int/ESATenderActions/details/68192

Pillar III - EIC

Pathfinder (TRL1-4)
- **For consortia**
- Early stage research on breakthrough technologies
- **Grants up to €3/4 million**

Transition (TRL 4-6)
- **For consortia and single entities**
- Technology maturation from proof of concept to validation
- Business & market readiness
- **Grants up to €2.5 million**

Accelerator (TRL 6-9)
- **For individual SMEs**
- Development & scale up of deep-tech/ disruptive innovations by startups/ SMEs
- Blended finance (**grants up to €2.5 million; equity investment up to €15 million or above**)

- Focus on **breakthrough, game-changing, market-creating, deep-tech**
- **Mainly bottom up** complemented by targeted funding on strategic technologies/ challenges
- Steered by **EIC Board** of leading innovators (entrepreneurs, investors, researchers, ecosystem)
- **Business Acceleration Services** (coaches/ mentors, corporates, investors, ecosystem)
- **Pro-active management** (roadmaps, reviews, re-orientations, etc) with EIC Programme Managers
- **Fast track access** to Accelerator for results from EIT, EIC Pathfinder

Thank you for
your attention!
Romain.lezier@ec.europa.eu
https://defence-industry-space.ec.europa.eu/eu-space-policy/eu-space-research_en
#EUSpaceResearch