

**EN**

**HORIZON 2020**  
**WORK PROGRAMME 2014 – 2015**

5. *Leadership in enabling and industrial technologies*

*iii. Space*

*Revised*

**This Work Programme was adopted on 10 December 2013. The parts that relate to 2015 (topics, dates, budget) have, with this revised version, been updated. The changes relating to this revised part are explained on the Participant Portal.**

*Consolidated version following  
(European Commission Decision C (2015)2453 of 17 April 2015)*

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## ***Introduction***

Space research is supported in Horizon 2020 under the priority "Industrial Leadership", in line with the main objective and challenge to foster a cost-effective competitive and innovative space industry (including SMEs) and research community to develop and exploit space infrastructure to meet future Union policy and societal needs. Building on the successes of the Seventh Framework Programme, Horizon 2020 will enable the European space research community to develop innovative space technologies and operational concepts "from idea to demonstration in space", and to use space data for scientific, public, or commercial purposes. This will anchor and structure space research and innovation at the European level and address key aspects identified in the Commission Communication "EU Space Industrial Policy: Releasing the Potential for Growth in the Space Sector" (COM(2013) 108 final of 28 February 2013).

Actions will be carried out in conjunction with research activities of the Member States and ESA, aiming at building up complementarity among different actors. For this purpose an enhanced coordination between the different actors is envisaged, notably at the level of preparation of this work programme.

The Commission proposal for Horizon 2020 sets the following motto for EU Space R&D for 2014 to 2020 'Prepare for the increasing role of space in the future and reap the benefits of space now'.

The work programme has been structured to address these challenges by:

- Prioritising the existing two EU Space flagships of European Global Navigation Satellite System (EGNSS) and Earth Observation reaping the benefits they can generate in the coming years and ensuring their state-of-the-art also in the future;
- Ensuring support for the third programmatic priority of the EU space policy: the protection of space infrastructure and in particular the setting up of a Space Surveillance and Tracking system (SST) at European level;
- Ensuring support to EU industry to meet the objectives defined in the Commission communication on Space Industrial Policy, notably to maintain and enhance industry's competitiveness and its value-chain in the global market;
- Ensuring that Europe's investments made in space infrastructure are exploited to the benefit of citizens; as well as supporting European space science; and
- Enhancing Europe's standing as attractive partner for international partnerships in space science and exploration.

A novelty in Horizon 2020 is the Open Research Data Pilot which aims to improve and maximise access to and re-use of research data generated by projects. While certain Work Programme parts and areas have been explicitly identified as participating in the Pilot on Open Research Data, individual actions funded under the other Horizon 2020 parts and areas can choose to participate in the Pilot on a voluntary basis. The use of a Data Management Plan is required for projects participating in the Open Research Data Pilot. Further guidance on the Open Research Data Pilot is made available on the Participant Portal.

## **Call - Applications in Satellite Navigation - Galileo<sup>1</sup>**

### ***H2020-GALILEO-GSA-2014-2015***

The European Global Navigation Satellite System (EGNSS), operated under civilian control, encompasses satellite radio-navigation system established under the Galileo programme and European Geostationary Overlay System (EGNOS).

The Galileo programme will provide GNSS services and increase availability and reliability of other GNSS, while ensuring the European non-dependence from other GNSS systems. It will provide a strategic advantage for Europe and generally maximise the socio-economic benefits for the European citizens.

Horizon 2020 will accompany the infrastructure deployment by 1) fostering the further uptake of EGNSS in applications, 2) preparing the secure utilisation through the development of PRS and 3) foreseeing the future evolution of the EGNSS infrastructure. This call for proposals refers to point number 1 above, related to application development.

These Horizon 2020 activities are complementary to the funding of the infrastructure and the operations of the EGNSS, which will come from the budget of the Regulation of the European Parliament and of the Council on the implementation and exploitation of European satellite navigation systems.

To meet the overall objectives of the Galileo programme and to foster the uptake of EGNOS and Galileo, the development of applications is vital. New satellite navigation applications are being developed every day, covering numerous sectors of the world economy. The expected global market will reach EUR 240 billion by 2020.

These activities will give European industry the right opportunities to acquire the knowledge and expertise required to compete in the international environment. Small and Medium Enterprises are key players for innovation in this sector.

Part of the Horizon 2020 Space activities related to GNSS for the period 2015-2020<sup>2</sup> will be implemented by the European GNSS Agency in indirect management in accordance with Article 58(1)(c) of the Regulation (EU, Euratom) No 966/2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 (the "Financial Regulation"). The Agency will use grants and procurement as forms of funding in accordance with Article 10 of the Regulation (EU)

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<sup>1</sup> This call will be managed by the European GNSS Agency (GSA) subject to the conclusion of a delegation agreement with the Commission.

<sup>2</sup> This part does not include the management of GNSS infrastructure related activities, which will be entrusted to ESA, see section 8. GNSS evolution, infrastructure-related R&D activities.

No 1291/2013 establishing Horizon 2020. In accordance with Article 6 of that Regulation Horizon 2020 shall fund neither the construction nor the operation of the Galileo programme.

The European GNSS Agency will manage all the phases of the project lifecycle in accordance with the procedures set out in the Horizon 2020 Rules for Participation and with due regard to the Regulation<sup>3</sup> (EU) No 1285/2013 on the implementation and exploitation of the European satellite navigation systems (the "GNSS Regulation"), where appropriate. To this end a delegation agreement covering the 2015-2020 activities will be concluded between the Commission and the European GNSS Agency, setting out in detail the entrusted tasks and the arrangements ensuring the protection of the financial interests of the Union.

The European GNSS Agency has been chosen to carry out these tasks in accordance with its tasks under Article 14(2) of GNSS Regulation, in particular point c) and taking into account the experience acquired from the implementation of Seventh Framework Programme/Galileo-related projects and its expertise in the field of application market development.

The maximum Union contributions as well as the corresponding Space activities related to GNSS to be implemented by the European GNSS Agency will be decided annually by the Commission in the context of the Horizon 2020 Work Programmes. After the adoption of the Work Programme, the Commission will sign with the European GNSS Agency a transfer for funds agreement serving as legal commitment within the meaning of Article 85 of the Financial Regulation.

Actions under this particular call should result in the development of applications and implementation of pilot projects with a potential to contribute to the growth and strengthening of the European GNSS market and to have an impact on sectors where the EU's added value and cost effectiveness are the greatest.

The application of space technologies shall also be supported through the respective Societal Challenges, where appropriate.

Proposals are invited against the following topics:

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<sup>3</sup> Regulation (EU) No 1285/2013 of the European Parliament and of the Council of 11 December 2013 on the implementation and exploitation of European satellite navigation systems and repealing Council regulation (EC) No 876/2002 and Regulation (EC) No 683/2008 of the European Parliament and of the Council

### **GALILEO-1-2014-2015: EGNSS applications**

Specific challenge: European society and industry are facing new challenges, requiring more innovation, productivity and competitiveness, whilst using fewer resources and reducing environmental impact. GNSS offers various possibilities for the development of new space enabled applications, which will enhance Europe's capacity to address major societal challenges in focus areas such as health, citizen safety, mobility, smart cities, sustainable resources monitoring and management, regional growth, low-carbon energy infrastructure planning and protection, disaster management and climate action including natural catastrophes.

Satellite navigation provides continuous, real-time, reliable, accurate and globally available position, velocity and time. The technology fits important societal and market needs.

Scope: Proposals should aim at developing new innovative applications, with future commercial impact. The topic addresses application development in all market segments, such as: transport (road, rail, maritime, aviation), high precision surveying, location based services (LBS), agriculture, emergency services etc responding to user requirements. Application development should be seen in a broad context - it includes the development, adaptation and/or integration of new software, hardware, services, datasets, etc. The use of EGNOS and Galileo Early Services is a key priority for this topic.

Research and innovation activities within this topic should take into consideration possibility of:

1. Exploitation of synergies with other space-based services and systems in order to enable multi-use character of EGNOS and Galileo-enabled applications in all market segments,
2. Exploitation of the distinguishing features of EGNOS and Galileo signals and operational advantages in downstream applications,
3. Preparation for the use of early services, ensuring a greater precision and availability of signals,
4. Implementation of pilot projects for further development of EGNSS based applications,
5. Standardisation, certification, legal and societal acceptance, which will foster EGNSS adoption.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1.5 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Activities should promote innovation in order to maximise the potential of the European GNSS and its adoption. They should demonstrate a clear advantage of using Galileo and EGNOS and include synergies with other GNSS. Proposals should aim at the definition and implementation of pilot projects and development of the EGNSS-enabled applications that are close to the market and driven by user requirements with a high societal benefit and a potential to eventually set common standards in the field of GNSS applications. The proposal should have a clear intention and rationale to commercialise the products and services developed, including a



business plan.

Release of practical tools to the GNSS developer community, ideally with free open source license, is of particular interest.

Type of action: Innovation actions

*The conditions related to this topic are provided at the end of this call and in the General Annexes.*

### **GALILEO-2–2014-2015: Small and Medium Enterprise (SME) based EGNSS applications**

Specific challenge: European society and industry are facing new societal challenges, requiring more innovation, productivity and competitiveness, whilst using fewer resources and reducing environmental impact. GNSS offers various possibilities for the development of new space enabled applications, which will enhance Europe's capacity to address major societal challenges in focus areas such as health, citizen safety, mobility, smart cities, sustainable resources management, regional growth, low-carbon energy infrastructure planning and protection, disaster management and climate action including natural catastrophes.

Satellite navigation provides continuous, real-time, reliable, accurate and globally available position, velocity and time. The technology fits important societal and market needs.

Scope: This topic will explore new applications in niche market sectors and business models in any application domain. Proposals should aim at developing sophisticated, innovative applications, such as mass market location based services (LBS) products, feasibility studies, market tests etc. Application development should be seen in a broad context - it includes the development, adaptation and/or integration of new software, hardware, services, datasets etc. Proposals should address emerging user needs and, specifically, take advantage of the Galileo and EGNOS capabilities and their distinguishing features. A specific emphasis will be given to support development of technological breakthrough into viable products with real commercial potential, where SMEs, which are considered as the key players for innovation in this domain, play a pivotal role, given their flexibility and adaptability.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Activities should aim at developing highly innovative and adaptive applications taking advantage of the Galileo and EGNOS. The proposal should be led by an SME and have a clear intention to commercialise the products and services developed, including a business plan. Additional partners within the consortium should contribute directly to the needs identified by the SME in the lead, in order to fulfil the above objective of commercialisation.

Release of practical tools to the GNSS developer community, ideally with free open source license, is of particular interest.

Type of action: Innovation actions

*The conditions related to this topic are provided at the end of this call and in the General Annexes.*

### **GALILEO-3–2014-2015: Releasing the potential of EGNSS applications through international cooperation**

Specific challenge: Although Galileo is a European programme, it has a strong international dimension. International cooperation in the field of Galileo-enabled applications is therefore an essential element facilitating its breakthrough to new and emerging markets and strengthening Europe's position as a major space player.

Scope: Activities under this topic will enable the development of innovative applications within international context and related standards with high international impact, ensuring that the EGNSS services are well known and can be used throughout the world. The objective is to support new proposals consisting of demonstrators of applications, adaptations of applications to a specific and local context outside of the European Union and the implementation of applications benefiting from multiple constellations, including Galileo. GNSS should be used as the primary positioning technology in the application and positioning should be a key enabler of the application. Third countries will be guided and supported in adapting services and developing applications corresponding to local needs and ensure that no unnecessary restriction to the use of the EGNSS is applied. Focus will be on regions of the world, which represent an attractive market for the European industry.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Proposals are expected to foster application development through international cooperation and create a broad acceptance of EGNSS in non-European countries. The consortium should aim to transform the research results into innovation in third countries, through the networking of relevant technology developers with local academia, incubators, SMEs, representatives from civil society as well as local authorities, notably for the provision of public services, best practices and technology through the establishment of self-sustainable partnerships and collaborative initiatives.

Release of practical tools to the GNSS developer community, ideally with free open source license, is of particular interest.

Type of action: Innovation Actions

*The conditions related to this topic are provided at the end of this call and in the General Annexes.*

### **GALILEO-4–2014: EGNSS awareness raising, capacity building and/or promotion activities, inside or outside of the European Union**

Specific challenge: Awareness raising and capacity building in the field of EGNSS are essential elements in facilitating the breakthrough of EGNOS and Galileo inside and

outside Europe and in increasing the number of opportunities for future collaboration between European and non-European GNSS entities. Promotion activities should take a more active role in generating new ideas ready to spin-off and/or to go into market introduction, in providing crucial seed financing and in increasing the visibility of the EGNSS.

Scope: The proposals should aim at capacity building, increasing awareness of EGNSS solutions, providing networking opportunities of centres of excellence and other relevant actors and achieving a critical mass of EGNSS applications success stories, making it an attractive option for private investors in Europe and also globally. Activities under this topic may also contribute to the cooperation schemes, which have been established with partner countries worldwide.

Technology promotion activities can include incentive schemes in the form of financial support to third parties for innovative applications developed by companies and entrepreneurs and based on the EGNSS that will promote the uptake of satellite navigation downstream applications across Europe and beyond.<sup>4</sup>

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The main aim of this topic is to support building of industrial relationships by gathering private and public institutions around services offered by EGNSS and related applications. This topic should support the competitiveness of EU industry by identifying strategic partners and by developing market opportunities.

The support to incentive schemes should foster the emergence of new downstream applications based on either Galileo and/or EGNOS and therefore to support the EU GNSS industry.

Type of action: Coordination and support actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes. For this topic, in as far as financial support for third parties is concerned, proposals must reflect the requirements envisaged in the provisions of the Financial Regulation and the detailed conditions stipulated in the Annexes.***

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<sup>4</sup> In-line with the requirement of Regulation No 966/2012 of the European Parliament and of the Council of 25 October 2012 and Commission Delegated Regulation No 1268/2012 of 29 October 2012

**CONDITIONS FOR THIS CALL**

Opening dates<sup>5</sup>: 11/12/2013 for 2014 topics  
04/11/2014 for 2015 topics

Deadline(s)<sup>6</sup>:

GALILEO-1-2014 GALILEO-2-2014 GALILEO-3-2014 GALILEO-4-2014	03-04-2014 at 17.00.00 Brussels time
GALILEO-1-2015 GALILEO-2-2015 GALILEO-3-2015	08-04-2015 at 17.00.00 Brussels time

Overall indicative budget: EUR 38.00 million from the 2014 budget, and EUR 25.00 million from the 2015 budget<sup>7</sup>

Topics	2014 EUR million	2015 EUR million
GALILEO-1-2014, GALILEO-1-2015	15.00 – 20.00	10.00 – 15.00
GALILEO-2-2014, GALILEO-2-2015	5.00 – 10.00	5.00 – 10.00
GALILEO-3-2014, GALILEO-3-2015	5.00 – 8.00	0 – 5.00
GALILEO-4-2014	5.00 – 10.00	0

Eligibility and admissibility conditions: The conditions are described in parts B and C of

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<sup>5</sup> The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening.

<sup>6</sup> The Director-General responsible may delay this deadline by up to two months.

<sup>7</sup> The budget amounts for 2015 are subject to the availability of the appropriations provided for in the draft budget for 2015 after the adoption of the budget for 2015 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

the General Annexes to the work programme, with the following exceptions:

GALILEO-1-2014 GALILEO-1-2015 GALILEO-2-2014 GALILEO-2-2015 GALILEO-3-2014 GALILEO-3-2015 GALILEO-4-2014	With the view of favouring wider competition and participation, the European Space Agency will not participate in consortia of proposals submitted under this call for proposals
GALILEO-2-2014 GALILEO-2-2015	The consortium coordinator must be an SME.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide<sup>8</sup> published on the Participant Portal.

Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation ( <i>single stage</i> )	Indicative date for the signing of grant agreements
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<sup>8</sup>See: [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/pse/h2020-guide-pse\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf)

GALILEO-1-2014	Maximum 5 months from the final date for submission	Maximum 3 months from the date of informing applicants
GALILEO-1-2015		
GALILEO-2-2014		
GALILEO-2-2015		
GALILEO-3-2014		
GALILEO-3-2015		
GALILEO-4-2014		

Consortium agreements: In line with the Rules for Participation, participants in Research and Innovation Actions or in Innovation Actions are required to conclude a consortium agreement prior to grant agreement.

Implementation: Indirect management by the European GNSS Agency under a delegation agreement with the European Commission.

## **Call - Earth Observation**

***H2020-EO-2014***

### ***Space enabled applications***

Over the last decade, Europe has established the autonomous capacity for space-borne observations and operational services in the field of environment and the management thereof, climate change, civil protection and security. Operational satellites are providing data on a free and open data policy basis as well as commercially, and are complemented by first-of-a-kind research satellites. During its lifetime, Horizon 2020 will be supporting the operational Copernicus activities by addressing the continuity of pre-operational services until end of 2014, fostering the development of uptake of EO data (and specifically Copernicus) in applications and commercial exploitation, and performing RD&I to answer specific service evolution needs expressed by the operational Copernicus services. In the years 2014 and 2015, scientific, operational and commercial exploitation of the existing and emergent European space infrastructure needs to be enhanced, by stimulating the emergence of novel ideas on what can be observed from space, and what information might still be hidden in existing Earth Observation (EO) data of various kinds. Research to promote such new ideas will ensure Europe's leadership in space-enabled applications in the future, and enable Europe to effectively address its research challenges, as well as the focus areas of the Commission's strategic programme for Horizon 2020, in innovative ways within the societal challenge pillar.

