WORK PROGRAMME 2012

COOPERATION

THEME 9

SPACE

(European Commission C(2011)5068 of 19 July 2011)

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THEME 9: SPACE

Objective:

The objective of the FP7 space work programme is to support a European Space Policy focusing on applications such as GMES (*Global Monitoring for Environment and Security*), with benefits for citizens, but also other space foundation areas for the competitiveness of the European space industry. This will contribute to fulfil the overall objectives of the European Space Policy, complementing efforts of Member States and of other key players, including the European Space Agency.

I. CONTEXT

Policy context

Europe has been active in the space sector for several decades, and activities encompass a wide spectrum ranging from launchers to application satellites. Space activities, through scientific research and especially through their direct applications, are acknowledged as strategic for their contribution to the construction of Europe and the competitiveness of the European Union.

The **Treaty on the Functioning of the European Union** (TFEU) has strengthened the European Union's competence in the area of space. With its article 189 the Member States have again confirmed the strategic importance of space for the European Union. The Treaty gives the European Union the responsibility to draw up a European space policy and, to this end, to promote joint initiatives, to support research technological development, and to coordinate space related efforts. This article mentions the fact that the necessary measures to attain these objectives may take the form of a European space programme.

Besides its strategic relevance, the space sector provides a stimulus to innovation and growth in the European economy, and thus space research is expected to contribute significantly to the **Europe 2020 priorities**, especially with regard to **Smart and Sustainable Growth** and **Innovation**. Support to the space sector is crucial if the EU wants to remain competitive at global level.

Furthermore, Europe is increasingly dependent on space infrastructure and applications thereof for the daily functioning of our society and proper policy development and implementation at European and national level. Space research thus **supports EU policies** and contributes to **addressing major societal challenges**, e.g. in climate change, transport, citizen's security, natural and man-made disasters. Space technologies are supported with a view to generate applications and services that benefit European citizens (e.g. environmental monitoring, security), and to stimulating technology spin-offs that benefit other industrial sectors. Given the size of investments needed to develop these sectors, there is a clear added-value of common and coordinated EU-level action.

Innovation Union aspects

The Innovation Union initiative underlines that research and innovation are key drivers of competitiveness, jobs, sustainable growth and social progress. The work programme 2012 has been designed to support the implementation of the Innovation Union initiative and in particular to bring together research and innovation to address major challenges.

The work programme can contribute to the innovation objective in two ways, and constitutes a significant change to the approach in earlier work programmes:

1. By supporting more topics aimed at generating knowledge to deliver new and more innovative products, processes and services. This will include pilot, demonstration and validation activities. The focus on innovation will be reflected in the description of the objectives and scope of the specific topics, as well as in the expected impact statements. The innovation dimension of the proposals will be evaluated under the evaluation criterion ' Impact'.
2. By identifying and addressing exploitation issues, like capabilities for information and dissemination, and by enhancing the use of the generated knowledge (protection of intellectual property rights like patenting, preparing standards, etc).

Information on the Risk-Sharing Finance Facility (RSFF), an innovative financial instrument under FP7, is available online[1] (footnote). The Commission will respond to further needs of potential beneficiaries for information on the RSFF (by, e.g. awareness-raising activities in conjunction with the European Investment Bank, participation to thematic events).

European space policy

The Communication on the European Space Policy[2], a joint document of the European Commission and the ESA Director-General, was adopted in April 2007 and received strong political support from the Member States of both the EU and ESA. With Article 189 of the TFEU, which introduces a new and clear mandate for the EU in space matters, space has now become an EU policy in its own right which should be developed through appropriate measures.

In its recently adopted Communication on Industrial Policy[3], the Commission announced that it will:

- propose measures in 2011 to implement the priorities of the Space policy based on Article 189 of the TFEU;

- pursue a Space Industrial policy developed in close collaboration with the European Space Agency and Member States.

The Commission has adopted in 2011 a Communication on the EU space strategy[4] to state its priorities:

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[1] http://www.eib.org/products/loans/special/rsff/index.htm?lang=en and http://ec.europa.eu/invest-in-research/funding/funding02_en.htm

[2] COM(2007) 212 final, 26 April 2007, "Communication from the Commission to the Council and the European Parliament : European Space Policy

[3] COM(2010)614, 28 October 2010, "An Integrated Industrial Policy for the Globalisation Era - Putting Competitiveness and Sustainability at Centre Stage"

- pursue the achievement of Galileo/EGNOS (European Geostationary Navigation Overlay System) and GMES. Concerning GMES, it is necessary to complete the space observation infrastructures that are designed for land, ocean, atmosphere and air quality monitoring, as well as emergency response and security, in order to deliver on the "climate change" service of GMES. This includes that as manager and user of the GMES programme, the EU must define and facilitate the development of this European service;
- define the governance scheme and data policy of the European space situational awareness system taking into account its dual nature and the need to ensure its sustainable exploitation;
- reinforce its partnership with Member States in order to ensure that security missions do not depend on third countries' assets and guarantee the continuity of missions undertaken by Member States themselves;
- continue to support space research.

In order to implement these actions, an appropriate **governance scheme** needs to be implemented. This should strengthen the partnership of the European Union with the Member States and establish appropriate relations with the European Space Agency.
Due regard will also be paid to **international cooperation**, which is key for space, including to its development potential, notably for Africa.

In parallel to the preparation of the above mentioned processes the Commission pursues the definition of a space industrial policy, in close collaboration with its Member States and the ESA.

Global Monitoring for Environment and security (GMES)

The strategic role of GMES in the development of the EU's role as a global actor has been outlined already in the February 2004 Communication[5] of the Commission, which also identifies the **major EU policies to be addressed by GMES services and the R&D projects** to be undertaken in FP7.

With the entering into force of the Regulation (EU) No 911/2010 of the European Parliament and Council[6] on the European Earth monitoring programme (GMES) and its initial operations (2011-2013), this R&D build-up phase of GMES has been complemented with funding for the transition phase to operations.

GMES was created to **respond to specific information needs** on the state of the environment, climate change and security issues and to establish a coherent European framework for the exploitation of environmental satellites and the provision of operational services. GMES **brings together Earth observation systems** (satellites, ground and atmospheric sensors, buoys, etc.) to provide accurate and timely information to manage the natural resources and the environment, understand and adapt to the effects of climate change; ensure civil security; and deal with emergencies during natural and man-made disasters, and

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[4] COM(2011) 152 final, 4 April 2011, "Towards A Space Strategy for the European Union that Benefits its Citizens"
[5] COM(2004)65 final, 3 February 2004
[6] OJ, L 276, 20.10.2010, p. 1.

improve documentation needed to conduct prevention and preparedness efforts inside and outside the EU. In addition to its **public policy relevance**, GMES also represents a **great potential** for economic growth, for businesses and SMEs, which will be able to make use of the data and information it provides and also can develop innovative services markets themselves.