Proposals are invited against the following topic:

### **EO-1-2014: New ideas for Earth-relevant space applications**

**Specific challenge:** Space systems produce information which often cannot be acquired in any other way. Specifically, the Copernicus data, including the Contributing Missions (current and future), are expected to provide improved data quality, coverage and revisit times, and increase the value of Earth Observation data for scientific work and future emerging applications. Equally, space data obtained for specific purposes can subsequently reveal novel scientific insights which were not specifically intended or expected at the time of space sensor launch. Explorer missions, e.g. at ESA, generate new remote sensing opportunities. In order to fuel this cycle of discovery, and further enhance scientific, operational and commercial exploitation of collected space data related to Earth (now or in the near future), new upstream data products and analysis methods suitable for subsequent integration into applications (such as for instance conducted in the calls of the Horizon 2020 societal challenges, or service product lines) should be generated. In this context space data (i.e. remotely-sensed data as well as in-space located measurements, gravity data, magnetic data, GNSS signals) could be relevant to a wide variety of Earth-related topics (relevant to earth environment, atmosphere, agriculture, land use, risk, emergency management, security, cultural heritage and archaeology etc.), thereby widening the data scope beyond conventional EO images.

**Scope:** New and hitherto immature uses of Earth-relevant space-based data (also taking into account specific satellite sensor acquisition modes) should be investigated to enable integration or assimilation into scientific investigations related to Earth system sciences,

or forecasting models at regional or wider geographical extent. Attention should be given to space based data covering geographic areas sensitively affecting the earth system, as is the case for instance for the Arctic and Antarctic regions. When considering inclusion of space based data, consideration should also be given to the near real-time access opportunities offered by state of the art and next generation space/satellite communications capabilities.

It is expected that proposals address also how the insights proposed to be obtained from space based data can be validated, e.g. in combination with ground based observations, or in-flight collected data, with appropriate attention also being given to calibration of space data. Research into specification of the uncertainties associated with the derived results should also be included. To enhance the use of intermediate and final products, due attention is also to be given to standardisation of data, best practices, dissemination mechanisms and reference frames. Furthermore, to enable integration into operational services such as Copernicus requires highly automated processes with minimum manual intervention to be developed.

Preference shall be given to the usage of data from space-borne European instruments. In case such European data exists, the primary use of non-European data shall be justified by the applicant. Proposers may thus find it helpful to consult information on availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data, at the Commission's web <http://ec.europa.eu/enterprise/policies/space/research>

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Proposals are expected to prepare the ground for further innovative exploitation of European space data in scientific activities and/or future and emerging applications.

Proposals are expected to have a significant impact in stimulating wide and further exploitation of the used data, be it in scientific or commercial use, or operational services. The application potential of these new data products and concepts will have to be demonstrated through selected examples and demonstration cases. The results shall be actively disseminated in the relevant scientific publications, as well as towards potential user communities as appropriate. For operational exploitation, the needs of the user community are expected to have been validated in order to ensure a positive impact. The research may deliver as well input for drawing up user requirements for enhanced processing tools or future observation instruments.

An important impact is also the applicability of the results for further systematic research usage, either in the context of the societal challenges addressed by Horizon 2020 calls, or research conducted in domains not covered in the scope of other Horizon 2020 funding areas. Results will therefore have to attain the necessary maturity to fulfil this promise. Specific commercial or scientific agreements for usage of results will be positively considered.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***



### ***Tools for access to space data***

Efficient and widespread exploitation of the existing and planned operational European space infrastructure (especially Copernicus with its sentinel satellites) is only possible if further efforts are made for the processing, archiving, standardised access and dissemination of satellite data. Sustainable availability has also to be coupled with generic search, data-mining and visualisation techniques inviting wide data use, also allowing for standardised and automated approaches. Wide use has to be achieved at European and global levels, and coordination with mechanisms promoted in the context of the Global Earth Observation System of Systems (GEOSS) and the Committee on Earth Observing Satellites (CEOS) is to be achieved.

For successful exploitation of space borne sensors to take place, it is furthermore necessary to provide access to easy-to-use, calibrated and validated data products, taking into account the latest and emerging remote sensing capabilities and the most recent online data manipulation, collaboration, visualisation and sharing technologies. Validation efforts have to provide researchers and users with well-defined uncertainty ranges of space data to make the subsequent usage verifiable and to allow for cross-sensor or cross-satellite use of data.

Proposals are invited against the following topics:

#### **EO-2-2014: Climate Change relevant space-based Data reprocessing and calibration**

Specific challenge: Research areas such as Climate Change address long time periods of data records, where historical data are essential to identify reliable trends and anomalies. The data from past remote sensing missions available either from European and non-European missions, must be made accessible in a way to establish seamless time series of similar observations, contributing to the generation of Climate Data Records across sensors and technologies over two decades and more. At the same time, the relevance of space derived variables and products needs to be critically examined, and enhanced to optimally fit the requirements arising from current policy issues in a variety of EU sectors. This includes the needs of assessment of impact of climate change, as well as mitigation and adaptation strategies in different societal benefit areas. This work is complementary to efforts undertaken by ESA in the Climate Change Initiative (CCI), and will require coordination with on-going efforts accordingly.

Scope: The remote sensing data maintained in archives of the relevant data holding agencies will require to be reprocessed to ensure the generation of consistent time series of data and products with the most up to date operational algorithms. These time series shall benefit from the panoply of available source data to ensure suitability for producing the most reliable, accurate, stable and complete Climate Data Records. Manipulation of historical data at the relevant sources will be required to enable quick analyses, bulk reprocessing and wide access to different science and application communities. Interoperability of diverse observation collections, including all parts of the atmosphere and its boundary (such as ice, fresh water, sea surface and land surface), tropospheric and stratospheric data, sensor calibration and sensor-to-sensor cross calibration will have to be included, as well as estimates of the associated uncertainties, limits and biases. The proposed activities will need to be closely coordinated with the ESA Climate Change

Initiative (CCI) and other relevant initiatives of space data calibration in context of CEOS or GEO.

Proposers are advised to consult further information on availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data, as well as issues recommended to be detailed in the proposals at the Commission's web <http://ec.europa.eu/enterprise/policies/space/research>.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 5.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The proposal is expected to significantly contribute to the availability of validated space-based observational data on Climate Change as a long time series, providing consistent Climate Data Records over a time period corresponding to the satellite era. Close cooperation with other relevant on-going activities such as the ESA CCI and GEO is expected. Proposers should demonstrate how the work performed adds value to existing data repositories and efforts by the respective remote sensing data holding agencies. Best practices in combining data from different satellites and other sensors in consistent ways should be established and promoted.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### **EO-3-2014: Observation capacity mapping in the context of Atmospheric and Climate change monitoring**

Specific challenge: Climate research, and atmospheric research, are cases that clearly illustrate the full complexity of needs for validation and calibration of space data, and hence of the remote sensing data at source. The latter includes a range of sensors operated by different space agencies that all need to be sufficiently reliable and accurate to contribute efficiently to the generation of Climate Data Records. More atmospheric species, as well as aerosols, need to be monitored, simultaneously and for the same air mass, at local to global level. The transport and dispersion of these various constituents are critical quantities to be monitored. Space based remote sensing data have to be integrated with measurements taken at various places in the atmosphere, from the middle atmosphere down to ground level. Efforts must be coordinated at national and international levels to optimize the use of existing in-situ measurements, establishing observation profiles, the deployment of new measuring systems and the design of campaigns dedicated to the calibration and validation of remote sensing data. Vicarious calibration techniques require detailed and complete documentation of the state of the atmosphere at time of satellite overpasses over a variety of land, water and icy surfaces to span a large range of environmental conditions. The integrated use of different technologies or tools for measuring the atmospheric effects can promote further the earth observation for monitoring the environment.

A comprehensive 3-D coverage has to be developed and implemented together with an appropriate validation strategy. While calibration and validation campaigns are conducted at national and international level, particularly to validate specific sensors and

satellites, a European coordinated approach in charting systematically the available and needed instrument suites for systematic climate change monitoring in space and time, and the correspondingly required validation campaigns remains elusive.

**Scope:** To achieve this, research is needed to assess gaps in remote observation availability and suitable approaches for defining virtual observation constellations. It should include mapping of ground based networks, airborne, balloons and sub-orbital platforms as well as space based sensors. Appropriate calibration and validation of data is to be assessed, charting the campaigns that will be needed to cover the climate change monitoring needs in years to come from remote sensing data gathered over land, water and icy surfaces. A mapping of available/deployed sensor technologies and measurements should be performed as a first step, to identify gaps in available systems and current knowledge to characterise the atmospheric, measure atmospheric profiles, profiles and different ground level conditions and ensure the provision of reliable and accurate Climate Data Records for the atmosphere, land surfaces and oceans. This information should also lay the basis for drawing up the need for dedicated calibration and validation campaigns combining instruments and measurements deployed in ground based networks, airborne, UAV, balloons, sub-orbital and in-orbit platforms, as relevant for climate change monitoring. Since this activity is highly reliant on consensus of the users in form of the scientific community involved in subsequent climate change and atmospheric measurements/modelling, the proposal will have to mobilise such key players across Europe and globally, and will have to include mechanisms regarding best practices to reach a consensus on the strategies proposed.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**Expected impact:** The proposal is expected to lead to significant advances in greater consistency and cross-calibration/validation of long term space based measurements with ground-based historical references, providing a better overview of uncertainty of available data to generate Climate Data Records, including impacts information of space data. Based on the work done, best practices regarding calibration/validation campaigns should be promoted. Proposals are expected to add value to the work of bodies such as the Global Climate Observing System (GCOS), WMO Integrated Observing System (WIGOS) and the ESA Climate Modelling User Group.

While this action addresses climate relevant issues, monitored parameters and their uncertainty are important for many other purposes (air pollution, air traffic management etc.) and the availability of project material to the wider GMES/Copernicus community should be ensured as well.

**Type of action:** Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

**CONDITIONS FOR THIS CALL**

Publication date: 11/12/2013

Deadline(s)<sup>9</sup>:

EO-1-2014	26/03/2014 at 17.00.00 Brussels time
EO-2-2014	
EO-3-2014	

Overall indicative budget: EUR 21.50 million from the 2014 budget

Topics	2014 EUR million
EO-1-2014	10.00
EO-2-2014	5.50
EO-3-2014	6.00

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme, with the following exceptions:

EO-1-2014 EO-2-2014 EO-3-2014	With the view of favouring wider competition and participation, the European Space Agency will not participate in consortia of proposals submitted under this call for proposals
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide<sup>10</sup> published on the Participant Portal.

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<sup>9</sup> The Director-General responsible may delay this deadline by up to two months.

<sup>10</sup>See: [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/pse/h2020-guide-pse\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf)

Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation ( <i>single stage</i> )	Indicative date for the signing of grant agreements
EO-1-2014 EO-2-2014 EO-3-2014	Maximum 5 months from the final date for submission	Maximum 3 months from the date of informing applicants

Consortium agreements: In line with the Rules for Participation, participants in Research and Innovation Actions or in Innovation Actions are required to conclude a consortium agreement prior to grant agreement.

## **Call - Protection of European assets in and from space**

***H2020-PROTEC-2014***

The present call concerns space weather and Near Earth Objects (NEOs), while action to support the emergence of a Space Surveillance and Tracking capacity at European level will be dealt with under the heading ‘Other actions’.

With increasing dependence on space-based services, the ability to protect our space infrastructures has become essential to our society. Any shutdown of even a part of space infrastructures could have significant consequences for the well-functioning of economic activities and our citizens' safety, and would impair the provision of emergency services.

Space harsh radiation and particle can damage spacecraft and ground infrastructure such as power grids and telecom networks. Space Weather activity aims at understanding, monitoring and forecasting such phenomena to mitigate and prevent them. Research is needed to improve our understanding and convert our scientific knowledge into an operational service.

NEOs such as Asteroid and Comets when impacting the earth can cause damages to an extent that it could threaten mankind. To meet this global concern, Research will promote a coordinated international effort to predict and mitigate the threats of NEO.

Proposals are invited against the following topics:

### **PROTEC-1-2014: Space Weather**

Specific challenge: Space weather services exist already today in Europe and in several countries outside the EU. New services are also being developed (e.g. in ESA's SSA programme and in EU Seventh Framework Programme projects). Their goal is to observe and to predict a range of solar events that may impact the near Earth environment including orbiting satellites and ground based systems. Today, the services partly rely on ageing solar observational infrastructure, which may need to be upgraded or replaced by new space based observatories in the coming years. Data from existing and upcoming missions, as well as available GNSS data, will open the door for Europe to push ahead in its impressive track record in space weather in general and heliophysics research in particular.

The challenge is to harness the expected much richer and larger volumes of data to enable new and more sophisticated modelling of complex physical phenomena and their impact. This will necessitate new approaches to data processing and international cooperation in this domain.

Scope: Exploratory work studying new ideas for data analysis and modelling of space weather with a view to enhancing the performance of space weather prediction. Proposals can cover the full range of space weather phenomena from the solar cycle, flares and coronal mass ejections to the effects of the solar wind in the near-earth environment and the evolution in between.

Research into further improvement of existing models, their validation and the associated simulation tools in the context of international cooperation with leading space weather

service providers and/or related to emerging European space weather services.

There is scope for cooperation with international partners with relevant expertise (also third States' entities with or without EU funding).

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Proposals are expected to deliver new insights into the detailed processes that generate space weather. This should contribute to new services able to predict, with a significantly higher precision than today, space weather events affecting the Earth and the near Earth space environment.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

#### **PROTEC-2-2014: Access technologies and characterisation for Near Earth Objects (NEOs)**

Specific challenge: In order to conduct close approach missions to NEOs, or to undertake mitigating demonstrations, it will be necessary to have a number of specific technologies and instruments readily available to conduct missions to asteroids with very weak gravitational fields.

In parallel, it is fundamental to acquire in-depth information on the internal structure and other physical properties of NEOs, not only for the design of most impact mitigation missions, but also for the assessment of the consequences of an impact on Earth.

Scope: In the first type of action, research is to be conducted on technologies and instruments relevant to orbiting, hovering, and manoeuvring close to small asteroids with very weak gravity fields. Accurate guidance, navigation and control (GNC) of a high-velocity ( $> 10 \text{ km s}^{-1}$ ) kinetic impactor spacecraft into a small NEO or for prolonged hovering around it, as well as orbit determination and monitoring (types of observation and precision) before, during, and after a mitigation attempt, require further technology development. The same applies to means for material sampling and collection, in-situ analysis and sample return to Earth, which are of relevance to physical characterisation.

In actions covering the second specific challenge, scientific research is needed to identify suitable objects for possible missions for detailed characterisation of properties and for developing demonstration and testing of deflection techniques. A characterisation of the NEO population, in particular the small NEOs (50 – 300 m) is to be undertaken. Typical mitigation-relevant physical properties of NEOs include sizes, albedos, mineralogy, shapes, densities, structures, porosities, frequency of binaries, frequency of rubble piles, etc.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: For the first type of action, proposals are expected to contribute to the development of essential techniques and instruments, which would allow approaching and navigating in close vicinity and on the surface of asteroids and comets. The proposals should aim at TRL 5-6 (Technology Readiness Level<sup>11</sup>) and are expected to address technologies needed for deflection as well as for sample return missions.

Proposals addressing the second specific challenge are expected to lead to a comprehensive characterisation of NEO properties, which is mandatory for any mitigation or deflection mission. Data is to be made available in an open repository, taking into account complementary with existing databases. The identification of suitable targets and their accessibility for exploratory missions or mitigation demonstration missions is expected. An analysis of possible future actions in European programmes such as Horizon 2020 and ESA actions is expected.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

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<sup>11</sup> Technology Readiness Levels are defined in part G of the General Annexes. In the specific area of space, further details can be found in the European Space Agency website "Strategic Readiness Level - The ESA Science Technology Development Route". European Space Agency, Advanced Studies and Technology Preparation Division, <http://sci.esa.int/sre-ft/50124-technology-readiness-level/05>



**CONDITIONS FOR THIS CALL**

Publication date: 11/12/2013

Deadline(s)<sup>12</sup>:

PROTEC-1-2014, PROTEC-2-2014	26/03/2014 at 17.00.00 Brussels time
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Overall indicative budget: EUR 9.00 million from the 2014 budget

Topics	2014 EUR million
PROTEC-1-2014 PROTEC-2-2014	9.00

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme, with the following exceptions:

PROTEC-1-2014 PROTEC-2-2014	With the view of favouring wider competition and participation, the European Space Agency will not participate in consortia of proposals submitted under this call for proposals
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide<sup>13</sup> published on the Participant Portal.

Indicative timetable for evaluation and grant agreement:

	Information on	Indicative date
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<sup>12</sup> The Director-General responsible may delay this deadline by up to two months.

<sup>13</sup>See: [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/pse/h2020-guide-pse\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf)

**HORIZON 2020 – WORK PROGRAMME 2014-2015**

*Leadership in enabling and industrial technologies – Space*

	the outcome of the evaluation ( <i>single stage</i> )	for the signing of grant agreements
PROTEC-1-2014 PROTEC-2-2014	Maximum 5 months from the final date for submission	Maximum 3 months from the date of informing applicants

Consortium agreements: In line with the Rules for Participation, participants in Research and Innovation Actions or in Innovation Actions are required to conclude a consortium agreement prior to grant agreement.

## Call – Competitiveness of the European Space Sector: Technology and Science

*H2020-COMPET-2014*

### *Competitiveness of European Space Technology*

Competitiveness, non-dependence and innovation of the European space sector (including SMEs) must be ensured by fostering the development of space technologies. The overarching objective is to contribute at European level, in conjunction with Member States and ESA, to the safeguarding and further development of a competitive and entrepreneurial space industry and the strengthening of European non-dependence in space systems. This implies enabling advances in space technologies and operational concepts from idea to demonstration in representative terrestrial environments and/or in space.