Article 3 of the GMES Regulation defines the fields that may be covered by actions in the context of the GMES initial operations. With a view to the limited operational funding available, recital 30 of the GMES Regulation emphasises that "[…] *the two [FP7 and GMES Initial Operations(GIO)] funding sources should be managed in a coordinated manner in order to ensure consistent progress in the implementation of GMES*".

In order to optimise the available resources (both from the GMES Regulation and from theme Space of the Specific Programme Cooperation), funding from the GMES Regulation budget will support initially:

- the land monitoring and emergency management themes of the service component of the GMES programme;
- the GMES space component;
- GMES policy measures set out by the Regulation.

The other four GMES services (marine, atmosphere, climate change and security) will be mainly financed by FP7 funds. The total FP7 budget foreseen for the 3-years period for each of these 4 domains is in the order of EUR 20-30 M€.

Crucial to the success of the GMES service component is the compliance with the requirements and the guidelines included in the Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)[7]. FP7 research and development activities for GMES shall therefore contribute to the ongoing INSPIRE implementation, by promoting the use and sharing of Earth observation data and information in accordance with the principles of INSPIRE. Furthermore, timely, reliable and relevant information on the state of environment should be made available to all and be easily understood. To this end the Commission has proposed in its Communication "Towards a Shared Environmental Information System (SEIS)" [8] to improve, modernise and streamline the present information systems by establishing a European Shared Environment Information System, to which GMES shall contribute, by promoting sharing of Earth observation data and information in accordance with the principles of SEIS.

International Cooperation

In the context of international cooperation, a diversified approach is a key element in Europe's space policy. Candidates for cooperation among other established or emerging space powers are the United States, Russia, Canada, People's Republic of China, India, and the Ukraine. To support implementation of bilaterally identified cooperation areas, the participation of countries for which a specific Space dialogue (e.g. South Africa) or S&T cooperation agreements (e.g. Brazil) are in place, is particularly welcome. The use of space applications can contribute to their economic and social development and support environmental protection.

[7] OJ L 108 of 25.4.2007, p. 1.
[8] COM(2008)46 final, 1 February 2008

International cooperation with third countries (ICPC)[9] will be supported in view of expanding the use of earth observation data, and the corresponding data processing and management methods in third countries, and enhancing the relations with established space powers.

In the framework of the European Development Policy space applications such as Earth observation or satellite communications have been recognized as a central tool to support Africa in its sustainable economic and social development.[10] In particular, African and European policymakers and stakeholders got together in Lisbon at the end of 2007 calling for an Action Plan on *GMES and Africa* to be prepared, and a wide consultation process with the objective of expressing African needs for the development of GMES-related services and capacities followed. This has now led to a phase of implementation in the frame of the Joint Africa Europe Strategy under Partnership 8 on Science, Information Society and Space.

Furthermore, for GMES to become the main European contribution to the global 10-year implementation plan for the Global Earth Observation System of Systems (GEOSS), FP7 GMES projects will also provide opportunities for data exchange with international partners, in the area of environment monitoring (especially in areas such as global climate change), and will encourage the increased use of Earth observation, as well as the development of a system of worldwide observation systems.

Additional activities, such as dedicated policy studies, can serve as valuable tools to negotiate future cooperative activities with international partners, and to better understand the benefits and risks of cooperation in order to define the scope of cooperative activities with third partners in the field of space.

Approach for 2012

The action plan underlying the Space Work programme is based on the European Space Policy. The Work programme responds directly to policy needs expressed in the Communication on EU Space strategy, the European Space Policy Communication, the Resolutions of the Space Council[11], and follows the recommendations of the Space Advisory Group. As regards GMES Services, consolidated user requirements established in user consultation processes linked to GMES implementation are also instrumental in providing guidance to the Commission in the annual update of the Work Programme and of emerging needs, including for GMES information by policy makers.

Furthermore, the close adherence of principles and values expressed in various European policies will support the general acceptance of these in Europe. Ethical principles and gender mainstreaming are typical examples of such principles.

Applicants are advised to keep the overall scope and strategic requirements expressed in section I, as well as the actions described in section IV, in mind when responding to specific topics of a call. Furthermore, ethical principles and gender aspects must always be taken into account. The forms of the grant to be used for the different funding schemes mentioned in the

[9] International Cooperation Partner Country (ICPC) is a third country which the Commission classifies as low-income, lower-middle-income or upper-middle-income country and which is identified as such in the work programmes, see list in Annex 1 to the Work Programme "Cooperation"

[10] COM(2005) 489 final, 12 October 2005, "EU Strategy for Africa: Towards a Euro-African Pact to Accelerate Africa's Development"

[11] 4th Space Council Resolutions [also COM(2007) 212 final], 22 May 2007; 5th Space Council Resolutions, 25-26 September 2008; 6th Space Council Resolutions, 29 May 2009; 7th Space Council Resolutions, 25 November 2010

Space theme Work Programme are given in Annex 3 to the Work Programme "Co-operation" 2012.

Modalities of Implementation: Research Executive Agency, European Space Agency

Calls for proposals under this work programme Theme Space will be implemented by the **Research Executive Agency** (REA) according to the provisions of Commission Decision C/2008/3980 final of 31 July 2008 "delegating powers to the Research Executive Agency with a view to performance of tasks linked to implementation of specific European Union programmes People, Capacities and Cooperation in the field of research comprising, in particular, implementation appropriations entered in the Community budget". The management of all projects to be funded as a result of this work programme will be implemented by REA, with the exception of:

- actions implemented on the basis of calls for tenders
- identified beneficiary actions (being in support of policy)
- other specific topics explicitly identified as being of a strategic nature for the European Commission.

The **European Space Agency** will not participate in consortia of FP7 proposals submitted under the FP7 "Cooperation" Space Theme to this call for proposals.

Gender dimension

The pursuit of scientific knowledge and its technical application towards society requires the talent, perspectives and insight that can only be assured by increasing diversity in the research workforce. Therefore, all proposals are encouraged to have a balanced participation of women and men in their research activities and to raise awareness on combating gender prejudices and stereotypes. When human beings are involved as users, gender differences may exist. These will be addressed as an integral part of the research to ensure the highest level of scientific quality. In addition, specific actions to promote gender equality in research can be financed as part of the proposal, as specified in Appendix 7 of the Negotiation Guidance Notes [ftp://ftp.cordis.europa.eu/pub/fp7/docs/negotiation_en.pdf]".

Activities

Two main activities, complemented by a set of cross-cutting activities, will be undertaken to achieve the policy objectives expressed above, and several specific action areas are prioritised within these activities. However, not all specific action areas will be open for specific call topics in the call during 2011, covering commitment appropriations of 2012.

Activity 9.1. Space-based applications at the service of European Society

The **first activity**, the development of GMES (Global Monitoring for Environment and Security) being central to this activity, covers five main *action areas*:

1. Support to the **(pre-)operational validation of GMES services and products** based on the integration and harmonisation of related observation data (both satellite-based and in-situ, including ground-based, ship-borne and airborne), starting with the funded GMES Services.
2. Integrated use and application of **satellite communication and satellite navigation solutions with space-based observation systems**, and with related non-space systems.

3. **Support to the coordinated provision of observation data**, both from space-based infrastructure and from in-situ observation systems. [12]
4. Development of **Earth observation satellites**, which relate to the management of the environment and security, and which complement in-situ systems.
5. Continuity of **GMES services,** ensuring complementarity and consistency with the GMES Regulation on the European Earth observation programme (GMES) and its initial operations (2011-2013)[13]

During 2012, only **three of the five specific *action areas* above will be prioritised** (namely area 1, 3 and 4), following a strategic approach as outlined as follows.

As regards integrated use and application of **satellite communication and satellite navigation solutions with space-based observation systems** (action area 2), the current availability of EGNOS is considered to create opportunities for the private sector to provide innovative and value-adding services. In light of current funding opportunities outside FP7[14], and limited budget availability in 2012, further dedicated FP7 support to action area 2, including a wider range of (downstream) geo-information R&D needs, is envisaged only in 2013.

The work programme 2011 for the FP7 space theme allocated resources already with high priority to the Marine and Atmosphere domains, resulting in service projects aiming at continuity (action area 5), as well as a number of smaller projects meeting R&D needs in these two domains. Research and development activities undertaken in the FP7 work programmes 2012 and 2013 under action area 1 will thus focus thematically on R&D needs for the build up of **Security** and **Climate Change monitoring services**, and other **earth observation/remote sensing research** to further strengthen the GMES implementation.

In the **GMES Security** domain, 3 distinct areas have been identified as priorities for service provision in support to security applications

1) Border surveillance (in particular in support to the European external border surveillance system - EUROSUR)
2) EU external actions
3) Maritime Surveillance

In the domain of Maritime Surveillance, the 3rd call has provided funding for a set of projects, which have recently started. It is therefore proposed to support the other two domains of border surveillance and EU external actions in 2012.

As regards **Climate and Climate Change monitoring**, space based observations provide a key source of data at global scales of the earth's environment, climate change, and the provision of Climate services. An identification of the key observables has been undertaken

[12] Coordination and Support Actions for these activities are regarded as policy related actions and will not be managed by the Research Executive Agency (REA)
[13] OJ, L 276, 20.10.2010, p. 1.
[14] For example as Implementing Measure under the Competitiveness and Innovation Framework Programme (CIP)

by the second Global Climate Observing System (GCOS) report 2003 in defining Essential Climate Variables (ECV), and these have been updated in 2010. The GMES services in the Land, Marine and Atmosphere domain include within their product portfolios a wide range of parameters which may already correspond to these ECVs, or contribute to their generation. More importantly though, space based observations processed by the GMES services will contribute to climate change analyses if the continuity of the underlying measured physical parameters with previously existing data records can be reconciled. Specific efforts are to be undertaken by the FP7 projects to further upgrade their product catalogues to include this climate relevant information. It is thus proposed to further support this effort in 2012 through a Coordination and Support Action, devoted to coordinating the research activities within the GMES service community, which will lead to a structured approach for delivering quality controlled and validated climate data records.

Furthermore, the call FP7-SPACE-2010-1 has resulted in a set of projects specifically performing long-term time series generation and validation, regional reanalysis and downscaling and examining forcing and feedback mechanisms associated with changes in terrestrial carbon and water fluxes, sea level and ocean circulation over the high latitude and arctic regions. ESA has also initiated a dedicated Climate Change Initiative (CCI)[15] to realise the potential of the long-term global Earth Observation archives and contributing to the ECV databases required by United Nations Framework Convention on Climate Change (UNFCCC). In its implementation, representative ECVs for the ocean, terrestrial and atmospheric domains are addressed covering elements of the carbon cycle and the water cycle, the factors of uncertainty in climate radiative forcing and feedback, and rapidly changing elements of the climate system. The initiated CCI projects closely coordinate their analyses with the GMES thematic services in land, marine and atmosphere domains, and involve major climate modelling centres in Europe. At the same time, the Global Framework for Climate Services, established by the 3rd World Climate Conference in September 2009, will require a set of ECVs which will go beyond those required for the UNFCCC.

Furthermore, operational agencies dealing with Earth Observation satellites, with their mandate to provide continuous and reliable measurements over long periods of time, have a central role to play in the generation of ECVs. The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), with its fleet of satellites, its distributed network of Application Facilities and thanks to its unique archive dating back to 1981, already provides a wealth of environmental and climate data and products. In this respect, the first priority of EUMETSAT is to extract Fundamental Climate Data Records (FCDRs) from its direct satellite measurements that reach the suitable quality for observing climate trends. These records form in turn the raw material from which high quality ECVs can be derived. In parallel, EUMETSAT participates in global initiatives to ensure that measurements from different satellite systems are inter-calibrated so that all the related observations can be fully exploited at a global level over long periods of time.

Recent activities funded by the FP7 Theme Environment (including climate change) include two climate services, Enabling CLimate Information Services for Europe (ECLISE) and responding to user needs with local climate information in the Mediterranean region (CLIM-RUN). These are first steps towards a realisation of a European Climate service. The development of a more effective interface between climate change knowledge and policy making process will be targeted also specifically in 2012 in the FP7 call of the Theme Environment, addressing drivers and processes at appropriate spatial and temporal scales,

[15] ESA/PB-EO(2009)32, rev. 1, of 8 May 2009; and ESA/PB-EO(2009)69 of 18 May 2009

large scale experiments to integrate climate data and knowledge including monitoring technologies and earth observation systems.