Competitiveness of European space industry is strongly dependent on performance in a global market, which has a high variability when compared to the institutional market. The ability to react to contract opportunities world-wide with recurring technologies for satellites is a critical success factor, and depends on ready access for integrators to subsystem and equipment capacities in Europe.

To ensure the competitive advantage, subsystems and/or equipment have to be technologically mature (i.e. at adequate technology readiness level –TRL<sup>14</sup>– level, possibly flight proven) and be accompanied by adequate production rates. European focus in future space technologies, beyond the current state of the art, needs to be strengthened along the entire TRL chain: from low TRL Key technologies to in-orbit demonstration and validation.

Technologies enabling recurrence of use contribute to enhancing industrial competitiveness. Research on modular, reusable elements is therefore encouraged. Standardisation of such modular components by existing initiatives such as the European Space Components Coordination (ESCC) and the European Cooperation for Space Standardization (ECSS), and their interfaces across Europe will optimise the investments and will facilitate access to emerging commercial markets. Synergies with ongoing work with ESA in the area of technology standardisation will be sought.

Proposals are invited against the following topics:

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<sup>14</sup> Technology Readiness Levels are defined in part G of the General Annexes. In the specific area of space, further details can be found in the European Space Agency website "Strategic Readiness Level - The ESA Science Technology Development Route". European Space Agency, Advanced Studies and Technology Preparation Division, <http://sci.esa.int/sre-ft/50124-technology-readiness-level/05>

### **COMPET-1-2014: Technologies for European non-dependence and competitiveness**

Specific challenge: The space sector is a strategic asset contributing to the independence, security and prosperity of Europe and its role in the world. Europe needs non-dependent access to critical space technologies, which is a *conditio-sine-qua-non* for achieving Europe's strategic objectives. "Non-dependence" refers to the possibility for Europe to have free, unrestricted access to any required space technology. Reaching non-dependence in certain technologies will open new markets to our industries and will increase the overall competitiveness of the European Space sector.

Scope: Research in technologies for European non-dependence and competitiveness has been undertaken within the frame of the EC-ESA-EDA joint initiative on Critical Technologies for European non-Dependence, launched in 2008.

Activities to be proposed in this call will address technologies identified on the list of Urgent Actions as part of the Joint EC-ESA-EDA task force on Critical Technologies (see *Excerpt from Critical Space Technologies for European Strategic Non-Dependence – List of Urgent Actions for 2012/2013*" – June 2012, and the update for the 2014 call in <http://ec.europa.eu/enterprise/policies/space/research> focusing on those areas that have not so far benefitted from prior Framework Programme funding and representing the highest potential for being addressed through the co-funding instruments available in Horizon 2020. A number of priority technologies have been identified for H2020 support from which proposers can choose:

U1 - Space qualification of low shock non-explosive actuators

U2 - Advanced thermal control systems

U5 - Alternative to Hydrazine in Europe

U11 - Application Specific Integrated Circuits (ASICs) for Mixed Signal Processing

U17 - High density (up to 1000 pins and beyond) assemblies on PCB

In this context, technological spin in and/or bilateral collaborations should be enhanced between European non-space and space industries and proposals are expected to provide advanced critical technologies that are of common interest to different space application domains (e.g. telecom, Earth-observation, science, etc.), or even with applicability to terrestrial domains.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. A maximum of one proposal per identified Urgent Action line will be selected for funding.

#### Expected impact:

- To reduce the dependence on critical technologies and capabilities from outside Europe for future space applications, as identified in the EC-ESA-EDA Critical Space Technologies for European Strategic Non-Dependence (see "*Critical Space Technologies for European Strategic Non-Dependence – Background Document – 2011*").

- To develop or regain in the mid-term the European capacity to operate independently in space, e.g. by developing in a timely manner reliable and affordable space technologies that in some cases may already exist outside Europe or in European terrestrial applications. Nevertheless, proposals should strive to go beyond the present state of the art or, preferably, the expected state of the art at the time of completion if alternative technologies are being developed outside Europe.
- To enhance the technical capabilities and overall competitiveness of European space industry satellite vendors on the worldwide market. The proposals are expected to open new competition opportunities for European manufacturers by reducing the dependency on export restricted technologies that are of strategic importance to future European space efforts. They should enable the European industry to get non-restricted access to high performance technologies that will allow increasing its competitiveness and expertise in the space domain.
- Proposals should include a work package dedicated to the development of a commercial evaluation of the technology, and should address how to access the commercial market with a full range (preload) of recurring products.
- Proposals should improve the overall European space technology landscape and complement the activities of European and national space programmes.

Proposals should ideally include development activities up to space qualification.

Type of action: Research and innovation actions.

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### **COMPET-2-2014: Independent access to space**

Specific challenge: The ability to access space is a vital strategic capability for Europe as it has been underlined by EU Council in several resolutions and conclusions. Such capability is necessary to ensure a leading position alongside other major spacefaring nations. The present topic will support research into breakthrough technologies to provide access to space which are complementary and in synergy with the on-going work undertaken by Member States and the European Space Agency to develop solutions for affordable and reliable launcher capabilities. Research efforts should strengthen Europe's capability in terms of having an available, reliable and competitive launch service and lead to cheaper new solutions to ensure the development of a world-class European space-industry and satellite-based applications and services.

Scope: All possible technologies and launching systems, including partly reusable systems and subsystems, will be considered provided that they can demonstrate complementarity no overlapping with on-going launcher developments and credible realization options. Due consideration will be given to the potential of these technologies to strengthen competitiveness and cost-efficiency as well to their commercial potential. Areas of potential improvements for conventional launching systems could be: high energy density green propellants, high performance engineered materials for advanced lightweight structures and components, innovative avionics solutions for safer and more reliable launch operations, adaptation and use of the launcher upper stages for providing extra functionality regarding multiple access to space of small payloads and platforms.

Regarding innovative systems to access space, proposals should have a consistent approach to prove fulfilment of market demands and superiority over classical systems. It is welcomed to explore new solutions for affordable and reliable launcher capabilities in benefit of the wide spectrum of European space RTD community needs (from sub-orbital to orbital injection).

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The technological developments to be addressed must target either a breakthrough in technologies for accessing space or a relevant optimisation or cost reduction of the present launch propulsion systems in terms of fostering the European capabilities of accessing space.

Incremental or disruptive advances over current technologies and functionalities must be proven and assessed in terms economic end-to-end viability. In this context, key advances to achieve a quick and frequent access to space will be prioritised.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### **COMPET-3–2014: In-Space electrical propulsion and station keeping**

Specific challenge: Advances in-Space propulsion beyond the use of chemical technologies will enable a much more competitive development and exploitation of Space systems. The challenge is to enable major advances in electric propulsion for in-space operations and transportation, and guarantee the leadership of European capabilities in electric propulsion at world level within the 2020-2030 timeframe. The objective is to propose a Programme Support Activity (PSA), for the future implementation of a Strategic Research Cluster (SRC) in Horizon 2020. The overall budget for such an SRC could be in the range of several tens of millions of euros and should achieve a full in-orbit validation of the electric propulsion systems developed at pre-commercial level during the SRC. This validation is to be achieved not later than 2023.

Further information on the concept of a Strategic research cluster in Horizon 2020 is available from <http://ec.europa.eu/enterprise/policies/space/research>.

Scope: In-Space transportation begins where the launch vehicle upper stage separates. It comprises the functions of primary propulsion, reaction control, station keeping, precision pointing, and orbital manoeuvring necessary for all satellites.

Some of these technologies will be used in commercial and governmental communications satellites for orbit positioning and station-keeping. Further development is needed to maintain European leadership in this domain which is threatened by a very strong competition of non-European actors aiming at proposing all-electric platforms. Research and development of promising electric propulsion technologies, far beyond the current state of the art, is encouraged. The Power Processing Units (PPU) for the electrical thrusters will be considered as well. A first objective for the SRC is to foster

incremental advances in the development of thrusters by extending their specifications and operative ranges by a factor of at least 3, including advanced studies in the areas of new power concepts, architectures and associated advanced technologies. A second objective is to set up activities for promoting possible disruptive RTD in the field of in-space electrical propulsion, including the increase of electric power for propulsion.

In order to assess the commercial viability of the technologies developed, the proposal should envisage studying the impact of using electrical thrusters in several types of generic platforms. Examples of these are: propulsive modules of interorbital vehicles (as tugs for contribution to in-orbit services), transfer of different payloads towards deep space, GTO transfer for communication satellites, and orbit control. To validate the electrical thrusters to be developed at pre-commercial level during the SRC, a qualification flight will have to be executed not later than 2023. This will serve as a validation for future mission implementation.

Alternative approaches, not already planned for development by other entities are encouraged.

The Commission considers that one proposal requesting a contribution from the EU in the range of EUR 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The initial expected life of the PSA action is 5 years. In this time, the consortium should have delivered:

- Collection and consolidation of requirements for future electric propulsion thrusters from European satellite primes
- Survey of available European electric propulsion technology and its technological readiness level
- Identification and definition of all the activities required to address the challenge of this topic. The contents of the activities must be in agreement with the objectives and boundaries defined in the scope.
- A fully detailed master plan to coordinate all the activities for the whole duration of the SRC.
- A plan for the analysis and evaluation of the results during the execution of the activities within the SRC.
- A plan for the specific exploitation and potential use of the SRC expected outputs.
- A risk assessment and contingency analysis for the SRC.

The execution of the SRC during a first period of 5 years will assure reaching the TRL-

6<sup>15</sup> in the future devices that will form the next-generation of European electrical space thrusters. The goal at the end of the SRC will be to guarantee the leadership of European capabilities in electric propulsion at world level within the 2020-2030 timeframe.

Type of action: Coordination and support action

***The conditions related to this topic are provided at the end of this call and in the General Annexes. All participants funded in the context of this SRC will be required to establish complementary agreements with participants that are awarded grants under different actions, as actions will be complementary to each other.***

#### **COMPET-4-2014: Space Robotics Technologies**

Specific challenge: The challenge is to enable major advances in space robotic technologies for future on-orbit satellite servicing (robotics and rendezvous), and the exploration of the surfaces of the other bodies in our solar system. The objective is to propose a Programme Support Activity (PSA) for the future implementation of a Strategic Research Cluster (SRC) in Horizon 2020. The overall budget for such an SRC could be in the range of several tens of millions of euros and should achieve an in-orbit demonstration at a significant scale of an autonomous system with key elements for the future sector of on-orbit satellite servicing. This demonstration will be achieved not later than 2023. Further information on the concept of a Strategic research cluster is available from <http://ec.europa.eu/enterprise/policies/space/research>.

Scope: Driven by the objective of exploring different strategic directions in the European Space Robotics landscape, and having the chance to present different proposals for different scopes for a Robotics SRCs, with different budgetary conditions, the final target of this topic is to increase the competitiveness of the European Space Industry in sectors demanding robotics solutions. This will be done for the benefit of European robotics and clearly defining the spinning-off and spill over effects to other areas of robotic activity on Earth (such as automobile or underwater). In particular, the topic is centred on-orbit satellite servicing (robotics and rendezvous) and planetary surface exploration. The benefit of investing in space robotics technologies for future on-orbit satellite servicing and planetary surface exploration should also be of benefit in sectors as human-robotic partnership, orbital debris removal but would also spin-off in all terrestrial activities where human intervention is impossible or too hazardous (submarine environments; nuclear, biological and chemical industries crisis management, etc.). Therefore, synergies

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<sup>15</sup> Technology Readiness Levels are defined in part G of the General Annexes. In the specific area of space, further details can be found in the European Space Agency website "Strategic Readiness Level - The ESA Science Technology Development Route". European Space Agency, Advanced Studies and Technology Preparation Division, <http://sci.esa.int/sre-ft/50124-technology-readiness-level/05>



with the current industrial robotics shall be fostered. Spinning-in, i.e., bringing into space innovations originated in other domains, will be also considered,

At a first stage, the SRC led by this PSA is expected to address robotics issues at two levels: (1) design and manufacturing of reliable and high performance novel robotic building blocks for operation in space environments, and (2) developing really innovative advanced robotic concepts and functions.

The robotic building blocks (1) will likely involve: sensors and actuators, materials and structures, manipulators and tools, hardware and control of robotic systems, processing algorithms; sensor fusion and perception; communications and energy systems.

The robotic concepts and functions (2) are expected to involve several of the following areas: mobility, manipulation, and vision; interoperability with other robots; human-machine co-operation; teleoperations for near Earth locations; partly and highly autonomous operations (in very remote locations that have high Earth communication latencies).

In a second stage, the SRC led by this PSA must have the objective of achieving higher performance and/or lower cost and/or less risk at demonstration level..

As most of the space robotics technologies required are mature enough (with the exception of the autonomous operations that require demonstration and/or validation), particular effort must be made to achieve an effective application of technology, i.e. rigorous systems engineering and system performance analysis, rather than an approach based on pure technology development. To validate the performance of integrated servicing systems three different levels of demonstration can be foreseen: Earth analogues; ISS infrastructure and in-orbit demonstration.

In any case, the final stage of the SRC must involve a space demonstration. However, a validation at the level of a qualification flight for a future mission is not required.

The Commission considers that one proposal requesting a contribution from the EU in the range of EUR 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The initial expected life of the PSA action is 5 years. In this time, the consortium should have delivered:

- Identification and definition of all the activities required by 2023 to address the challenge of this topic. The contents of the activities must be in agreement with the objectives and boundaries defined in the scope.
- A fully detailed master plan to coordinate all the activities for the whole duration of the SRC.
- A plan for the analysis and evaluation of the results during the execution of the activities within the SRC.
- A plan for the specific exploitation and potential use of the SRC expected outputs.
- A risk assessment and contingency analysis for the SRC.
- The execution of the SRC during a first period of 5 years will assure an advance in European robotics technologies for space: consolidation of building blocks, development of advanced concepts and functions. This will be done with the aim of

paving the way for the European activity in areas where robotics are key enabling technologies, such as for example on-orbit servicing, orbital debris removal, autonomous operations in planetary surfaces.

The SRC designed and developed by the PSA is expected to deliver its final results at the end of the H2020 cycle (2023-2024). During its lifetime:

- The SRC shall exploit the potential to generate intense public interest by demonstrating an application (such as satellite repair, refuelling or “cleaning space”, etc.), which citizens can easily relate to.
- Some or all the entities involved in the operational projects of the SRC should be in a privileged position to explore the for-profit viability of some or all the solutions and technologies developed within the SRC.

Type of action: Coordination and support action

***The conditions related to this topic are provided at the end of this call and in the General Annexes. All participants funded in the context of this SRC will be required to establish complementary agreements with participants that are awarded grants under different actions, as actions will be complementary to each other.***

#### **COMPET-5-2014: In-Orbit demonstration/Validation (IOD/IOV)**

Specific challenge: In-Orbit demonstration/Validation (IOD/IOV) is a unique tool to boost industry’s competitiveness by eliminating the famous “valley of death” and accelerating the deployment of innovative technology.

The challenge in H2020 is to make access to space possible for new technologies and innovations by means of in-orbit demonstrations (IOD) and/or validations (IOV). This maturity level is crucial to enable the competitiveness, non-dependence and innovation of the European space sector. Apart from assessing launching opportunities, platforms and possible upper stages may need to be adapted or developed (complementary to those already existing in Europe) to affordably harness existing European launching capabilities for placing new space products in orbit.

At this initial stage of Horizon 2020 studies are needed to help define the envelope and the requirements for the implementation of affordable missions of IOD/IOV (in combination with the launching system to be selected) within the Horizon 2020 timing and development contexts. This, together with the analysis, design and implementation of the technological elements (platforms, launchers, interfaces, etc.) represents the needed bricks for making this tool available. The IOD/IOV themselves will be addressed in future calls. This call covers only the studies assessing these activities.

Scope: Many of the technologies developed for space will need to be demonstrated in orbit in order to be accepted as new space products. In many cases, in order to be considered for future missions, flight heritage is a requirement, in particular when a high risk is associated with the use of totally new technologies and innovations. It is the intention of the Commission to ensure that at least two opportunities for IOD/IOV are co-funded during H2020 as a final step in the process of supporting space RTD.

IOD refers to the spaceflight of a scaled version of a particular technology or critical

technology subsystem, which would still need further steps to be ready for mission adoption. IOV would already serve as a qualification flight for future missions implementation. Such a successful validation flight of a particular technology would not require any additional space testing before it can be adopted for a specific mission.

The studies should define possible scenarios for one or several future flight opportunities for IOD/IOV of European technology developments (components, payloads, spacecraft subsystems, re-entry vehicles, etc.) and/or innovative system architectures. European technologies are those originated from EU R&D programmes as well as projects financed by ESA, National Space Programmes or European private initiatives (e.g. satellite communications).

The studies will cover proposals for the IOD/IOV platforms in connection with affordable launch systems, with special focus on European launch solutions. A description of the missions to be accomplished, with the resources available to host a/some technological package/s for demonstration are also required together with the first design and implementation of all the elements needed for the mission. The studies will consider different approaches for the platform for the IOD/IOV activities, or adaptation of existing ones such as: dedicated spacecraft, autonomous multiple payload dispenser systems, platforms of standardised parts, segments/rings, upper stages of launchers and re-entry vehicles among others. Proposed solutions should be suitable to recurrently place new space products into orbit to perform relevant missions, and to demonstrate their viability by proving maturity of technology payloads.

The studies will analyse, from a programmatic point of view, the recommended TRL level that the envisaged technologies must have to be demonstrated/validated<sup>16</sup>. An appropriate phasing between the flight opportunities and the technologies to be demonstrated/validated in orbit shall be presented in the studies. The industrial applicability of the technologies in the short/medium term is an important requirement. Other prioritisation criteria will be based on the balance of packages to ensure the maintenance of a relevant number and variety of technologies in order to optimize the IOD/IOV.