In light of these various ongoing substantive activities, a conference "GMES for climate change" to be held in Helsinki on 16 and17 June explored whether there are still any gaps and, if so, which of these need to be addressed specifically by GMES and should be considered as components of a specific operational GMES climate change service. Following this consultation, the call for 2013 will be prepared to address this important thematic service domain of GMES.

As regards support to **Emergency Management services**, the Commission proposal is to allocate funding from the GMES Regulation budget in priority to emergency response phase i.e. emergency response maps and reference maps produced in rush mode in support to the management of crises inside and outside the EU. In addition, the GMES Regulation will ensure the sustainability of one of the Early Warning systems on floods at European level, EFAS (European Flood Alert System). This covers on-demand production and delivery for immediate crisis management, i.e. corresponding mapping needs in the field, and related operation activation services, but does not provide sufficient support to the important phases preparing for emergencies or dealing with the aftermath of emergencies. Recognising this, **FP7 funding in 2012 shall provide support to the *'non-response'* phases** prevention and preparedness, and the post-response period of recovery and reconstruction.

The GMES Space Component currently under development will provide Europe with an unprecedented source of operational satellite data products. First streams of space data will be available from Sentinel 1 in 2013, to be followed shortly thereafter with data from Sentinels 2 and 3. User oriented GMES services at European level, as well as geo-information services at local level should be enabled with suitable access tools, user-friendly data-mining and searching techniques, and processing/validation methodologies to integrate these data streams into their geo-information production. **FP7 funding in 2012 shall provide support to R&D activities, devoted to this goal.**

Support to the coordinated provision of observation data (action area 3), both from space-based infrastructure and from in-situ observation systems will be addressed in 2012. Further to the additional resources to be made available through the EC/ESA Delegation Agreement for space data supply to services, specific attention will also be given to R&D needs of in-situ observation systems identified as crucial for GMES in the context of the coordination study by the European Environment Agency (project GISC, GMES in-situ coordination).

Action area 4 of development of **Earth observation satellites** will be supported in 2012 and 2013 with a payment transfer from FP7 under the ESA-EU Delegation Agreement.

Activity 9.2. Strengthening the foundations of Space science and technology

For the **second activity**, the strengthening of foundations of Space science and technology, the support is to be maximised through synergies with initiatives of ESA or other European, national or regional entities. This activity comprises three more *action areas*:

1. Support to research activities related to **space science** and **exploration**,

2. New concepts in **space transportation**, and **key technologies** including **critical components**,
3. Research to reduce the vulnerability **of space assets**.

During 2012, only **two of the three specific *action areas* above will be prioritised**, following a strategic approach as outlined.

Previous work programmes have supported under the first action area the exploitation of scientific data from in-space experiments to cover the post-mission take-up of data. In 2012, this activity will be targeted towards astronomical and astrophysical data obtained from in-space observatories.

As regards key technologies, the Competitiveness Council[16] has recognised the importance of space technology, contributing to the overall competitiveness and innovation potential of the European economy. Europe's advance in space technology is vital for sustaining operational space infrastructures serving as tools and platforms for the development of innovative applications and services for the benefit of European citizens, both in the short/medium term as well as in the long term.

In the short/medium term, Europe's ability to act in space is dependent on its uninterrupted or unimpeded access to space technologies which originate from outside the EU, and R&D is required to enhance European Non-Dependence. Such Critical Technologies for European Non-Dependence have now been covered in calls of four years running. It is time to take stock of the activities which have been started and their results before re-opening the topic in a further call, an approach which also has been taken with other areas in the FP7 work programme. Furthermore, the joint task force group (EC, ESA, EDA) will be engaging in 2011 in reviewing and updating the list of critical technologies and harmonizing the response of the three institutions. This list will then be considered for shaping the call in 2012 (i.e. for funding during 2013).

In 2012, support to R&D activities in action area 2 will rather focus on key technologies, which facilitate and sustain the use of space as a tool *in the long term*. It is proposed to focus part of the budget available under Strengthening Space Foundations on the development of disruptive technologies with the intention of assessing the interest of the European space research community to engage in long-term research aimed at the development of next-generation technologies. In preparation for the future Framework programme, it is proposed to introduce a selection of such topics into the next Space call. The focus will be on highly innovative research in areas that are not yet sufficiently mature to find a place within European missions, but which have nevertheless been identified as areas in which technology breakthroughs will be required over the next decades.

Initiating research on such "next-generation" technologies will contribute to Europe's long-term competitiveness in the space sector with the aim of leapfrogging global competitors in key areas. The bottom-up approach intrinsic to the framework programme is particularly well suited for promoting new ways of thinking through the co-financing of high-risk research projects.

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[16] Council document 17165/10 - Europe 2020 Flagship Initiative: "Innovation Union": Accelerating the transformation of Europe through innovation in a fast changing world - Council conclusions, 29 November 2010

Proposals shall thus contribute to increasing innovative capacity of future developments by addressing new concepts and technologies, thereby broadening the range of technologies available for future European space activities and developments, and potentially leading to disruptive technologies, which may allow Europe to maintain its lead, or even take the lead in certain new key areas.

Specific Research to reduce the vulnerability of space assets has been covered substantively in the previous call of 2009, and could be addressed again in 2013.

Activity 9.3. Cross-cutting activities

The **third activity** comprises a number of horizontal issues:

1. Activities in **SME relevant research** will be embedded *in all the action areas* mentioned. Applications of GMES and other space infrastructures, including GNSS, typically require very sophisticated, state-of-the-art processing, which are often the result of research and developments done in specialised academic organisations and commercial spin-offs. Typical opportunities for SME participation in GMES may be found in the development and/or adaptation of methodologies and tools for services tailored for specific applications. Concerning space science, exploration, space transportation and space technologies spin-in and spin-off activities are encouraged. Additionally to this general approach, collaborative projects will be *specifically supported in 2012* under this action area, which bring together SMEs not traditionally working in space projects with Space industry or space research organisations.
2. **International cooperation** with third countries (ICPC) will be supported in view of expanding the use of earth observation data, and the corresponding data processing and management methods in third countries, and enhancing the relations with established space powers, with a view of facilitating wider space research alliances. Candidates for cooperation among other established or emerging space powers include the United States, Russia, Canada, Japan, the People's Republic of China, India, Brazil, South Africa, and the Ukraine. The European Neighbourhood Policy governs relations with Eastern and Southern neighbours (i.e. Black and Caspian Sea region) and countries of North Africa and the Middle East (i.e. Mediterranean region).

   All projects conducted in the Theme Space are open for such participation of third countries under the normal participation rules, with the topics mentioned above being of particular interest for international participation. Participants are eligible to participate and to be funded in the context of the Space Theme calls described in this Work Programme.
3. Effective **dissemination actions** are of importance as significant wider benefits are expected to arise from the research projects and actions supported under this programme.
4. **Cross-thematic approaches:** in this work programme, complementarity is ensured with other Themes of the Cooperation Programme. In particular, the topics in Activity 9.1 relating to GMES in this work programme are complemented by work in the Theme 'Environment (including Climate Change)'. Also the 'Space technologies' topic in this work programme is complemented by activities in the Themes 'Nanosciences, Nanotechnologies, Materials and new Production Technologies', 'Energy', 'Transport' and 'Information and Communication Technologies'.

5. Actions in order to better understand the opportunities and challenges associated with the **European Space Policy implementation** process will be undertaken, together with road-mapping activities identifying future Framework programme research needs.

II. CONTENT OF CALLS

The current planning foresees one call in 2011 covering an annual work programme, for projects to be funded from the 2012 Space theme budget. No further call on these activities is currently planned based on the commitment appropriations of 2012.

Activity: 9.1 Space-based applications at the service of European Society

Area 9.1.1 (Pre-)operational validation of GMES services and products

The "S" in GMES – support to border surveillance

GMES can make an important contribution to serve EU security needs. This has been demonstrated repeatedly in the domains of border and maritime surveillance, humanitarian relief missions, conflict early warning and prevention and others. A working group was set up in February 2008 that brought together users, policy makers and technical expertise on space technology, airborne sensors, data processing and other relevant technologies. Important insights are available from EU projects such as LIMES (FP7) or MARISS (ESA) or national projects such as SEAHORSE and MINERVA. Following guidelines presented by the Commission to Members States at an informal GMES Advisory Council dedicated to the security dimension of GMES, a strategy was put in place for further definition of the contents of security services.

As a result of these consultations, a service for the exploitation of space for border surveillance is under definition in the context of the development of the *European Border Surveillance System* (EUROSUR)[17] and in cooperation with the *Global Monitoring for Environment and Security* (GMES) initiative. As of 2013, EUROSUR will gradually establish an *information sharing and cooperation mechanism* enabling Member States' authorities carrying out border surveillance and the European Agency for the Management of Operational Cooperation at the External Borders (FRONTEX) to cooperate with the aim to:

- Increase internal security of the EU by preventing cross-border crime;
- Reduce the number of irregular migrants entering the Schengen area undetected;
- Considerably reduce the unacceptable death toll of migrants at sea.

In 2009, a **GMES technical concept in support of EUROSUR** has been prepared, with a detailed overview of surveillance sensors, capabilities and platforms, including satellites,

[17] Compare Communication examining the creation of a European Border Surveillance System (EUROSUR), COM(2008) 68 final of 13 February 2008; Report on the progress made in developing EUROSUR, SEC(2009) 1265 final of 24 September 2010; Commission staff working paper determining the technical and operational framework of EUROSUR and the actions to be taken for its establishment, SEC(2011)145 final of 28 January 2011.

unmanned aerial vehicles and aerostats. The concept describes the applicability of these **surveillance tools to the following scenarios**:

1) Tracking vessels on the high seas;
2) Punctual monitoring of selected third-country ports and coasts;
3) Monitoring the pre-frontier land areas.

In 2010-2011, a **concept of operations** (CONOPS) for the application of surveillance tools in the context of EUROSUR has been elaborated. Along the concept, FRONTEX should provide the national coordination centres for border surveillance in the Member States with surveillance information on their external borders and the pre-frontier area on a frequent, reliable and cost-efficient basis. This service should be delivered in close cooperation with other relevant EU agencies (e.g. the European Maritime Safety Agency (EMSA)), using the EUROSUR communication network for the exchange of information.

In the elaboration of the CONOPS, lessons learned from previous and ongoing R&D projects were taken into consideration. In 2011, in addition, the FP7 Space theme projects SIMTISYS, DOLPHIN and NEREIDS were launched to develop satellite-based simulators and services for maritime surveillance, including borders. It is expected that these projects will also provide know-how and information that can be used for border monitoring along sea and coastal areas, and help optimise cooperation between actors.

The workflow between the Member States' authorities and the involved EU agencies will be tested in the on-going **EUROSUR pilot project**, which contemplates the use of multiple sources of information including Space and GMES in particular.

The applicability of the service described in the CONOPS has to be **tested and verified** in operational, technical and economical terms before it can possibly be implemented as an operational service as of 2014.

The current challenge is to bridge the gap between research and the operational set-up envisaged in the Concept of Operations for GMES support to EUROSUR. Developments in this area will have to be integrated in the stakeholders' processes taking into consideration actual working practices, methodologies and timeliness in the access to information that will be required in a future operational environment. As such, it is expected that the projects will work on:

- Identification of relevant sources of data/information, which can be complemented by space-borne data;
- Definition of criteria and mechanisms for data acquisition and satellite-tasking based on dynamic border surveillance intelligence and risk-assessment requirements;
- Definition and testing of mechanisms for integration of space-based data with other relevant sources of data for improved border permeability risk-analysis and intrusion detection, along the communication channels in place, whenever possible, or using ad-hoc mechanisms if necessary;
- Definition and testing of the workflow between stakeholders;
- Testing trials, which will include assessment of added-value, cost-effectiveness and user up-take;
- Outlook of future services based on evolution and availability of technology;
- Drafting of the specifications of a full operational system (phased approach 2014 onwards);

- Identification of areas where further research is needed to contribute to the objectives of EUROSUR.

These objectives shall be achieved through two complementary projects. The work will involve close cooperation with FRONTEX and other relevant EU Agencies as the CONOPS foresees the exploitation of capacities of such as border surveillance and maritime surveillance. It will therefore be a key asset for the consortium to possess a very good detailed understanding of FRONTEX's and EU Agencies' (such as EMSA) working methods and existing operational systems, so that synergic and complementary actions can take place and seamlessly assimilated by the operational stakeholders. It is expected that participants show in their proposals that they will be able to have this impact.

Proposals should take into account the developments made in related previous and on-going projects, and be synergetic to the other activities supported by GMES research or initial operations funding. System integration and validation in pre-operational service chains will be a key aspect to achieve the objectives set and sound specifications for a future operational system.

Proposals should also involve Member States' authorities, as these will be important users served through FRONTEX. To achieve a tangible impact, it is expected that participants show in their proposal that they are ready to sign during the early stages of the project a Memorandum of Understanding with end-users regarding the long term use of results.