The Commission considers that proposals requesting a contribution from the EU of between EUR 300.000 and 500.000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

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<sup>16</sup> Technology Readiness Levels are defined in part G of the General Annexes. In the specific area of space, further details can be found in the European Space Agency website "Strategic Readiness Level - The ESA Science Technology Development Route". European Space Agency, Advanced Studies and Technology Preparation Division, <http://sci.esa.int/sre-ft/50124-technology-readiness-level/05>

- Identification of a portfolio of solutions and opportunities to implement IOD/IOV missions for enabling the flight and operation of innovative space technologies developed in Europe. These solutions will be fully parametrised (technical aspects, implementation of the technologies and the mission, cost, commercial viability).
- Down-selection, within such a portfolio, of those solutions which are suitable for a Horizon 2020 context and are RTD based and innovative.

Type of action: Coordination and support actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### **COMPET-6-2014: Bottom-up space technologies at low TRL**

Specific challenge: In the mid- and long-term the competitiveness of the space sector and its ability to serve the Union's internal and external policies including the Common Security and Defence Policy depends on the continuous incorporation of novel, or even disruptive technologies. The European RTD investment in the field of very low-TRL<sup>17</sup> technologies is to be enhanced. A number of challenges in space technologies have parallels to terrestrial challenges, for example in the fields of aeronautics, energy, environment, ICTs, natural resource exploration, sensors, robotics, advanced materials and production methods, security and health.

Scope: New ideas must be incorporated into the current state of the art. As many advances could come from non-space sectors, such sectors must be actively researched for potential ideas. This should mobilise both traditional space actors and non-space actors, to look for space technologies of the future. The aim of this topic is to attract new actors to space activities and demonstrate technologies that are potentially disruptive, and not only incremental. Such highly innovative technologies should lead to radical improvements in performance, and will enable emerging missions. Drastic improvements in miniaturisation, efficiency, versatility and functionality are expected.

Proposals based on low TRL (1-3) ideas and technologies which could have a final application in future space systems are solicited. The target is to demonstrate these up to TRL 4-5. In this first call, proposals on the fundamental areas of knowledge are foreseen, in which, among others, some of the Key Enabling Technologies (KETs) play a major role. In particular, proposals are sought with relevance for the fields of: "high-resolution optical and radar observation related technologies (including hyperspectral systems)",

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<sup>17</sup> Technology Readiness Levels are defined in part G of the General Annexes. In the specific area of space, further details can be found in the European Space Agency website "Strategic Readiness Level - The ESA Science Technology Development Route". European Space Agency, Advanced Studies and Technology Preparation Division, <http://sci.esa.int/sre-ft/50124-technology-readiness-level/05>

"radiation-hardened instrument components", "in-situ sensors/instruments of physical parameters", "technologies for flexible/new generation SatCom payloads" and "advanced inter-satellite and/or downlink communications and tracking techniques (RF or Optical)".

The Commission considers that proposals implemented in less than 24 months and requesting a contribution from the EU in the range of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Only up to two proposals will be financed on each of the five lines foreseen: "high-resolution optical and radar observation related technologies (including hyperspectral systems)", "radiation-hardened instrument components", "in-situ sensors/instruments of physical parameters", "technologies for flexible/new generation SatCom payloads" and "advanced inter-satellite and/or downlink communications and tracking techniques RF or Optical".

Expected impact: Spinning-in of new enabling technologies to space systems up to TRL 4-5 and clear indication of the ways in which these technologies can significantly improve performance and/or reduce costs if further developed.

Proposals preferably will mobilise the incorporation of research groups and SMEs without previous experience in space RTD, into the space landscape.

Ideally proposals should result in developments affecting a range of sectors.

Type of action: Research and innovation action.

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### ***Space exploration and science***

Space exploration is a catalyst for the emergence of new technologies, scientific results and innovation that have significantly improved the safety and quality of life on Earth delivering value across all economic areas. Technological priorities for Europe covering the whole spectrum of space exploration activities have been identified and endorsed by EU Council (automation and robotics; novel energy production and storage; advanced propulsion; life support systems). The International Space Station (ISS) plays a key role as a platform for the preparation of next human exploration missions. Life support is one of the key technologies for human exploration and a domain that can bring together a wide array of participants from the space sector and beyond.

Europe has also, over the years, established a leading position in space science, with missions to various destinations in our Solar System. The proposed approach is to enable the European space science community to make a concerted effort to capitalise on current European space science infrastructure, and to achieve the highest possible science return from operational and future space missions. To this end coordinated activities which further science in the context of space missions, i.e. preparing for space missions and deploying scientific activities in support of future or operational missions, will be supported.

The 2014 call topic on space science focuses on Mars data and on the definition of a European sample curation facility. Proposers should note that helio/plasma physics and Earth observation data are dealt with in call sections on space weather and Earth observation respectively.

Exploitation of space science data will be addressed across H2020 on a recurring basis, ensuring a more extensive utilisation of scientific data originated from European missions and missions with European participation.

Proposals are invited against the following topics:

### **COMPET-7-2014: Space exploration – Life support**

Specific challenge: ISS is the current cornerstone of European activities in human spaceflight. With its assembly now complete, and with several years of operations ahead until 2020 and possibly beyond, ISS should be used to the fullest extent for optimising and broadening the scientific, technological and operational return of Europeans investments. ISS should also be further used as a test-bed for the preparation of future exploration ventures as well as for enabling overall scientific and technological progress and provide benefits to citizens. The selection of these proposals in the area of life support will depend on their suitability for research on-board ISS.

Scope: Prepare for demonstrating technologies, and operations techniques and process, critical for future human missions as well as advancing knowledge related to human spaceflight and terrestrial applications for the benefits of citizens. Proposals demonstrating closed loop regenerative life support system technologies (including for instance modelling of complex microbial or plant-based ecosystem, trace elements, circular dynamic system) for safe production of healthy consumables and in particular food for future manned exploration missions should be proposed to be implemented by leveraging synergies between space and non-space actors (e.g. biotechnology, nutrition, food, controlled agriculture, industrial ecology, health sectors). These on-ground preparatory activities are a prerequisite to potential flight hardware development and activities to be conducted on-board the European Columbus module of the ISS.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Proposals are expected to prepare the ground for further innovative development of R&D in human spaceflight and future terrestrial applications. Systems are expected to be developed and tested on the ground and demonstrate operational capability (or close to). An important impact is also the potential applicability of these test projects on-board ISS. Results will therefore have to attain the necessary maturity to fulfil this promise.

The results are expected to have a significant impact in stimulating non-space actors' contribution to space exploration. This research topic should attract active participation of researchers in academia and SMEs. The results should be actively disseminated in the relevant scientific publications, as well as towards potential user communities as appropriate.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

**COMPET-8-2014: Science in context: sample curation facility and scientific exploitation of data from Mars missions**

Specific Challenge: Two specific areas of space science where there is a significant underinvestment when compared to the potential scientific return for Europe are sample curation facility and the exploitation of data of Mars.

One of the main mid-term goals of global space exploration activities is to bring back samples from Mars, asteroids or the Moon. These sample return missions will be developed in the context of ESA programmes or in the international context. However, a European extra-terrestrial sample curation facility will be required in preparation for such missions. The challenge here is to study and map all the aspects required to develop such a facility for all types of samples at the European level, taking into account specificities of receiving potential Moon, Mars and Asteroids samples.

With the highly successful Mars Express mission, launched in 2003, and still operational, Europe firmly established its role on Mars science and exploration. In the last decade an extensive amount of data has been acquired of the atmosphere, surface and sub-surface of Mars. The challenge is to fully exploit this data for fundamental scientific purposes, and in preparation for the next set of European Mars missions to be launched in 2016 (ExoMars orbiter and lander) and 2018 (ExoMars rover) and prepare for future Mars missions.

Scope: An action on sample curation facility should aim at guaranteeing terrestrial planetary protection. It should analyse what facilities, analytical methods and instruments, portable receiving facilities for sample transfers, and analogue samples are required in what timeframe. This analysis must take into account specificities of receiving potential Moon, Mars and Asteroid samples in order to adequately serve future sample return mission that will take place with European involvement.

For the exploitation and development of tools for the exploitation of data of Mars for scientific research, and analysis in preparation of the two ExoMars missions the scope is to rely on the data available through the ESA Planetary Science Archive or other means (e.g. instrument teams). Combination and correlation of this data with data from NASA missions is encouraged to further increase the scientific return and to enable new investigations with existing data sets. This includes data from the atmosphere, surface and sub-surface of Mars, as well as data from the Martian moons Phobos and Deimos. Enhanced data products would be fed back to the ESA archives.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: In the first case, building on existing roadmaps, the action is expected to analyse of opportunities and risks and define further necessary steps, for the implementation of a European extra-terrestrial sample curation facility taking into account specificities of receiving potential Moon, Mars and Asteroids samples.

In the second case proposals are expected to result in scientific publications, open access tools for data use interacting with European archives, and in high-level data products, such as digital maps or atmospheric models, which can be used in the preparation for the

operational phases of the ExoMars missions and subsequent missions.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### ***International Cooperation in Space matters***

Proposals are invited against the following topic:

#### **COMPET-9-2014: Technology “demonstrator projects” for exploration**

Specific challenge: The EU, together with ESA, initiated the high-level platform for space exploration with three dedicated international high level conferences at ministerial level (i.e. Prague in 2009, Brussels in 2010, and Lucca in 2011). The next conference will be hosted by the United States in January 2014. One of the potential outcomes of the International Space Exploration Forum (ISEF) as proposed by Europe is to advance towards the identification of possible future collaboration domains building on technology “demonstrator projects,” to be proposed by one or more actors and linked to exploration missions.

Scope: This topic will allow implementing the technology “demonstrator projects” to be initiated after the ISEF meeting. These demonstrator projects would target underpinning enabling technologies for space exploration, notably robotics, novel energy production and storage, propulsion or life support, as well as atmosphere entry, return/re-entry vehicles or communication and data handling systems. Actors, including international partners, interested to participate to such demonstrator projects could form clusters around several technology “demonstrator projects”. Technology demonstrator projects open to international partnerships would allow developing cutting edge space technology making an important success factor for European researchers and industry.

In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012) 497) and the Commission Staff Working Document “A Role for Europe within a Global Space Exploration Endeavour” preparing for a European position for ISEF, international cooperation is encouraged, in particular with countries active in space exploration.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impacts: Clusters around technology “demonstrator project” would meet and discuss how to build such projects, including governance, technical appraisal, costing aspects and possible funding arrangements. Workshops and information events should be part of the activity. Concrete results and further steps may be presented at the next ISEF meeting.

Instrument: Coordination and support actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***



## ***Outreach and Communication***

Proposals are invited against the following topics:

### **COMPET-10-2014: Outreach through education**

Specific challenge: Space endeavours bear a significant potential of inspiration and motivation for the younger generations. Positive exposure to and experiences in the space domain can contribute moreover to building long-term partnerships between peoples from different cultural backgrounds and countries inside and outside Europe. The challenge is to design and run sustainable outreach activities which can act as catalysers, motivating pupils and students at different ages and education levels. Proposals which could be implemented across different cultures, inside and outside Europe, would be considered.

Scope: One of the main obstacles for the development and sustainability of the European space industrial fabric (and the delivery of cutting-edge scientific achievements) is the lack of scientists, engineers and technicians with specific interest on the area of space research and development.

The main delivery of the action should be an initiative capable of attracting the interest of a significant number of students towards space, while creating at the same time a relevant impact outside the targeted population in terms of news coverage, social-media interest, stakeholders' involvement, etc.

The key advancements of the European space initiatives (Seventh Framework Programme-Horizon 2020 projects, Copernicus and Galileo) should be given a privileged position in the proposal, but the main objective should remain attracting the interest of students, mainly European, for space exploration science and technology.

Proposals should take into account similar activities of ESA and national education programmes. They could focus in the context of the classroom or outside the normal classroom environment, including contests.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The expected impact as a whole is developing and testing certain tools and mechanisms for children and/or teenagers (and potentially teachers) to know more about space science and technology and the European initiatives in this field. The testing of tools should pay special attention to potential differentiated results in terms of gender or socioeconomic status.

By the end of the action the initiative should have proven its capacity to:

- Reach out to a significant number of students among the target group and stimulate an active response among a significant number of them.
- Achieve a significant coverage by media and attention by stakeholders.
- Potentially, being able to track and estimate the results of the action, sampling the numbers of students involved and the numbers of students that opt for a technical career related to space when compared to the general population of students in their cohorts.

Type of action: Coordination and support actions

*The conditions related to this topic are provided at the end of this call and in the General Annexes.*

### **COMPET-11-2014: Transnational and international cooperation among NCPs**

Specific challenge: Facilitate trans-national co-operation between NCPs within the Space domain with a view to identifying and sharing good practices and raising the general standard of support to programme applicants, taking into account the diversity of actors that make up the constituency of this domain.

Scope: Support will be given to a consortium of formally nominated NCPs in the area of Space. The activities will be tailored according to the nature of the area, and the priorities of the NCPs concerned. Various mechanisms may be included, such as benchmarking, joint workshops, enhanced cross-border brokerage events, specific training linked to the Space domain as well as to gender dimension of Research and Innovation, and twinning schemes. Special attention will be given to enhance the competence of NCPs, including helping less experienced NCPs rapidly acquire the know-how accumulated in other countries.

The focus throughout should be on issues specific to the Space part of Horizon 2020 and should not duplicate actions foreseen in the NCP network for quality standards and horizontal issues under ‘Science with and for Society’.

Only NCPs from EU Member States, Associated Countries and other space faring nations and ACP (African, Caribbean and Pacific) countries which have been officially appointed by the relevant national authorities are eligible to participate in and receive funding for this action.

The consortium should have a good representation of experienced and motivated NCPs.

Submission of a single proposal is encouraged. NCPs from EU Member States or Associated Countries choosing not to participate as a member of the consortium should be identified and the reason explained in the proposal. These NCPs are nevertheless invited and encouraged to participate in the project activities (e.g. workshops), and the costs incurred by the consortium for such participation (e.g. travel costs paid by the consortium) may be included in the estimated budget and be eligible for funding by the Commission.

The Commission considers that one proposal requesting a contribution from the EU in the range of EUR 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- An improved and professionalised NCP service across Europe, thereby helping simplify access to Horizon 2020 calls, lowering the entry barriers for newcomers, and raising the average quality of proposals submitted.
- A more consistent level of NCP support services across Europe.
- More effective participation of SMEs and of organisations from third countries, alongside European organisations, in line with the principles of mutual benefit.

Type of action: Coordination and support action

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

**CONDITIONS FOR THIS CALL**

Publication date: 11/12/2013

Deadline(s)<sup>18</sup>:

COMPET-1-2014	26/03/2014 at 17.00.00 Brussels time
COMPET-2-2014	
COMPET-3-2014	
COMPET-4-2014	
COMPET-5-2014	
COMPET-6-2014	
COMPET-7-2014	
COMPET-8-2014	
COMPET-9-2014	
COMPET-10-2014	
COMPET-11-2014	

Overall indicative budget: EUR 53.04 million from the 2014 budget

Topics	2014 EUR million
COMPET-1-2014	11.04
COMPET-2-2014	8.00
COMPET-3-2014	4.00
COMPET-4-2014	4.00
COMPET-5-2014	2.00
COMPET-6-2014	5.00
COMPET-7-2014	8.00
COMPET-8-2014	4.00
COMPET-9-2014	3.00
COMPET-10-2014 COMPET-11-2014	4.00

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<sup>18</sup> The Director-General responsible may delay this deadline by up to two months.

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme, with the following exceptions:

COMPET-1-2014 COMPET-2-2014 COMPET-5-2014 COMPET-6-2014 COMPET-8-2014 COMPET-9-2014 COMPET-10-2014 COMPET-11-2014	With the view of favouring wider competition and participation, the European Space Agency will not participate in consortia of proposals submitted under this call for proposals
COMPET-1-2014	A maximum of one proposal per identified Urgent Action line will be selected for funding.
COMPET-3-2014 COMPET-4-2014 COMPET-11-2014	The Commission will only fund one project under each of these topics.
COMPET-3-2014 COMPET-4-2014	The general conditions for participation in Horizon 2020 Research and Innovation actions will apply to these Coordination and Support Actions: i.e. at least three legal entities, established in a different Member State or associated country and independent of each other.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide<sup>19</sup> published on the Participant Portal.

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<sup>19</sup>See: [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/pse/h2020-guide-pse\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf)

Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation ( <i>single stage</i> )	Indicative date for the signing of grant agreements
COMPET-1-2014	Maximum 5 months from the final date for submission	Maximum 3 months from the date of informing applicants
COMPET-2-2014		
COMPET-3-2014		
COMPET-4-2014		
COMPET-5-2014		
COMPET-6-2014		
COMPET-7-2014		
COMPET-8-2014		
COMPET-9-2014		
COMPET-10-2014		
COMPET-11-2014		

Consortium agreements: In line with the Rules for Participation, participants in Research and Innovation Actions or in Innovation Actions are required to conclude a consortium agreement prior to grant agreement.

## **Call – Earth Observation**

***H2020-EO-2015***

### ***Space enabled Applications***

New innovative geo-spatial products for commercial exploitation are enabled by space data, and directly enhance the competitiveness of the European value-adding and geo-information service sector. This will also further validate the premise that space systems produce information complementary to in-situ data, which often cannot be acquired in any other way. This is key to return on the major space investments made in Earth Observation space infrastructure, and validating Europe's investments made, especially in the Union's Copernicus programme. With the availability of Copernicus data, actions will be funded in 2015 which have high business potential and are developing space enabled EO products and applications close to the market.