The common application of surveillance tools as supported by GMES, should not only provide relevant information and intelligence for combating irregular migration and cross-border crime to the national coordination centres for border surveillance in the Member States, but could provide such information also to neighbouring third countries, which are cooperating with EU Member States via dedicated regional networks such as SEAHORSE.

This shall be achieved by one project for each of the following topics.

- Expected impact (both topics SPA.2012.1.1-01 and SPA.2012.1.1-02):

In the context of Step 5 of the EUROSUR roadmap, the projects of both topics are expected to test and validate the common application of surveillance tools for the scenarios identified. By testing product applicability under real-life conditions, project results are expected to serve as a basis for an operational service in this field.
Projects are expected to have a tangible and significant impact on the European user communities' capability to independently adopt and implement appropriate policy in the area of border surveillance in a reliable and timely manner.
Projects are also expected to result in a significantly enhanced use of space-based assets and associated data in this field. Furthermore, project impacts should contribute directly to the sustainability and competitiveness of European value-adding services. All impacts should be complementary to past and ongoing activities in the field of border/maritime surveillance.

SPA.2012.1.1-01 Testing and validating the intelligence-driven and high time-critical scenarios of the CONOPS

Proposals under this topic should focus on the 1st scenario and parts of the 2nd scenario mentioned above:

1) Tracking vessels on the high seas

The 1st part of the project is to test and validate the workflow and technology for tracking larger vessels (as set out in CONOPS) coming from a distant third country port until interception. Based on intelligence derived from the EUROSUR common pre-frontier intelligence picture, this vessel has been identified before departure or at an early stage of its journey as being used for irregular migration, cross-border crime or as posing a threat to internal security. In line with the CONOPS requirements, two components should be tested under real-life conditions:

- *Monitoring* of a specific third country port to determine if/when the vessel has departed (incl. estimates on departure time, direction, speed, behaviour);
- *Tracking* the identified vessel in a covert and reliable manner over the high seas (position, using ship reporting systems and, if necessary, satellite imagery; estimated arrival time in patrolling areas and EU territorial waters etc); confirming the characteristics and status of identified vessels, and detecting changes in behaviour or status.

2) Punctual monitoring of selected neighbouring third-country ports and coasts

The 2nd part of the project is to monitor selected third country coasts, which, based on intelligence processed in the common pre-frontier intelligence picture of EUROSUR, have been identified as regular departure points for smaller vessels[18] (as set out in CONOPS) used for irregular immigration and cross border crime or as posing a threat to internal security. In line with the CONOPS requirements, the following *high-time critical* component should be tested under real-life conditions:

- *Monitoring* of specific ports and stretches of third country coasts from which small boats are departing on a regular basis (incl. type of boat, estimates on departure time, direction, speed, weather conditions, behaviour, estimated number of people transported, estimated arrival time in patrolling areas and EU territorial waters etc), detecting and characterising an anomalous situation and providing monitoring of the evolution of the situation.

The proposal should provide an overview of resources needed for Space-based observation data, taking into account the existing availability of space data through the EU funded data access mechanisms via ESA[19]. Data requirements beyond the existing agreement between Commission and ESA will have to be covered by the budget of the project.

The project participants will cooperate with FRONTEX, which will represent the end-users (FRONTEX, other EU agencies and Member States' authorities) and which will therefore not participate in the call for proposals. In order to achieve the necessary impact, during the life-time of the projects, FRONTEX and the other end-users have the right to share any products/databases delivered by the selected companies/consortia with each other for the purposes of border surveillance/EUROSUR. In line with the GMES objective to provide products as a public good, the project is expected to grant FRONTEX and the other end-users

[18] E.g. wooden cayucos, rubber boats and speed boats.
[19] Data Warehouse Requirements Document v1.7 dated 21/12/2010

free user rights on selected products for a limited time period (at least 2 years) once the projects have ended.

As regards intellectual property rights, participants should adhere to the following strategy: Any kind of background (in the meaning of Article 2 of the FP7 rules for Participation) provided by the EU, its agencies (e.g. Frontex) and other end-users to the companies/consortia during the lifetime of the projects remains their intellectual property. The Union will enjoy access rights to information specifically acquired for the project and to foreground for the purpose of developing, implementing and monitoring Union policies related to environment and security on a royalty-free basis. Special Clause 28 will therefore be applied to any Grant Agreement in this topic.

Participants can obtain further information regarding the **2009 GMES technical concept in support of EUROSUR** and the **2011 concept of operations** for the common application of surveillance tools in the context of EUROSUR from the Commission[20].

Funding schemes: One *Collaborative project* with an upper eligibility limit of EUR 4 000 000 requested EU contribution (up to one proposal can be selected).

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

SPA.2012.1.1-02 Testing and validating the low time-critical components of the CONOPS

Proposals under this topic should focus on parts of the 2nd scenario and on the 3rd scenario mentioned above:

1) Punctual monitoring of selected third-country ports and coasts

Following the 2nd scenario, the following *low time-critical* component should be tested under real-life conditions:

- *Intelligence picture* detecting and verifying methods and routes used in the selected pre-frontier areas. (Automated recognition processes could be particularly valuable in realising this information.) This should include the punctual monitoring of known departure points, stop-overs, houses where boats are built/stored, types of boats built/used; comparison of departed/intercepted boats; estimate on boats perished/not detected. The reference picture is needed first before monitoring can be envisaged, but it is also used as an input to risk analysis and the knowledge base of the CPIP. The reference picture should include geo-databases on sea currents to help build the relationship between departure points, boat type and prospective countries of landing.

2) Monitoring of the pre-frontier land areas

Following the 3rd scenario, the objective is to provide the following products:

a. *Reference picture* on the basis of mapping of terrain/topography, geo-coded, digital elevation models (DEM), geographic features and land-use, transport infrastructure,

[20] Further information is available from http://ec.europa.eu/enterprise/policies/space/research/fp7-call-for-proposals/index_en.htm

routes, demarcations, etc. in selected parts of the pre-frontier area and the Member States' border area. Updates to the reference picture can be conducted annually or on an ad-hoc basis (as required).

b. *Intelligence picture* detecting and verifying methods and routes used in the selected pre-frontier areas. (Automated recognition processes could be particularly valuable in realising this information.) This should include punctual monitoring in certain pre-frontier land border countries to monitor changes in routes, nexus points, tracks, transport or other infrastructure, third-country authority resources and patrols, etc. (e.g. monitoring during RABIT operations at land borders).

c. Input to the low time-critical *local situational picture,* in particular on build-up of people or vehicles, demarcations, weather conditions, water levels in rivers, snow cover etc.