Proposals are invited against the following topic:

### **EO 1 – 2015: Bringing EO applications to the market**

Specific challenge: If space investments made in earth observation are to generate economic return, it is essential that EO products and information generation are taken out of the research environment and products are put into the market. Such EO products often realise highly automated processes with minimum manual intervention. For such applications and developments to succeed, the product needs to be shaped according to users' demands, to be validated and proven. This needs to be achieved in an environment integrated at the user, in order for users to accept the innovative potential which the product promises. This will require also specific attention to be given to the various processes in place in the users' workflows which incorporate the EO information. Furthermore, the commercial providers will have to prove that they can sustain their product operationally based on market revenues. To this end a credible planning for the 3 years after the end of public funding shall be part of the proposal.

Scope: The outcome of this innovation project should be a commercial service platform, sustained by a production process capable to deliver to the user a product which is validated and accepted as a marketable product. Transnational collaboration has a key role to play in this context, as it enhances access to markets beyond the national borders, notably by enabling space application providers to absorb market-related tacit knowledge and know-how of their partners. Corresponding validations and customisations are to be undertaken, and the business case for the application is to be demonstrated. Service level models are to be developed, with appropriate quality of service definitions for the application. Application products are expected to adopt open standards for data documentation, data models and services.

The choice of EO application is left to the proposer. A preference will also be given to SMEs, which are considered to be particularly important players in this European EO applications sector.

Proposers are advised to consult further information on availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data, as well as issues

recommended to be detailed in the proposals at the Commission's web <http://ec.europa.eu/enterprise/policies/space/research>.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Proposals are expected to establish sustainable supply chains for innovative EO applications with demonstrated commercial value with targeted client communities. Complete integration into the customer's existing business processes and processing chains, as well as the economic viability of the application is to be demonstrated.

Proposals are expected to enhance the European industry's potential to take advantage of market opportunities and establish leadership in the field, and to boost business activity.

It is expected that proposals lead to new or improved products, processes or services on the market, which are capable of generating within 3 years after the end of public funding a significant turnover for the participants, and create a significant number of new jobs.

Type of action: Innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### ***Tools for access to space data***

Efficient and widespread exploitation of the existing and planned European space infrastructure (especially Copernicus with its sentinel satellites) is only possible if further effort can be made for the processing, archiving and standardised access to retrieved satellite data. Sustainable availability has also to be coupled with generic search, data-mining and visualisation techniques inviting wide re-use, also through standardised approaches. Such re-use has to be achieved at European and global level, and coordination with mechanisms promoted in the context of the Global Earth Observation System of Systems (GEOSS) and the Committee on Earth Observing Satellites (CEOS) is to be achieved.

For successful exploitation of space borne sensors to take place, it is furthermore necessary to develop easy-to-use, calibrated and validated data products, taking into account the latest and emerging remote sensing capabilities and the most recent online data manipulation, collaboration and sharing technologies. Validation efforts have to provide researchers and users with uncertainty ranges of space data to make the subsequent usage verifiable.

Proposals are invited against the following topics:

### **EO-2-2015: Stimulating wider research use of Copernicus Sentinel Data**

Specific challenge: Europe's investment in the Copernicus Sentinel satellites will provide Europe with an unprecedented source of operational satellite data. The first and largest



streams of data will become available from Sentinel 1 (SAR data) during 2014, to be followed shortly thereafter with data from Sentinels 2 and 3 (optical imaging data), as well as Sentinel 5p. In the longer term also major contributions for atmospheric measurements will be made by Sentinels 4 and 5. Data streams are expected to amount to several terabyte per satellite orbit, thereby delivering unprecedented temporal and spatial resolution and data continuity, calling for new data handling and processing paradigms. While this data is ingested into the operational Copernicus services, wide use by the scientific community and industry researchers for developing products is still limited and needs to be stimulated with easy-to-use interfaces for performing R&D. Where appropriate, integration into operational services such as Copernicus may require the efficiency of highly automated processes with minimum manual intervention.

Scope: To fully benefit from the high scientific, operational and commercial potential of the Sentinel data, development tools, as well as stable and predictable access methods need to be developed, such as:

- development of simulators of space based earth observation data, to facilitate the uptake of EO data, and to prepare data processing chains;
- research into efficient information retrieval from satellite data repositories and dissemination;
- developing software to read and transform data for access by scientific, institutional and commercial users, including data mining techniques;
- developing data co-registration and fusion methods (data from several sentinels and /or other contributing satellite missions);
- advanced visualisation techniques (allowing also for sensory exploration of data beyond visual experience);
- efficient and validated sentinel data integration methods for operational service use.

The ability to access diverse space data archives, of large volumes of data, the use of standardised forms of data query, retrieval, formats and data exchange methods will be central to these tasks. Attention should be given to platforms offering novel methods able to cope with the big data challenge (storage, processing, remote access, etc.). A particular aspect of interest is also the international use of Sentinel data, as acceptance of Copernicus data in a global context will be a key to success of Europe's contribution of Copernicus to GEOSS. Such collaboration necessitates also appropriate data sharing interfaces for sentinel data to be developed and agreed upon, based on open source solutions as far as possible.

Proposers are advised to consult further information on availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data, as well as issues recommended to be detailed in the proposals at the Commission's web <http://ec.europa.eu/enterprise/policies/space/research>.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Significantly wider use of Copernicus Sentinel data should be achieved, in Europe as well as internationally. Increased awareness with users of satellite data is to be generated and further opportunities for new uptake of satellite data should be created. Possible models for operational supply of data to users, including for further scientific exploitation should be demonstrated. For methods designed for operational deployment in services, proposals are expected to collaborate closely with services and downstream users to ensure that commercial and operational opportunities are fully identified and exploited. The work should contribute to the definition of best practices and their adoption in scientific and commercial user communities, and in a GEOSS context if possible.

This research topic should attract active participation of researchers in academia and industry, specialising on the use of sentinel data and their integration and/or comparison with other sensor data (from space or in-situ). It should actively involve students performing research with satellite data.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### **EO-3-2015: Technology developments for competitive imaging from space**

Specific challenge: Observation concepts based on fractionated sensors (e.g. telescope arrays) have revolutionised astronomy, and their observation potential from space (swarm missions, satellite constellations) has yet to be realised. This represents a departure from an approach of many different sensors residing on one satellite, in favour of many smaller single-sensor missions. It remains to be established for which areas of Earth observation (land monitoring, atmospheric measurements, water quality, maritime surveillance, emergency management, security, etc.) this approach might be particularly effective, be it in performance, risk management and cost effectiveness. Equally, it needs to be understood which technologies would be needed to allow a network/constellation to act as one instrument. Specific requirements for the sensors may also be needed to allow benefit to be taken of such mission concepts.

Scope: Research should be undertaken to review the emerging fractionated observation system concepts. The required technology challenges as regards interfacing, synchronisation, formation flying, precision thrusting and pointing, communication within the constellation or with ground stations are to be identified. Potential benefits to be obtained (e.g. monitoring performance, risk mitigation, cost effectiveness, responsiveness) are to be examined in light of observation needs in different earth observation domains. Observation needs should be validated with the respective user communities to be fit for purpose in terms of scientific and commercial applications. Constellations of instruments might be of the same instrument type, or include a variety of different instruments and related data fusion approaches. Demands for data transfers and communication should be examined in light of current developments of high-speed in-space communication methodologies. The results obtained should enable mission designers and implementers to decide what missions should be initiated for which application areas, and the requirements for communications support.

The Commission considers that proposals requesting a contribution from the EU in the

range of EUR 2.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Proposals are expected to contribute to increasing the effectiveness of future developments by addressing

- significant advances in performance
- greater coherency between different measurement sources,
- mission planning parameters,
- mission scalability and incremental deployment.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

**CONDITIONS FOR THIS CALL**

Opening date<sup>20</sup>: 04/11/2014  
Deadline(s)<sup>21</sup>:

EO-1-2015	08/04/2015 at 17.00.00 Brussels time
EO-2-2015	
EO-3-2015	

Overall indicative budget: EUR 25.00 million from the 2015 budget<sup>22</sup>

Topics	2015 EUR million
EO-1-2015	9.00
EO-2-2015	11.00
EO-3-2015	5.00

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme, with the following exceptions:

EO-1-2015 EO-2-2015 EO-3-2015	With the view of favouring wider competition and participation, the European Space Agency will not participate in consortia of proposals submitted under this call for proposals
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide<sup>23</sup> published on the

<sup>20</sup> The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening.

<sup>21</sup> The Director-General responsible may delay this deadline by up to two months.

<sup>22</sup> The budget amounts for 2015 are subject to the availability of the appropriations provided for in the draft budget for 2015 after the adoption of the budget for 2015 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

Participant Portal.

Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation ( <i>single stage</i> )	Indicative date for the signing of grant agreements
EO-1-2015 EO-2-2015 EO-3-2015	Maximum 5 months from the final date for submission	Maximum 3 months from the date of informing applicants

Consortium agreements: In line with the Rules for Participation, participants in Research and Innovation Actions or in Innovation Actions are required to conclude a consortium agreement prior to grant agreement.

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<sup>23</sup>See: [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/pse/h2020-guide-pse\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf)

## Call – Protection of European Assets in and from Space

**H2020-PROTEC-2015**

The present call concerns space debris as Near Earth Objects and space weather have been already covered in the 2014 call of this Work Programme. The support to the emergence of a Space Surveillance and Tracking (SST) capacity at European level is channelled through ‘Other actions’.

Proposals are invited against the following topic:

### **PROTEC-1-2015: Passive means to reduce the impact of Space Debris**

Specific Challenge: Reducing the impact of collisions between active satellites and orbital debris is a challenge that needs to be addressed at multiple levels. In addition to SST which addresses surveyance and tracking to prevent collision other aspects must be considered:

1. Prevention, avoid adding new debris to the already large debris population.
2. Mitigation, specifically de-orbiting solutions for satellites and launcher upper stages at the end of their operational life.
3. Protection, i.e. shielding satellites from impact of small debris.

Scope: To develop and test concepts and technologies needed for safe de-orbiting and disposal of space objects, including up to in-orbit demonstration as an option. Planned end-of-life de-orbiting or safe disposal of new satellites and launch vehicle’s upper stages as well as non-technical issues including legal issues should be considered.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Innovative and cost effective solutions, allowing scalable system-design, for post-mission disposal of satellites and launcher upper stages which are in line with or exceed international and European guidelines and legal requirements.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

**CONDITIONS FOR THIS CALL**

Opening date<sup>24</sup>: 04/11/2014

Deadline(s)<sup>25</sup>:

PROTEC-1-2015	08/04/2015 at 17.00.00 Brussels time
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Overall indicative budget: EUR 6.50 million from the 2015 budget<sup>26</sup>

Topics	2015 EUR million
PROTEC-1-2015	6.50

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme, with the following exceptions:

PROTEC-1-2015	With the view of favouring wider competition and participation, the European Space Agency will not participate in consortia of proposals submitted under this call for proposals
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide<sup>27</sup> published on the Participant Portal.

<sup>24</sup> The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening.

<sup>25</sup> The Director-General responsible may delay this deadline by up to two months.

<sup>26</sup> The budget amounts for 2015 are subject to the availability of the appropriations provided for in the draft budget for 2015 after the adoption of the budget for 2015 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

<sup>27</sup> See: [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/pse/h2020-guide-pse\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf)

Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation ( <i>single stage</i> )	Indicative date for the signing of grant agreements
PROTEC-1-2015	Maximum 5 months from the final date for submission	Maximum 3 months from the date of informing applicants

Consortium agreements: In line with the Rules for Participation, participants in Research and Innovation Actions or in Innovation Actions are required to conclude a consortium agreement prior to grant agreement.



## Call – Competitiveness of the European Space Sector: Technology and Science”

**H2020-COMPET-2015**

Following the equivalent 2014 call within this work programme, the 2015 call maintains the support in certain key areas (critical technologies, access to space, low TRL<sup>28</sup>) while extending its reach to other areas of space science and exploration and new domains of international cooperation.

Proposals are invited against the following topics:

### *Competitiveness of European Space Technology*

#### **COMPET-1-2015: Technologies for European non-dependence and competitiveness**

Specific challenge: The space sector is a strategic asset contributing to the independence, security and prosperity of Europe and its role in the world. Europe needs non-dependent access to critical space technologies, which is a *conditio-sine-qua-non* for achieving Europe’s strategic objectives. "Non-dependence" refers to the possibility for Europe to have free, unrestricted access to any required space technology. Reaching non-dependence in certain technologies will open new markets to our industries and will increase the overall competitiveness of the European Space sector.

Scope: Research in technologies for European non-dependence and competitiveness has been undertaken within the frame of the EC-ESA-EDA joint initiative on Critical Technologies for European non-Dependence, launched in 2008. Critical Components, which are integral part of critical technologies, have also been dealt with in the context of European Space Components Coordination (ESCC) and the Components Technology Board (CTB).

Activities to be proposed in this call will address technologies identified on the list of Urgent Actions as part of the Joint EC-ESA-EDA task force on Critical Technologies (see "Excerpt from Critical Space Technologies for European Strategic Non-Dependence – List of Urgent Actions for 2012/2013" – June 2012 and the update for the 2015 call <http://ec.europa.eu/enterprise/policies/space/research>), focusing on those areas that have

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<sup>28</sup> Technology Readiness Levels are defined in part G of the General Annexes. In the specific area of space, further details can be found in the European Space Agency website "Strategic Readiness Level - The ESA Science Technology Development Route". European Space Agency, Advanced Studies and Technology Preparation Division, <http://sci.esa.int/sre-ft/50124-technology-readiness-level/05>

not so far benefitted from prior Framework Programme funding and representing the highest potential for being addressed through the co-funding instruments available in Horizon 2020.

A number of priority technologies have been identified for H2020 for 2015:

- U4 - Advanced materials and material technology for combustion chambers
- U6 - Fibre Optic Gyro (FOG) based Inertial Measurement Unit - IMU
- U7 - Power amplification: Travelling Wave Tube (TWT) materials
- U12 - High Capacity Field-Programmable Gate Array (FPGA)

In this context, technological spin in and/or bilateral collaborations should be enhanced between European non-space and space industries and proposals are expected to provide advanced critical technologies that are of common interest to different space application domains (e.g. telecom, Earth-observation, science, etc.), or even with applicability to terrestrial domains.

The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Without prejudice to the outcome of the evaluation process and with a view to covering all four urgent actions, a maximum of one proposal per identified Urgent Action line will be selected for funding.

Expected impact:

- To reduce the dependence on critical technologies and capabilities from outside Europe for future space applications, as identified in the EC-ESA-EDA Critical Space Technologies for European Strategic Non-Dependence (see *Critical Space Technologies for European Strategic Non-Dependence – Background Document - 2011*).
- To develop or regain in the mid-term the European capacity to operate independently in space, e.g. by developing in a timely manner reliable and affordable space technologies that in some cases may already exist outside Europe or in European terrestrial applications. Nevertheless, proposals should strive to go beyond the present state of the art or, preferably, the expected state of the art at the time of completion if alternative technologies are being developed outside Europe.
- To enhance the technical capabilities and overall competitiveness of European space industry satellite vendors on the worldwide market. The proposals are expected to open new competition opportunities for European manufacturers by reducing the dependency on export restricted technologies that are of strategic importance to future European space efforts. They should enable the European industry to get non-restricted access to high performance technologies that will allow increasing its competitiveness and expertise in the space domain.
- Proposals should include a work package dedicated to the development of a commercial evaluation of the technology, and should address how to access the commercial market with a full range (preload) of recurring products.

- Proposals should improve the overall European space technology landscape and complement the activities of European and national space programmes.

Proposals that include development activities up to space qualification will be favoured in terms of their potential impact.

Type of action: Research and innovation action

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### **COMPET-2-2015: Independent access to space**

Specific challenge: The ability to access space is a vital strategic capability for Europe as it has been underlined by EU Council in several resolutions and conclusions. Such capability is necessary to ensure a leading position alongside other major spacefaring nations. The present topic will support research into breakthrough technologies to provide access to space which are complementary and in synergy with the on-going work undertaken by Member States and the European Space Agency to develop solutions for affordable and reliable launcher capabilities. Research efforts should strengthen Europe's capability in terms of having an available, reliable and competitive launch service and lead to cheaper new solutions to ensure the development of a world-class European space-industry and satellite-based applications and services.

Scope: All possible technologies and launching systems, including partly reusable systems and subsystems, will be considered provided that they can demonstrate complementarity and no overlapping with on-going launcher developments and credible realization options. Due consideration will be given to the potential of these technologies to strengthen competitiveness and cost-efficiency as well to their commercial potential. Areas of potential improvements for conventional launching systems could be: high energy density green propellants, high performance engineered materials for advanced lightweight structures and components, innovative avionics solutions for safer and more reliable launch operations, adaptation and use of the launcher upper stages for providing extra functionality regarding multiple access to space of small payloads and platforms. Regarding innovative systems to access space, proposals should have a consistent approach to prove fulfilment of market demands and superiority over classical systems. It is welcomed to explore new solutions for affordable and reliable launcher capabilities in benefit of the wide spectrum of European space RTD community needs (from sub-orbital to orbital injection).

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: The technological developments to be addressed must target either a breakthrough in technologies for accessing space or a relevant optimisation or cost reduction of the launch present propulsion systems in terms of fostering the European capabilities of accessing space. It is welcomed to explore new solutions for affordable and reliable launcher capabilities in benefit of the wide spectrum of European space RTD community needs (from sub-orbital to orbital injection).

Incremental or disruptive advances over current technologies and functionalities must be proven and assessed in terms of economic end-to-end viability. In this context, key advances to achieve a quick and frequent access to space will be prioritised.

Technologies identified not addressed in the equivalent 2014 call will be preferentially considered.

Type of action: Research and innovation actions.

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### **COMPET-3-2015: Bottom-up space technologies at low TRL**

Specific challenge: In the mid- and long-term the competitiveness of the space sector depends on the continuous incorporation of brand-new and even disruptive technologies. The European RTD investment in the field of very low-TRL technologies is to be enhanced. A number of challenges in space technologies have parallels to terrestrial challenges, for example in the fields of aeronautics, energy, environment, telecommunications and ICTs, natural resource exploration, sensors, robotics, advanced materials, security, and health.

Scope: New ideas must be incorporated into the current state of the art. As many of the advances come traditionally also from non-space sectors, an active search must be done in non-Space areas of knowledge in addition to the identification of breakthrough technologies from the space sector. This should mobilise the traditional space actors, and non-space actors, to look for space technologies of the future. The aim of this topic is to attract new actors to space and demonstrate technologies that are potentially disruptive and not only incremental. As “push” technologies, these will promise radical improved performances, and will enable emerging missions. Drastical increments in miniaturisation, power reduction, efficiency, versatility, and increased functionality are as well expected.

Proposals based on low TRL<sup>29</sup> (1-3) ideas and technologies which could have a final application in future Space systems are solicited. The target is to demonstrate them up to TRL (4-5). In this second call proposals on several fundamental areas of knowledge are foreseen, in which, for example, some of the Key Enabling Technologies (KETs) are playing a major role. In particular, proposals are sought with relevance for the fields of: "energy storage", "energy production", "materials and structures", "additive layer

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<sup>29</sup> Technology Readiness Levels are defined in part G of the General Annexes. In the specific area of space, further details can be found in the European Space Agency website "Strategic Readiness Level - The ESA Science Technology Development Route". European Space Agency, Advanced Studies and Technology Preparation Division, <http://sci.esa.int/sre-ft/50124-technology-readiness-level/05>

manufacturing techniques", "mechanisms", "wireless power transmission", "high performance and reliable electronics to boost on-board power", and "thermal control management systems" in the domain of space.

The Commission considers that proposals implemented in less than 24 months and requesting a contribution from the EU in the range of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Only up to two proposals will be financed on each of the eight lines foreseen ("energy storage", "energy production", "materials and structures", "mechanisms", "additive layer manufacturing techniques", "high performance and reliable electronics to boost on-board power", "wireless power transmission" and "thermal control management systems").

Expected impact: Spinning-in of new enabling technologies to space systems up to TRL 4-5 and clear indication of the ways in which these technologies can significantly improve performance and/or reduce costs if further developed.

Proposals should mobilise new incorporation of non-space actors, especially SMEs, and research groups into the space landscape.

Ideally proposals should result in developments affecting a range of sectors.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### ***Space exploration and science***

In 2015 support for space science and exploration will continue in the area of exploration, focusing on habitat management. Alongside this area, and in order to address the mandate of the specific programme to enable the exploitation of space data, in the area of science the Union will support in 2015 initiatives for the exploitation of astrophysics, comets and planetary data.

### **COMPET-4-2015: Space exploration – Habitat management**

Specific challenge: The International Space Station (ISS) is the current cornerstone of European activities in human spaceflight and a pillar of the European strategy for space exploration. With its assembly now complete, and with several years of operations ahead until 2020 and possibly beyond, it should be used to the fullest extent for optimising and broadening the scientific, technological and operational return of Europeans investments. ISS should also be further used as a test-bed for the preparation of future ventures as well as for enabling overall scientific and technological progress and provide benefits to citizens. The selection of these proposals in the area of habitat management will depend on their suitability for research on-board ISS.

Scope: Prepare for demonstrating technologies, and operations techniques and process, critical for future human missions as well as advancing knowledge related to human spaceflight and terrestrial applications for the benefits of citizens. Proposals demonstrating safe and reliable quality control of indoor environment in space including

microbial control (e.g. development of early detection and warning systems for environmental contamination and pollution) should be implemented by leveraging synergies between space and non-space actors (e.g. industrial ecology, health sectors). These on-ground preparatory activities are a prerequisite to potential flight hardware development and activities to be conducted on-board the European Columbus module of the ISS.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impacts: Proposals are expected to prepare the ground for further innovative development of R&D in human spaceflight and future terrestrial applications. Systems are expected to be developed and tested on the ground and demonstrate operational capability (or close to). An important impact is also the potential applicability of the test projects on-board ISS. Results will therefore have to attain the necessary maturity to fulfil this promise.

The results are expected to have a significant impact in stimulating non-space actors' contribution to space exploration. This research topic should attract active participation of researchers in academia and SMEs. The results should be actively disseminated in the relevant scientific publications, as well as towards potential user communities as appropriate.

Type of action: Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### **COMPET-5-2015: Scientific exploitation of astrophysics, comets, and planetary data**

Specific Challenge: Three specific areas of space science where there is a significant underinvestment when compared to the potential scientific return for Europe are the exploitation of astrophysics, comets, and planetary data.

Europe has an impressive track record in space astrophysics, comets and planetary research. Astrophysics missions such as XMM-Newton, Herschel or Planck, and in coming years Gaia, JUICE, EUCLID, CHEOPS or the James Webb Space Telescope are an opportunity for European researchers. The challenge will however be to allow the European astrophysics community to make the best possible use of those missions by supporting space astronomy observation proposals, using archived data, and making comparisons (including calibrations) between different missions, instruments, and between space and ground-based data. Likewise in comets research the challenge will be to allow the European astronomy community to make the best possible use of the current European mission to a comet (Rosetta), in combination with information from international (e.g. NASA, JAXA) missions and ground-based telescope observations. Europe has also a long experience and deep expertise in planetary missions such as Venus Express, or Cassini-Huygens. The utilisation of data set coming from European and international missions will allow the European planetary community to generate new knowledge and make the best use of past investments.

**Scope:** Astrophysics proposals shall make use of, or prepare for the use of ESA astrophysics missions, possible in combination with ground-based observations, and/or data from non-ESA missions (e.g. NASA, JAXA, or other national missions). Comets proposals shall prepare for and make use of the Rosetta mission, possibly in combination with ground-based observations, and/or data from non-ESA missions (e.g. NASA, JAXA, or other national missions). Planetary proposals shall make use of European missions and European instruments on-board international planetary missions and/or data from non-ESA missions (e.g. NASA, JAXA, or other national missions).

These activities shall add scientific value through advanced analysis of the data, leading to scientific publications and higher level data products which can be used by other scientists in their studies. This could be done in combination with the development of open source tools for processing and visualisation of astrophysics, comets or planetary data. Enhanced data products should be suitable for feeding back into the ESA archives.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 1.5 million would allow this specific challenge dedicated to astrophysics, comets or planetary data to be addressed appropriately, including through proposals from small teams. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**Expected impact:** A higher number of scientific publications based on Europe's space data, high-level data products made available through appropriate archives, and tools developed for the advanced processing of data. Proposals are expected also to add value to existing activities on European and international levels, and enhance and broaden research partnerships.

**Type of action:** Research and innovation actions

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

### ***International Cooperation in Space matters***

The prospects for continued scientific exploration and discovery in the Solar System has increased in recent years with Cassini, Juno, Dawn, New Horizons missions, Rosetta and future planned missions such as OsirisRex and JUICE. Missions are also still considered to Jupiter's Moon Europa and the rest of the Jovian system etc. Many of the science questions inherent to future missions relate to the prospects for life in the Solar System — either due to the potential to find life among the outer planet region or by improving our understanding of the potential contribution to the origin of life on Earth by Solar System material such as comets and asteroids. As a consequence, some of the future mission opportunities and their potential encounters with other Solar System bodies raise serious questions about biological or organic contamination that may be carried to the outer Solar System or contaminate small Solar System bodies that are visited or harvested by space probes, as well as the Earth in case extra-terrestrial samples are brought back.

### **COMPET-6-2015: International Cooperation in space science**

Specific challenge: Europe has a long-standing tradition of international collaboration in space sciences with missions open to international partnerships or by participating to missions of partners (e.g., with USA, Japan, Russia, China, and India). With the increasing international competition in space science Europe should continue to play a leading role in planetary science shaping the research in the field including the elaboration of planetary protection guidelines.

Scope: In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with space powers active in planetary science. The diverse range of competences spread among universities, research institutes, and space agencies in different countries in the world, should be harnessed in this proposal in view of establishing a coordinated authoritative position in the planetary protection research field. Networking, experts meetings and workshops resulting in recommendations for further action and guidelines for future missions are part of the effort.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: This activity would allow reviewing the planetary protection status of outer Solar System bodies including small Solar System bodies. That may include to establish a new categorisation and the measures that should be taken (or not) to protect them from Earth-sourced biological and organic contamination. Addressing the categorisations of future missions to the outer Solar System and making recommendations will help improving the Committee on Space Research (COSPAR) Planetary Protection Policy and help to resolve scientific uncertainties associated with current knowledge. This action should provide the basis for a regular exchange of information on the issue of planetary protection and identify also opportunities for European scientists to participate in future international missions.

Type of action: Coordination and support action.

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***



**CONDITIONS FOR THIS CALL**

Opening date<sup>30</sup>: 04/11/2014

Deadline(s)<sup>31</sup>:

COMPET-1-2015	08/04/2015 at 17.00 Brussels time
COMPET-2-2015	
COMPET-3-2015	
COMPET-4-2015	
COMPET-5-2015	
COMPET-6-2015	

Overall indicative budget: EUR 39.00 million from the 2015 budget<sup>32</sup>

Topics	2015 EUR million
COMPET-1-2015	14.00
COMPET-2-2015	5.00
COMPET-3-2015	7.00
COMPET-4-2015	6.00
COMPET-5-2015	6.00
COMPET-6-2015	1.00

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme, with the following exceptions:

COMPET-1-2015 COMPET-2-2015 COMPET-3-2015 COMPET-5-2015	With the view of favouring wider competition and participation, the European Space Agency will not participate in consortia of proposals submitted under this call for proposals
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<sup>30</sup> The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening

<sup>31</sup> The Director-General responsible may delay this deadline by up to two months.

<sup>32</sup> The budget amounts for 2015 are subject to the availability of the appropriations provided for in the draft budget for 2015 after the adoption of the budget for 2015 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

COMPET-6-2015	
COMPET-1-2015	A maximum of one proposal per identified Urgent Action line will be selected for funding.
COMPET-3-2015	Only up to two proposals will be financed on each of the eight lines foreseen
COMPET-4-2015	The standard eligibility conditions apply.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide<sup>33</sup> published on the Participant Portal.

Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation ( <i>single stage</i> )	Indicative date for the signing of grant agreements
COMPET-1-2015 COMPET-2-2015 COMPET-3-2015 COMPET-4-2015 COMPET-5-2015 COMPET-6-	Maximum 5 months from the final date for submission	Maximum 3 months from the date of informing applicants

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<sup>33</sup>See: [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/pse/h2020-guide-pse\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf)

**HORIZON 2020 – WORK PROGRAMME 2014-2015**

*Leadership in enabling and industrial technologies – Space*

2015		
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Consortium agreements: In line with the Rules for Participation, participants in Research and Innovation Actions or in Innovation Actions are required to conclude a consortium agreement prior to grant agreement.

## Call – SME Instrument

*H2020-SME-SPACE-2014-2015*

### **SME-SPACE-1-2014/2015: SME instrument**

Specific challenge: To engage small and medium enterprises in space research and development, especially those not traditionally involved in it and reduce as much as possible the entry barriers to SMEs for Horizon 2020 funding.

The specific challenge of the actions envisaged under this call could cover any aspect of the Specific Programme for Space (Horizon 2020 Framework programme and Specific programme). However, it is considered that actions in the areas of applications, especially in connection to the flagship programmes Galileo and Copernicus, spinning-in (i.e. application of terrestrial solutions to challenges in space) and the development of certain critical technologies could be adequately suited for this call.

Scope: The SME instrument consists of three separate phases and a coaching and mentoring service for beneficiaries. Participants can apply to phase 1 with a view to applying to phase 2 at a later date, or directly to phase 2.

**In phase 1**, a feasibility study shall be developed verifying the technological/practical as well as economic viability of an innovation idea/concept with considerable novelty to the industry sector in which it is presented (new products, processes, design, services and technologies or new market applications of existing technologies). The activities could, for example, comprise risk assessment, market study, user involvement, Intellectual Property (IP) management, innovation strategy development, partner search, feasibility of concept and the like to establish a solid high-potential innovation proposal aligned to the enterprise strategy and with a European dimension. Bottlenecks in the ability to increase profitability of the enterprise through innovation shall be detected and analysed during phase 1 and addressed during phase 2 to increase the return in investment in innovation activities.

The proposal should contain an initial business plan based on the proposed idea/concept.

The proposal should give the specifications of the elaborated business plan, which is to be the outcome of the proposal and the criteria for success.

Funding will be provided in the form of a lump sum of EUR 50.000. Proposals should last around 6 months.

**In phase 2**, innovation proposals will be supported that address the challenges identified in the specific programme for space and that demonstrate high potential in terms of company competitiveness and growth underpinned by a strategic business plan. Activities should focus on innovation activities such as demonstration, testing, prototyping, piloting, scaling-up, miniaturisation, design, market replication and the like aiming to bring an innovation idea (product, process, service, etc) to industrial readiness and maturity for market introduction close to deployment and market introduction, but may also include some research. For technological innovation a Technology Readiness Levels of 6 or above (or similar for non-technological innovations) are envisaged; please see part G of the General Annexes.

Proposals shall be based on an elaborated business plan either developed through phase 1 or another means. Particular attention must be paid to IP protection and ownership; applicants will have to present convincing measures to ensure the possibility of commercial exploitation ('freedom to operate').

Proposals shall contain a specification for the outcome of the proposal, including a first commercialisation plan, and criteria for success.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 2.5 million would allow phase 2 to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Proposals should last between 12 and 24 months.

In addition, in phase 3, SMEs can benefit from indirect support measures and services as well as access to the financial facilities supported under Access to Risk Finance of this work programme.

Successful beneficiaries will be offered coaching and mentoring support during phase 1 and phase 2. This service will be accessible via the Enterprise Europe Network and delivered by a dedicated coach through consultation and signposting to the beneficiaries. The coaches will be recruited from a central database managed by the Commission and have all fulfilled stringent criteria with regards to business experience and competencies. Throughout the three phases of the instrument, the Network will complement the coaching support by providing access to its innovation and internationalisation service offering. This could include, for example, depending on the need of the SME, support in identifying growth potential, developing a growth plan and maximising it through internationalisation; strengthening the leadership and management skills of individuals in the senior management team and developing in-house coaching capacity; developing a marketing strategy or raising external finance.

Expected impact:

- Enhancing profitability and growth performance of SMEs by combining and transferring new and existing knowledge into innovative, disruptive and competitive solutions seizing European and global business opportunities.
- Market uptake and distribution of innovations tackling the specific challenges in space in a sustainable way.
- Increase of private investment in innovation, notable leverage of private co-investor and/or follow-up investments.
- The expected impact should be clearly described in qualitative and quantitative terms (e.g. on turnover, employment, market size, IP management, sales, return on investment and profit).

Type of action: SME instrument (70%)

***The conditions related to this topic are provided at the end of this call and in the General Annexes.***

**CONDITIONS FOR THIS CALL**

Publication date: 11/12/2013

Opening dates<sup>34</sup>: 01/03/2014 for 2014 topics for phase 1 and phase 2 of the SME instrument  
18/12/2014 for 2015 topics for phase 1 and phase 2 of the SME instrument

Deadlines<sup>35</sup>:

SME-SPACE-1-2014/2015: SME instrument Open call cut-off dates	Phase 1	Phase 2	Phase 1	Phase 2
	18/06/2014	09/10/2014	18/03/2015	18/03/2015
	24/09/2014	17/12/2014	17/06/2015	17/06/2015
	17/12/2014		17/09/2015	17/09/2015
			25/11/2015	25/11/2015

Overall indicative budget: EUR 8.50 million from the 2014 budget and EUR 8.55 million from the 2015 budget<sup>36</sup>.

	2014 <i>EUR million</i>	2015 <i>EUR million</i>
SME-SPACE-1-2014/2015: SME instrument	8.50 out of which 0.85 for phase 1 7.48 for phase 2 0.17 for mentoring & coaching support and phase 3	8.55 out of which 0.875 for phase 1 7.50 for phase 2 0.175 for mentoring & coaching support and phase 3
	Single stage for both phase 1 and phase 2. The budget available for phase 1 and phase 2 will be divided equally between each cut-off date.	

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme, with the following exceptions:

<sup>34</sup> The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening.

<sup>35</sup> The Director-General responsible may delay this deadline by up to two months.

<sup>36</sup> The budget amounts for 2015 are subject to the availability of the appropriations provided for in the draft budget for 2015 after the adoption of the budget for 2015 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

SME instrument	Proposals for phase 1 are not required to provide a draft plan for exploitation and dissemination. A proposal for phase 2 shall include a first commercialisation plan.
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme, with the following exceptions:

SME instrument	<p>The criterion Impact will be evaluated first, then Excellence and Implementation. If the proposal fails to achieve the threshold for a criterion, the evaluation of the proposal will be stopped.</p> <p>For phase 1 the threshold for individual criteria will be 4. The overall threshold, applying to the sum of the three individual scores, will be 13.</p> <p>For phase 2 the threshold for the criterion Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.</p> <p>The final consensus score of a proposal will be the median of the individual scores of the individual evaluators; and the consensus report will comprise a collation of the individual reports, or extracts from them. Where appropriate, a Panel Review will be organised remotely.</p> <p>Applicants can provide during the electronic proposal submission up to three names of persons that should not act as an evaluator in the evaluation of their proposal for potential competitive reasons<sup>37</sup>.</p>
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Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide<sup>38</sup> published on the Participant Portal.

Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation ( <i>single or</i>	Information on the outcome of the evaluation ( <i>second</i>	Indicative date for the signing of grant agreements
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<sup>37</sup> If any of the persons identified is an independent expert participating in the evaluation of the proposals for the call in question, they may be excluded from the evaluation of the proposal concerned, as long as it remains possible to have the proposal evaluated.