The proposal should provide an overview of resources needed for Space-based observation data, taking into account the existing availability of space data through the EU funded data access mechanisms via ESA[21]. Data requirements beyond the existing agreement between Commission and ESA will have to be covered by the budget of the project.

The project participants will cooperate with FRONTEX, which will represent the end-users (FRONTEX, other EU agencies and Member States' authorities) and which will therefore not participate in the call for proposals. In order to achieve the necessary impact, during the life-time of the projects, FRONTEX and the other end-users have the right to share any products/databases delivered by the selected companies/consortia with each other for the purposes of border surveillance/EUROSUR. In line with the GMES objective to provide products as a public good, the project is expected to grant FRONTEX and the other end-users free user rights on selected products for a limited time period (at least 2 years) once the projects have ended.

As regards intellectual property rights, participants should adhere to the following strategy: Any kind of background (in the meaning of article 2.5 of the EC rules for Participation) provided by the EU, its agencies (e.g. FRONTEX) and other end-users to the companies/consortia during the lifetime of the projects remains their intellectual property. The Union will enjoy access rights to information specifically acquired for the project and to foreground for the purpose of developing, implementing and monitoring Union policies related to environment and security on a royalty-free basis. Special Clause 28 will therefore be applied to any Grant Agreement in this topic.

Participants can obtain further information regarding the **2009 GMES technical concept in support of EUROSUR** and the **2011 concept of operations** for the common application of surveillance tools in the context of EUROSUR from the Commission[22].

Funding schemes: One *Collaborative project* with an upper eligibility limit of EUR 2 000 000 requested EU contribution (up to one proposal can be selected).

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

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[21] Data Warehouse Requirements Document v1.7 dated 21/12/2010

[22] Further information is available from http://ec.europa.eu/enterprise/policies/space/research/fp7-call-for-proposals/index_en.htm

SPA.2012.1.1-03 GMES Security – Support to EU External Actions

As regards EU external actions, the identification of requirements is ongoing through an ad-hoc GMES-Security working group in **Support to External Actions (SEA**), active since 2010 with the involvement of relevant EC and Council/EEAS services, as well as National and EU Agencies' experts. Work will continue throughout 2011, accounting also for the needs of the newly-created European External Action Service (EEAS). Prioritisation of actions will follow.

The potential application areas identified so far under SEA include support to peace-keeping operations, intelligence for humanitarian-aid and civil protection operations, border monitoring outside the EU, treaty monitoring and nuclear non-proliferation, assessment of security risks related to urban resilience, food security, water management, illegal exploration of natural resources or monitoring of illicit crops and land use planning, in particular from a preventative point of view.

Capacities have been developed in FP7 projects, providing a baseline for operational capabilities in Europe. To prepare operational services, these technical capabilities need to be brought to a pre-operational status. In particular, lessons learned from projects such as G-MOSAIC and LIMES (FP7), GMOSS and TANGO (FP6) and other stakeholders' experience (e.g. National, EUSC, EUMETSAT, JRC …) have been used in the technology analysis subjacent to SEA scenarios, in particular regarding the availability and suitability of technology to respond to user needs.

Existing capabilities are to be further enhanced through research and development focussing on specific research gaps identified. Some examples are:

- Research on thematic mapping could span from basic theoretical concepts and algorithm development to new prototype applications, such as resource monitoring, population dynamics, desertification indicators and pressures, analysis of land-use changes in conflicts, and in particular for those areas identified under SEA;
- Use of multiple sensor information (Optical, SAR, Hyperspectral, ...) for improved target identification and characterisation.
- Combined use of Earth Observation, satellite positioning and in-situ data with open source intelligence and HUMINT (HUMan INTelligence). Integration of information for the supply of value-added information in the scenarios identified in SEA.
- Improvement and automation of processing chains explored in previous GMES projects in relevant areas; these could include issues such as consolidation of standards, third party validation concepts and intuitive user-interfaces to be used also in an operational scenario;
- Improvement of change detection techniques, automated feature extraction over large sets of data, development of newly emerging capabilities such as moving target identification and advanced satellite observation techniques;
- Tools and training in support to decision-making related to treaty monitoring and nuclear non-proliferation.

The objective of the projects will be to demonstrate how space data, when integrated with other types of data or intelligence, can contribute to respond to the needs in SEA user-driven scenarios. The work should clearly engage users and address how the results can lead to operational services. An objective to be included is the definition of the specifications of corresponding potential services for 2014 onwards.

Proposals should take into account the developments made in previous GMES projects, especially those on a security and related emergency context, and be synergetic to the other activities supported by GMES research or initial operations funding. . Particular emphasis should be placed on a harmonised set of operational services for Emergency/Crisis management, optimising data procurement and processing capacities, while facilitating service provision to different user communities[23], without unnecessary duplication. Synergies with Land, Marine and possibly Atmosphere services should also be fully explored (ie. using data from those services to derive added-value information for security applications, without duplication)

For each of the scenarios, the project should also include, where relevant, an analysis of the benefits based on potential synergies between defence and civil infrastructure and applications, as well as service evolution expectations based on technology evolution, in particular those related to the space segment.

Funding schemes: *Collaborative Projects* with an upper eligibility limit of EUR 4 000 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

  The projects are expected to significantly contribute to operational capacities in the Security context of GMES, in particular by supplying information and intelligence in support to EU External Actions, including mapping and geo-information products ready for deployment in emergency and crisis situations.

  Further insights into user uptake, possible models for operational supply, improved techniques in data fusion (including the use of HUMINT) and also the potential of future sensor technology will be demonstrated. The results obtained will also contribute to the sustainability and competitiveness of European value-adding services.

  The projects should also pay particular attention to data policy and confidentiality issues, especially in close-to-operational scenarios in sensitive areas.

  The impact of the system should be measured by the feedback received by the users and the potential of new methodologies in addressing the requirements expressed by the users for future operational services.

SPA.2012.1.1-04 Support to emergency response management

[23] e.g. communities now served for Emergency/Crisis management by G-MOSAIC and SAFER

The Commission proposal is to allocate funding from the GMES Regulation budget to rapid mapping and geographic reference data in support of the '*response phase'* for crises inside and outside the EU. This covers thus on-demand production and delivery for immediate crisis management, i.e. corresponding mapping needs and operation activation services. In contrast, **FP7 funding in 2012 shall provide support to the *'non-response'* phases** of the crisis management including prevention and preparedness, and the post-response period of recovery and reconstruction.