<sup>38</sup> See: [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/pse/h2020-guide-pse\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf)

	<i>first stage)</i>	<i>stage)</i>	
SME instrument	Two months after the corresponding cut-off date set out above for phase 1 and four months after the corresponding cut-off date set out above for phase 2.		One month from the date of informing applicants in phase 1 and two months from the date of informing applicants in phase 2.

Consortium agreements: In the case of two or more SMEs submitting a proposal, in line with the Rules for Participation and the Model Grant Agreement, participants are required to conclude a consortium agreement prior to grant agreement.



## **Fast track to innovation - Pilot**

Full details on this pilot are provided in the separate call for proposals under the Horizon 2020 Work Programme Part - Fast Track to Innovation Pilot (Part 18 of this Work Programme).

## Other actions

### In 2014<sup>39</sup>

#### 1. Research and Development activities related to Galileo Public Regulated Service (PRS)

The European GNSS will offer a solution for governmental usage of Galileo through the Galileo Public Regulated Service (PRS), which will be using the most secure cryptology together with the associated command and control structures. This funding is necessary to enable space-related technologies and the demonstrators underpinning such applications. This work will entail use and production of classified information and technologies.

Full complementarity with the secure societies part in societal challenges will be ensured. The security part concentrates on the security-related developments to meet the user needs for PRS.

Activities on two specific topics will be funded through public procurement actions. The total indicative **budget to be allocated for the subject for the budget year 2014 is EUR 20 million.**

These topics are outlined as follows. The procurement will be opened early in 2014, and the contracts are expected to be awarded by mid-2014, and will run for 30 months.

The implementation of these procurement activities will be entrusted to the European GNSS Agency (GSA) on the basis of article 58(1) (c) of the Financial Regulation. The GSA will manage all the phases of the proposal life cycle. To this end, a delegation agreement will be concluded between DG Enterprise and Industry and the GSA setting out in detail the entrusted tasks. The GSA has been chosen taking into account the experience acquired from the implementation of similar Galileo security related proposals in Seventh Framework Programme, its expertise in the field of security, in-line with its regulatory tasks and the Decision 1104/2011 of the European Parliament and the Council.

#### Procurement topic: Development of enabling technologies for PRS

The objective of this procurement is to develop PRS products based on innovative and promising technologies. Some of the main objectives to achieve are: low-cost security

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<sup>39</sup> The budget amounts for 2014 are subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

module, high-level of security and easy key management. Possible such technologies are listed hereafter:

- Physical un-clonable functions (PUF) technology is, at present, among the most promising technologies to provide secure RED key storage. With Coating-PUF the key is destroyed when a device is tampered with, because tampering alters the device coating that contributes to the device's unique signature. This technique allows a very high level of integration, at near-to-zero cost, and works without the need for a power supply. PUF technology might be also combined with intrusion detection. However, industrialisation of the coating material and coating process still needs to be achieved. The potential applications are multiple and could be used beyond PRS in other space-based applications.

- Three-dimensional integrated circuits (3D-IC) in nanotechnology may represent an opportunity for another path towards continuing the scaling and optimisation of performance, whilst requiring less investment. Stacking chips using a 3D-IC process should allow segregation of layers between different functions and technologies; highly computational layers would be separated by high security layers managing input/output and other security functions. 3D-IC could also enable on-chip antennas to be embedded in silicon ICs. These security layers could be developed within EU secure foundries, using ICs fabricated in EU secure manufacturing facilities. However, access is needed to high performance technologies required to implement the fast processing layers, which at present are produced mainly in Asia. Because there is no standard for 3D-IC fabrication, it is now urgent that an infrastructure is setup to enable broad adoption of 3D-ICs. This will benefit prices, allow more frequent fabrication runs, and boost the availability of engineers. The objective is to build several security modules with space capacities with the required skills to use from 2016/7 onwards.

- Scalable security module (SM) architecture would enable rapid design turnaround time, without the need to completely redesign the whole SM system. In fact, it should be noted that each time the IC technology process shrinks design validation becomes exponentially more complex. Initial studies on the feasibility of such an approach for the PRS SM are being undertaken by the GSA. By the end of 2013 an architectural proposal will be delivered, setting the base for the implementation of a first demonstrator for space capacity.

Expected impact: The action under this topic shall provide significant improvement to the security performance of the PRS security module in space applications.

Type of action: Public procurement, target of 3-4 contracts.

Indicative timetable: Second quarter 2014

#### Procurement topic: Development of low-end PRS enabled technologies

The objective of this procurement is to develop PRS products which suit the needs of low-end users (i.e. basic performance with a small form factor with no degradation of the intrinsic high level security which is common goal of all PRS products). Such products are very sensitive to the size, mass, power consumption and ability to have an unclassified field unit. Innovations could include the development of receivers that are unclassified even when loaded with a classified, cryptographic key or unkeyed solution that uses cloud based technologies via secondary communications channels. Achieving this objective requires investment into industrial lines, which are suited for production of large numbers of receivers.

This procurement will aim at developing solutions which aim at contributing to the above mentioned objectives in the most cost-effective manner. This will lead to demonstration products which will provide evidence of the concepts feasibility and help establishing a roadmap for further actions to develop full-fledged production of low cost, low end PRS products.

Expected impact: Action under this topic shall provide significant improvement to the cost, size, mass, power consumption and usability of PRS products for space applications.

Type of action: Public procurement, target of 2 contracts.

Indicative timetable: Fourth quarter 2014

## **2. Space Surveillance and Tracking: participation of the EU Satellite Centre in the SST Service Function**

In its proposal (*COM (2013)107 final*) for “**establishing a space surveillance and tracking support programme (SST)**”, it is foreseen that the EU Satellite Centre (EUSC) shall participate in the preparation of the setting up and operation of a service function to provide SST services to Member States, the Council, the Commission, the EEAS, public and private spacecraft operators, and public authorities concerned with civil protection.

The EUSC has acquired significant experience in Space Situational Awareness, including SST, through research proposals - named SPA and STEP - funded through the Seventh Framework Programme SPA and STEP proposals.

The STEP proposal in particular focused on issues related to the development of data policy aiming at facilitating the elaboration of coordinated information exchanges, data handling processes and operational interfaces. These activities are in line with the role of front desk SST service provider that is envisaged for the EUSC under the SST proposal.

From 2015 onward, once a consortium of Member States working with the EUSC has been set up to provide a SST service, the EUSC shall benefit from both the SST support Programme (Activity 3 in 2015) and from complementary activities aiming at improving the performances of the SST at European level (Activity 4 in 2015).

This activity may involve the use of classified background information (EU or national) or the production of security sensitive foreground information. As such, certain proposal deliverables may require security classification. The final decision on the classification of proposals is subject to the security evaluation.

Expected impact: The objective of this activity is to ensure the transition of EUSC activities from the general studies conducted in Seventh Framework Programme (SPA and STEP) towards its contribution to the specific role of front desk SST service provider.

This activity should take into account the wording of the Commission proposal for the SST services, which comprises the following:

- (a) The risk assessment of a collision between spacecraft or between spacecraft and space debris and the generation of collision avoidance alerts during the launch and in-orbit operation of space crafts;

- (b) The detection and risk assessment of on-orbit explosions or break-ups or collisions;
- (c) The risk assessment of and alerts related to the re-entry of space objects and space debris into the Earth's atmosphere and the prediction of the time and location of impact.
- (d) SST services shall be provided to Member States, the Council, the Commission, the EEAS, public and private spacecraft operators, and public authorities concerned with civil protection. The SST services shall be provided in compliance with the provisions on the use and exchange of SST data and information

Building on the experience and expertise acquired by ESA, this activity should contribute to the identification of the necessary functional elements of the SST service delivery function contribute to the design of the SST at European level. As a result of the work the grantee should propose the type of data and interfaces which could be made available to the various users and propose improvements which could be undertaken among the SST users. This activity is expected to last 24 months.

Legal Entity: European Union Satellite Centre, Apdo de Correos 511, E-28850 Torrejon de Ardoz, Madrid, Spain.

Type of action: Grant to identified beneficiary - Coordination and support action

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Indicative timetable: Second quarter 2014

Indicative budget: **EUR 1 million from the 2014 budget**

### **3. Studies & Communication**

During 2014 it is envisaged to support the preparation of communication material, dissemination of material, or conduct public procurement activities to enable communication of Horizon Space activities, and for organisation of events (conferences, workshops or seminars) related to the implementation of the European Space Policy, European R&D research agendas related to Horizon 2020.

Special attention will be given to events which aim to explore and implement specific initiatives in the field of space for innovation, and the question of how space exploration could contribute to innovation as well as events related to space exploration. These events should support the political debate and consensus building in Europe.

Support may be given to the organisation of conferences and information events to strengthen wider participation in the programme (including that of third countries), and to disseminate results of European research in the Space sector. Co-operation with the presidencies of the Council of the European Union in 2014 is envisaged.

Furthermore, procurement will be necessary of actions such as studies, preparation of roadmaps to underpin planning or actions to evaluate the outcomes of previous R&D actions such as Seventh Framework Programme.

One possible initiative currently foreseen is a study of the structural needs of the four distinct space science communities (Earth observation, astrophysics/fundamental physics, planetary sciences and space weather/heliophysics) in order to achieve an increase in scientific exploitation of data from European space missions. This should include the analysis of the effects of mission governance structures on the data exploitation chain, the data exploitation funding mechanism (national, ESA and EU), the various (national and ESA) archive set-ups, data dissemination and search mechanisms, data standardization issues, coordination of data processing and analysis, and visualisation tools.

Activities may include surveys as appropriate implemented through public procurement, and/or appointing (groups of) independent experts. This limited number of contracts may be implemented on the basis of framework contracts, in order to further ensure that the Commission is provided with appropriate and timely analyses, which in turn will facilitate the proper integration of policy studies into the preparation of new policy initiatives.

Type of action: Public procurement - framework contracts and/or calls for tender

Indicative timetable: Several procurements in 2014

Indicative budget: **EUR 1.5 million from the 2014 budget**

#### **4. Horizon 2020 proposal evaluation, monitoring and audits (EGNSS)**

During 2014 it is envisaged to support the implementation of Horizon 2020 with expert groups advising the GSA on evaluation of calls for proposals, as well as monitoring and audits of proposals under Horizon 2020 funding.

Type of action: Expert contracts or public procurement

Indicative timetable: Second quarter 2014

Indicative budget: **EUR 2 million from the 2014 budget.** This amount will be entrusted to the European GNSS Agency in addition to the budget entrusted to the Agency for the implementation of the Galileo Applications Call for Proposals.

#### **5. Transition towards Copernicus**

Europe has invested for about a decade in the development of pre-operational services for the monitoring of the marine environment and the atmosphere under the GMES (Global Monitoring for Environment and Security) umbrella, and a transition to operational implementation is imminent with the Commission's proposal for a financing of operational services through the Copernicus Regulation (as formulated in *COM (2013)312 final*).

In its proposal *COM (2013)312 final* for "establishing the Copernicus Programme", the importance of operational service delivery is documented. The legal base is expected to be adopted in early 2014 and the subsequent legal and administrative steps necessary for its operational implementation are expected to be completed in early 2015. The Land and Emergency services are currently financed within the context of GMES Initial Operations (GIO) and it is expected that it will be possible to sustain this financing until

early 2015. Research and development to prepare the pre-operational Security and Climate services is currently addressed through several Seventh Framework Programme research proposals, which will continue into 2015. However, in the case of the Marine and Atmosphere pre-operational services, which are both currently addressed through the Seventh Framework Programme research proposals MyOcean 2 and MACC II, respectively, these proposals will soon come to an end: September 2014 for MyOcean 2 and July 2014 for MACC II. This is highly likely to create a significant gap before Copernicus-funded operational services in these two areas can start, in principle in the second quarter 2015, especially as regards the two proposals' pre-operational coordinating and supporting activities.

To sustain the current pre-operational marine and atmosphere activities until March 2015 and in order to avoid any interruption in the critical handover phase between the pre-operational and fully operational services, it is essential to ensure interim continuity of the pre-operational services developed by MyOcean 2 and MACC II. In effect, any significant interruption in these services could potentially jeopardize several important high-level policy objectives and undermine other related scientific activities. In particular:

- Service continuity is a crucial precondition for uptake by downstream applications and the potential of Copernicus to deliver under the Europe 2020 strategy for smart, sustainable and inclusive growth would be at risk in the event of interruption.
- Service continuity is crucial for the quick uptake of newly available Sentinel data.
- Societal challenges are expected to make appropriate use of Copernicus data and information and include the EU capacities of Copernicus in their research (in particular with regard to climate action, environment, resource efficiency and raw materials). European research under Horizon 2020 could be delayed in the event of interruption.

In this context the Commission will fund two grants that can ensure the consolidation and stable provision of services on the existing pre-operational base, namely the services currently provided by the proposals MyOcean 2 and MACC II. The proposals should address all necessary work for the continued and uninterrupted service provision, response to newly available input data, in particular from space based infrastructure, and emerging user requirements (including streamlined access to the product portfolio). Activities will primarily cover all the aspects of the proposals' pre-operational coordinating and supporting activities underpinning the geo-information product provisions. However, some research and development support to enable and sustain the operability of the services can also be supported. Furthermore, support should be included to prepare for the smooth handover from the pre-operational service mode to the fully operational service mode. In addition, it is expected that the communication aspects associated with the launch of the fully-operational Copernicus services should be addressed.

Expected impact: These actions have a clear European added value, as set out in the Commission proposal *COM (2013)312 final* for “establishing the Copernicus Programme”, and shall provide the continuity needed to allow successful start of operational EU Copernicus marine and atmosphere activities, avoiding any discontinuity with the preceding pre-operational services. A minimum period of up to March 2015 is expected to be covered by the grant beneficiaries.

Legal entity: Based on the specific capacities provided by the proposal MACC II in the domain of Atmosphere monitoring, the European Centre of Medium-Range Weather Forecasts (ECMWF), Shinfield Park, Reading, UK, together with additional partners principally based on its MACC II consortium will be the direct beneficiaries for this funding. Based on the specific capacities provided by the proposal MyOcean 2 in the domain of Marine monitoring, Mercator Ocean, Parc Technologique du Canal, 8-10 rue Hermès - Bâtiment C, 31520 Ramonville Saint-Agne, France, together with additional partners principally based on its MyOcean 2 consortium will be the direct beneficiaries for this funding.

Type of action: Grant to identified beneficiaries – two coordination and support actions for Atmosphere and Marine monitoring service continuity respectively.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Indicative timetable: Second quarter 2014

Indicative budget: **EUR 5 million for Atmosphere and EUR 6 million for Marine from the 2014 budget**

## **6. Horizon 2020 proposal evaluation and project monitoring**

This action will support the use of appointed independent experts for the evaluation of proposals and, where appropriate, for the monitoring of running projects.

Type of action: Expert contracts

Indicative timetable: Second quarter 2014

Indicative budget: **EUR 2.03 million from the 2014 budget**



**In 2015<sup>40</sup>**

## **7. GNSS Evolution, Mission and Services related R&D activities**

In the first half of Horizon 2020 the Galileo mission will gradually become operational and will provide, the first European only navigation services to the citizens worldwide on top to the European Geostationary Navigation Overlay Service (EGNOS) which is fully operational since March 2011. This is the time to make a concerted research and innovation effort in the accompaniment of the gradual deployment of the services, and to consolidate the mission and services to match at best the expectations of the user communities. At the same time Europe should ensure that it maintains the performance of the infrastructure and that the appropriate protection elements are in place to avoid sudden disruption of services.

The main objective is to support the development of enabling technologies for future generations of EGNSS missions, and to support activities that enable the full exploitation of the EGNSS infrastructure in public, scientific and commercial fields.

This should result in a strengthening of the European capacity in this field and in an efficient deployment of services at the benefit of the user communities, supporting at the same time the development in Europe of innovative GNSS-based applications.

### **Procurement topic (1): Advanced mission concepts**

To satisfy the EU strategic objective to guarantee uninterrupted GNSS services and to maximise the benefits for European civil society, it is key to anticipate and assess the changes in the global GNSS context and usage, so as to identify the corresponding impacts on the definition of the GNSS services and the related mission objectives. It is therefore instrumental to develop a prospective vision of the GNSS arena at the horizon 2020 and beyond.

Activities should study new and innovative mission concepts for Galileo and EGNOS, with the aim to propose a realistic vision of the use of GNSS and SBAS in the long term future (2020+). Proposed concepts should be seen in a broad context, considering not only the evolution and trends of the sector world-wide but also the evolution of alternative technologies as well as the opportunity to exploit synergies with other space-based missions, in Europe or in cooperation with other space faring nations. The R&D activities should also aim at improving the knowledge on specific parameters (clock drifts, spacecraft position and attitude, difficult environment/multipath, atmospheric delays...), for developing innovative models leading to better performances.

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<sup>40</sup> The budget amounts for 2015 are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

Type of action: Public procurement

Indicative timetable: First quarter 2015

Indicative budget: **EUR 2 million from the 2015 budget**

### **Procurement topic (2): Ionosphere prediction service**

Today, GNSS has become an indispensable asset commonly used in the daily life of many EU Citizens through applications such as route guidance. It has become also a critical component for the operations of many national infrastructures, such as air traffic management, power networks, telecommunication and logistics and transport, all key sectors that rely heavily on satellite-based navigation and timing information.

In this situation, a disruption or increased inaccuracy of GNSS signal provision would have a major impact on the European society. One of the main hazards or sources of error that affect the provision of reliable satellite navigation and timing services is the solar activity, which has proven effects that can even cause major failure in the functioning of satellite navigation systems. With the gradual deployment of the Galileo services, it is key to anticipate such effects and advise the user communities of any potential disturbance of service, allowing thus, in case of critical use of GNSS signals (electrical power grids, telecommunications, transport), the timely shift towards reversionary or back-up systems in case of sudden availability.

It is proposed to continue the research and in particular coordination between European proposals in the field of space weather and ionosphere effects with the specific aim to define and develop an ionosphere activity prediction tool for Galileo.

Type of action: Public procurement.

Indicative timetable: First quarter 2015

Indicative budget: **EUR 0.8 million from the 2015 budget.**

### **Procurement topic (3): Commercial Service**

In 2015, tests involving the Commercial Service and including the real signal in space (SIS) will be executed through the CS Demonstrator, in order to test authentication and real-time data transmission for high accuracy services. In order to complement these activities, GSA will run application demonstrations and co-funded receiver development proposals. In addition to the above, H2020 activities shall complement the already foreseen activities for the CS through studying the performance improvement of the CS foreseen services, notably for authentication services, for which a performance and threat framework has not yet been established and fully accepted by the GNSS community. It may also support evolutions of CS service level definitions that will be used as a basis for future contracts with external service providers, and the research and development of new services that can be part of the CS bundle, either by adaptations of the Galileo infrastructure and/or signal definition in future Galileo versions, or by using additional ground-based data services to complement the signal in space. H2020 CS-related activities shall also cover the CS + OS synergies, for example for authentication, by

covering the development of technologies and elements related to OS I/NAV evolutions related to OS navigation message authentication (NMA) that will complement the CS spreading code-based authentication.

Type of action: Public procurement

Indicative timetable: First quarter 2015

Indicative budget: **EUR 0.9 million from the 2015 budget**

**Procurement topic (4): Support to the Galileo Safety of Life Service re-profiling, in particular for Advanced Receiver Autonomous Integrity Monitoring – ARAIM**

Integrity is one of the essential qualities of service to be provided by the Galileo safety of life service. ARAIM is a possible concept to which much effort is being devoted with the intention to provide a global integrity service based on multiple satellite constellations.

In this respect, cooperation with the United States of America was formally established through the creation of a specific EU-US ARAIM sub-group in Working Group C of the EU-US cooperation agreement. The first Interim Report of the Group was published on February 2013, while the Final Report, with conclusions and recommendations on the Advanced RAIM concept, is targeted by mid-2014.

It is proposed to continue the work on the ARAIM concept based on such conclusions and recommendations produced by the EU-US ARAIM sub-group.

Several actions are foreseen to be then undertaken:

- Technical work will need to be carried out in order to develop, compare, and eventually select the most suitable implementation option of the concept into the actual Galileo System and/or any other additional system concerned.
- Studies will need to be conducted on all qualities of safety of life services by Galileo, in order to assure that they are provided within the limits tolerable by the user requirements, including integrity, accuracy, reliability and availability.
- Studies will need to be conducted on the optimisation of the user receiver ARAIM algorithms for various types of operations or targeting different user communities. Simulations may be required to assess performance of different solutions and conduct the necessary trade-offs.
- Coordination actions with other GNSS stakeholders to ensure the adoption of a solution which is recognized and shared by all involved parties. First actions in this area should be launched towards the awareness and distribution of such recommendations in the relevant standardization body, such as (ICAO, EUROCAE...). As fundamental part of the awareness actions, the use of Galileo in those international fora will be promoted.

Type of action: Public procurement

Indicative timetable: First quarter of 2015

Indicative budget: **EUR 0.9 million from the 2015 budget.**

### **Procurement topic (5): Signals evolution**

Future improvements of the positioning, navigation and timing services of the European GNSS (EGNSS) programmes Galileo and EGNOS depend to a large extent on potential enhancements of the navigation signals which are transmitted by those systems. The Galileo programme is currently in its in-orbit test and validation phase and the Galileo satellite constellation is gradually being built up. In 2015 several Galileo satellites will broadcast operational signals which will be precisely measured and monitored on-ground in order to validate the signal performance and to identify means for further performance improvements.

In order to analyse and recommend improvements of the EGNSS signal characteristics, the Commission is assisted by the Compatibility, Signal and Interoperability (CSI) Working Group which is reporting to the European GNSS programme Committee.

The activities to be carried out in this procurement topic will aim at supporting and further expanding and evaluating the recommendations stemming from this working group. It will be also necessary to consider feedbacks from receiver manufacturers in order to assess the technical feasibility of new signal structures for the different Galileo services.

Type of action: Public procurement

Indicative timetable: First quarter 2015

Indicative budget: **EUR 0.7 million from the 2015 budget**

### **Horizon 2020 evaluation and project monitoring**

This action will support the use of independent experts for the preparation of procurement topics and actions under Activity 7 (*GNSS Evolution, Mission and Services related R&D activities*) and for the evaluation of tenders and monitoring of running projects.

Type of action: Expert contracts

Indicative timeline: 2015

Indicative budget: **EUR 0.3 million from the 2015 budget**

## **8. GNSS evolution, infrastructure-related R&D activities**

The Horizon 2020 programme shall cover space navigation related R&D activities for the European systems (EGNSS), which comprise the early phases of Galileo and EGNOS evolution programmes. The implementation of the next generation EGNSS infrastructures shall be financed from- of the EGNSS programme budget line.

The GNSS infrastructure-related R&D activities under Horizon 2020 for the period 2015-2020 will be implemented by ESA in indirect management in accordance with Article 58(1)(c) of the Regulation (EU, Euratom) No 966/2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC,

Euratom) No 1605/2002 (the "Financial Regulation"). ESA will use grants, procurement, or prizes as forms of funding in accordance with Article 10 of the Regulation (EU) No 1291/2013 establishing Horizon 2020. In accordance with Article 6 of that Regulation, Horizon 2020 shall, not directly or indirectly, fund neither the construction nor the operation of the Galileo programme.

ESA will manage all the phases of the project lifecycle in accordance with the procedures set out in the Horizon 2020 Rules for Participation and with due regard to the Regulation<sup>41</sup> (EU) No 1285/2013 on the implementation and exploitation of the European satellite navigation systems (the "GNSS Regulation") where appropriate. To this end a delegation agreement covering the 2015-2020 activities will be concluded between the Commission and ESA, setting out in detail the entrusted tasks and the arrangements ensuring the protection of the financial interests of the Union.

ESA has been chosen to carry out these tasks on the basis of its role in the development of future generation of the Galileo and EGNOS programmes pursuant to the GNSS Regulation; in addition ESA has a thorough expertise in the management of GNSS infrastructure R&D programmes.

The maximum Union contribution for the corresponding activities will be decided annually by the Commission in the context of the Horizon 2020 Work Programmes. After the adoption of the Work Programme, the Commission will sign with ESA a transfer for funds agreement serving as legal commitment within the meaning of Article 85 of the Financial Regulation.

Consistency with Galileo/EGNOS work programmes and the mission evolution targets as agreed with the GNSS Programme Committee will be ensured.

The activities in 2015 will be implemented with ESA acting on the Commission's behalf as technical programme manager and procurement agent. The mode of implementation of 2015 is through procurement contracts under an agreement on indirect management with ESA.

The following activities will be supported through funding by the Space theme in 2015:

- 1) EGNOS further evolution Phase B activities

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<sup>41</sup> Regulation (EU) No 1285/2013 of the European Parliament and of the Council of 11 December 2013 on the implementation and exploitation of European satellite navigation systems and repealing Council regulation (EC) No 876/2002 and Regulation (EC) No 683/2008 of the European Parliament and of the Council

- 2) Galileo 2<sup>nd</sup> generation phase A/B (system, satellite, payload and ground)
- 3) GNSS general research and technology
- 4) GNSS System Studies and Validation Activities
- 5) EGNSS R&T Technical Management

Type of action: Indirect management by ESA

Indicative timeline: First quarter 2015

Maximum Union contribution: **EUR 53 million**, including ESA remuneration costs

Implementation: Indirect management by the European Space Agency under delegation agreement with the Commission.

## **9. Space surveillance and tracking (SST)**

In line with the Decision No 541/2014/EU of the European Parliament and of the Council of 16 April 2014 establishing a Framework for Space Surveillance and Tracking Support (OJ L 158 of 27 May 2014, p. 227–234, at recital 24) Horizon 2020 will contribute to the funding of the SST support programme, since R&D activities for improved space surveillance are part of the Horizon 2020 Specific programme. This contribution to the SST programme will be realised through a grant to a predefined beneficiary resulting from the implementation of the programme to support the emergence of an SST capacity at European level.<sup>42</sup>

This action specifically aims (1) at supporting the pooling of national resources on the SST objectives outlined in COM (2013) 107 and coinciding with objectives and challenges of H2020 related to protecting Europe's investment made in space infrastructure; and (2) at achieving significant economies of scales by adding related H2020 resources to this joint effort, instead for the Commission to implement its own specific activities.

A grant agreement is to be concluded in 2015 in the context of the SST support programme, in which the designated beneficiary will be the consortium resulting from the implementation of the support programme for the emergence of a SST capacity.

Expected impact:

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<sup>42</sup> In line with recital 24 of the Decision and articles 129 of the Financial regulation and 193 of its Rules of Application (Commission Delegated Regulation (EU) No 1268/2012 of 29 October 2012 on the rules of application of Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council on the financial rules applicable to the general budget of the Union) this action may be financed jointly from separate source programmes.

To analyse, assess and undertake the necessary research, development and innovation activities for:

- (b) The establishment and operation of a sensor function consisting of a network of ground-based or space-based existing national sensors to survey and track space objects;
- (c) The establishment and operation of a processing function to process and analyse the SST data captured by the sensors, including the capacity to detect and identify space objects and to build and maintain a catalogue thereof;
- (d) The setting up and operation of a service function to provide SST services to spacecraft operators and public authorities.

Legal entity: Consortium resulting from the implementation of the support programme for the emergence of a SST capacity

Type of action: Grant to identified beneficiary - coordination and support actions

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Indicative timeline: First quarter 2015

Indicative budget: **EUR 2 million from the 2015 budget**

## **10. Improving the Performances of the SST at European Level**

The EU is ready to support the emergence of a European SST service built on a network of existing SST assets, notably sensors (radars and telescopes) owned by Member States. This will require the commitment of Member States owning relevant assets to cooperate and provide an anti-collision service at European level.

Once a consortium of Member States working with the European Union Satellite Centre has been set up to provide a SST service, Horizon 2020 can provide support to the upgrading and development of additional assets, in particular radars and telescopes, necessary to ensure, in the long-term, a high level of performance of this European service.

As a first step, Horizon2020 will support the consortium to identify and prioritise which assets within the European SST programme need to be either updated or renewed and propose possible candidate locations to deploy new systems in order to improve the overall performance.

This activity may involve the use of classified background information (EU or national) or the production of security sensitive foreground information. As such, certain proposal deliverables may require security classification. The final decision on the classification of proposals is subject to the security evaluation.

This activity should result in an action plan (including scope and priorities) for future EU research and innovation actions to upgrade and develop new assets which form the SST at European Level.

The activity may also include a request for the initial funding of the priority upgrading and development of assets identified in the action plan.

The action will deliver a sound analysis of the performances of the SST assets which will be networked within the SST at European level beyond those existing today.

This action will be the basis for initial and further funding to support the upgrading and development acquisition of these assets in coming years.

Legal entity: Consortium resulting from the implementation of the support programme for the emergence of a SST capacity.

Type of action: Grant to identified beneficiary - coordination and support actions

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Indicative timeline: First quarter 2015

Indicative budget: **EUR 10 million from the 2015 budget**

## **11. Studies & Communication**

During 2015 it is envisaged to support the preparation of communication material, dissemination of material, or conduct public procurement activities to enable communication of Horizon Space activities, and for organisation of events (conferences, workshops or seminars) related to the implementation of the European Space Policy, European R&D research agendas related to Horizon 2020.

Special attention will be given to events which aim to explore and implement specific initiatives in the field of space for innovation, and the question of how space exploration could contribute to innovation as well as events related to space exploration. These events should support the political debate and consensus building in Europe.

Support may be given to the organisation of conferences and information events to strengthen wider participation in the programme (including that of third countries), and to disseminate results of European research in the Space sector. Co-operation with the presidencies of the Council of the European Union in 2015 is envisaged.

Furthermore, procurement will be necessary of actions such as studies, preparation of roadmaps to underpin planning or actions to evaluate the outcomes of previous R&D actions such as the Seventh Framework Programme.

Activities may include surveys as appropriate implemented through public procurement, and/or appointing (groups of) independent experts. This limited number of contracts may be implemented on the basis of framework contracts, in order to further ensure that the Commission is provided with appropriate and timely analyses, which in turn will facilitate the proper integration of policy studies into the preparation of new policy initiatives.

Type of action: Public procurement - framework contracts and/or calls for tender

Indicative timetable: Several procurements in 2015

Indicative budget: **EUR 1 million from the 2015 budget**



## **12. Horizon 2020 proposal evaluation, monitoring and audits (EGNSS)**

During 2015 it is envisaged to support the implementation of Horizon 2020 through appointment of independent experts for the evaluation of calls for proposals and for monitoring of projects. In addition, the European GNSS Agency may organise conferences and workshops (information days) related to GNSS Applications, as well as conduct audits of proposals under Horizon 2020 funding.

Type of action: Expert contracts or procurement

Indicative timetable: Second quarter 2015

Indicative budget: **EUR 1.85 million from the 2015 budget.** This amount will be entrusted to the European GNSS Agency in addition to the budget entrusted to the Agency for the implementation of the Galileo Applications Call for Proposals.

## **13. Horizon 2020 proposal evaluation and project monitoring**

This action will support the use of appointed independent experts for the evaluation of proposals and, where appropriate, for the monitoring of running projects.

Type of action: Expert contracts

Indicative timeline: First quarter 2015

Indicative budget: **EUR 1.15 million from the 2015 budget**

## Budget

	<b>2014 Budget EUR million<sup>43</sup></b>	<b>2015<sup>44</sup> Budget EUR million<sup>54</sup></b>
<b>Calls</b>		
Call H2020-GALILEO-2014/2015 Applications in Satellite Navigation - Galileo	38.00 <i>from 02.040201</i>	25.00 <i>from 02.040201</i>
Call H2020-EO-2014 Earth Observation	21.50 <i>from 02.040201</i>	0.00
Call H2020-PROTECT-2014 Protection of European assets in and from space	9.00 <i>from 02.040201</i>	0.00
Call H2020-COMPET-2014 Competitiveness of the European Space Sector: Technology and Science	53.04 <i>from 02.040201</i>	0.00
Call H2020-EO-2015 Earth Observation	0.00	25.00 <i>from 02.040201</i>
Call H2020-PROTECT-2015 Protection of European assets in and from space	0.00	6.50 <i>from 02.040201</i>
Call H2020-COMPET-2015 Competitiveness of the European Space Sector: Technology and Science	0.00	39.00 <i>from 02.040201</i>
Call H2020-SME-2014/2015 SME Instrument	8.50 <i>from 02.040201</i>	8.55 <i>from 02.040201</i>

<sup>43</sup> The budget figures given in this table are rounded to two decimal places.

<sup>44</sup> The budget amounts for 2015 are subject to the availability of the appropriations provided for in the draft budget for 2015 after the adoption of the budget for 2015 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

**HORIZON 2020 – WORK PROGRAMME 2014-2015**

*Leadership in enabling and industrial technologies – Space*

<b>Contribution</b> from this part to call ‘H2020-FTI Pilot-2015’ (under Part 18 of the work programme)	-	3.40 <i>from 02.040201</i>
<b>Other Actions</b>		
2014 Activity 1 – Developments for a Galileo Public Regulated Service (PRS)	20.00 <i>from 02.040201</i>	0.00
2014 Activity 2 – SST – Satellite Centre with predefined beneficiary	1.00 <i>from 02.040201</i>	0.00
2014 Activity 3 – Studies and Communication	1.50 <i>from 02.040201</i>	0.00
2014 Activity 4 – Horizon 2020 proposal evaluation (EGNSS)	2.00 <i>from 02.040201</i>	0.00
2014 Activity 5 – Transition towards Copernicus	11.00 <i>from 02.040201</i>	0.00
2014 Activity 6 – Experts (expert evaluators, experts groups, monitors)	2.03 <i>from 02.040201</i>	0.00
2015 Activity 7 – GNSS Evolution, Mission and Services related R&D activities	0.00	5.60 <i>from 02.040201</i>
2015 Activity 8 – GNSS evolution, infrastructure-related R&D activities	0.00	53.00 <i>from 02.040201</i>
2015 Activity 9 – Space surveillance and tracking (SST)	0.00	2.00 <i>from 02.040201</i>
2015 Activity 10 – Improving the Performances of the SST at European Level	0.00	10.00 <i>from 02.040201</i>
2015 Activity 11 – Studies and Communication	0.00	1.00 <i>from 02.040201</i>
2015 Activity 12 – Horizon 2020 proposal evaluation (EGNSS)	0.00	1.85 <i>from 02.040201</i>
2015 Activity 13 – Horizon 2020 proposal evaluation (REA)	0.00	1.15 <i>from 02.040201</i>
<b>Estimated total budget</b>	<b>167.57</b>	<b>182.05</b>

**HORIZON 2020 – WORK PROGRAMME 2014-2015**

*Leadership in enabling and industrial technologies – Space*

<b>Contribution to horizontal activities (08.020500)</b>		
Dissemination activities (see Part 17 of the work programme)	0.15 <i>from 08.020501 Horizontal activities</i>	0.15
Corporate communication (see Part 17 of the work programme)	0.07 <i>from 08.020501 Horizontal activities</i>	–
<b>Estimated total budget for the horizontal activities</b>	<b>0.22</b>	<b>0.15</b>

<b>Estimated total budget including horizontal activities</b>	<b>167.79</b>	<b>182.20</b>
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