It is therefore proposed to launch research and development activities enhancing preparation of service products related to

- Risk and vulnerability mapping, including tools and products enhancing mitigation and preparedness, thereby supporting adaptation strategies and prevention capacities;
- Support to emergency recovery – geo-information tools and products supporting the recovery process, such as reconstruction efforts.

Proposals can target areas in- and/or outside Europe, prioritising geographic regions where crises and disasters are likely to occur, and/or where populations are particularly endangered or vulnerable (e.g. islands). The vulnerability to expected climate changes, and hydrological changes should also be taken into account. Combinations and integration of multiple datasets should be used as basis for risk assessment, examples being improved risk mapping based on satellite data coupled with Digital Terrain Models and in-situ data sources, combining different physical variables as for instance rainfall and detailed geological information, including local geographical reference data, data from GNSS services, and socio-economic data. Proposals could also address assessment of effectiveness of recovery or reconstruction efforts by change detection analysis based on satellite imagery. New developments in space based instruments should be taken into account.

Disaster types to be considered in this context could be floods, volcanic eruptions, ground motion, land slides, seismic hazards, earthquakes, tsunamis, extreme weather events, and forest fires.

Within Europe, activities should support the existing policies at EU level (e.g. flood Directive, guidelines on risk mapping etc.) and should be closely linked with existing national activities and capacities at Member States level. They should also stimulate coordination or cross-border cooperation between countries (e.g. by creating thematic or regional R&D clusters). Cross-cutting dimensions between GMES services should also be enhanced (e.g. by fostering complementarities between land and emergency management services). In the case of global applications, existing European cooperation mechanisms and frameworks should be supported.

Proposals should take into account the developments made in previous GMES developments, especially in both emergency and security contexts, and be synergetic to the other activities supported by GMES research or initial operations funding.

Funding schemes: *Collaborative Projects* with an upper eligibility limit of EUR 2 000 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

The projects are expected to significantly contribute to operational capacities in the GMES context by developing mapping and geo-information products ready for deployment in emergency and crisis situations.

The projects are expected to contribute to up-take by users and the definition of specifications for future operational capacities in the context of responding to natural disasters in Europe and globally. This particularly concerns support to civil protection authorities.

The impact of the system should also be demonstrated through the supply of information and added-value intelligence in the scenarios addressed by the projects and the feedback received by the users.

SPA.2012.1.1-05 Preparing take-up of GMES Sentinel data

Activities conducted by the EC and ESA in the implementation of the GMES Space Component will provide Europe with an unprecedented source of operational satellite data products. The first and largest streams of space data will be available from Sentinel 1 in the course of 2013, to be followed shortly thereafter with data from Sentinels 2 and 3. Further to these, there are also contributing and gap-filler missions particularly in the domain of mid and low resolution sensors. Data streams are expected to amount to several terabytes per satellite orbit, to be delivered in a specific format, which will require the build-up of enhanced service infrastructure to ingest and process such quantities of data to a higher level, and user-friendly data-mining and searching techniques for accessing the data.

Space data products provided by the GMES Space Component - are already being specifically tailored to the needs of the GMES services. Beyond this, however, the wider group of space data users and providers of geo-information services in Europe also should be enabled with access tools, to be ready when these products come online, and have efficient access to the Sentinel data products.

Emphasis should be put on the development of ingestion and processing chains and methods on enabling the processing of bulk Sentinel/contributing mission data on a continuous basis and the delivery of higher level products. This will require existing infrastructure to perform fully automatic processing to a much higher degree. Examples of such developments are automatic or semi-automatic tools generating dynamic products such as improved automatic change detection based on Sentinel data, and cloud-free ground reflectance mosaic products. Once the GMES Space component data products are defined[24], preparation activities will also require R&D devoted to ensure a smooth interface with the GMES space component to prepare for the reception of the future Sentinel data products. Emphasis should be put on the preparation of test data simulating the format and content of Sentinel Data products, testing dissemination mechanisms, models for operational supply, distribution and product selection tools, allowing efficient formulation of user demands. Projects should demonstrate applications including data validation activities, particularly in the global domain.

Apart from industry, especially SMEs, in the service provider sector, this research topic should also attract active participation of researchers in academia, specialising on the use of sentinel data and their integration and/or comparison with other sensor data; and actively

[24] Further information is available from http://ec.europa.eu/enterprise/policies/space/research/fp7-call-for-proposals/index_en.htm

involve students performing research with simulated sentinel data and their integration with data coming from other sensors. This would have the advantage of both mobilising Europe's research potential, as well as prepare the next generation of active data users.

Funding schemes: *Collaborative Projects* with an upper eligibility limit of EUR 2 000 000 requested EU contribution per project

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

The projects will be expected to establish a basis for the development of innovative new GMES products or applications based on operational space data availability from European Sentinel satellites.

In the context of already existing capabilities, projects will be expected to contribute to the integration of these data sources into service chains of the GMES services, particularly for global land applications.

Apart from addressing specific knowledge generation enabling GMES service delivery at European level, projects could also help stimulate new commercial activities through innovative space data applications, and thereby have a beneficial impact on SMEs active in the value-adding sectors. By developing products specifically tailored for subsequent integration into production chains of such SMEs, or strong participation of SMEs in the project should help realisation of that impact.

Further insights into the uptake of products, possible models for operational supply, and the evolution and trends of value-added product delivery in light of future space sensors will be demonstrated. The projects should also examine the impact that their products and services could have in a socio-economic context, reflecting on the mutual dependency of technology, organisational dynamics, societal issues as well as related legal/economic aspects.

The results obtained will contribute directly to the sustainability and competitiveness of European value-adding services.

Area 9.1.2 Integration of satellite communication and satellite navigation solutions with space-based observing systems

This part will **not be open** for specific call topics in 2012.

Area 9.1.3 Support to the coordinated provision of observation data

SPA.2012.1.3-01 Research and development for In-situ component

The in-situ component constitutes an essential data source for GMES alongside the space component. Research activities will be supported, which enhance measurement and data transmission/exchange capabilities of in-situ systems which underpin GMES services, and interface in-situ data with space based data. This includes the challenge to link spatial dynamically sensed information with precisely located surface measurements.

The need for global in-situ data coverage in GMES places specific demands on sensor systems, capable of networking over global ranges, and which can be deployed and operate autonomously in remote areas as well as technically challenging environments. Additionally, developments related to "smart grids", which advance beyond passive logging systems that require manual downloading, i.e. 'intelligent' sensor networks allowing active communication of data to centralised systems for integration with other environmental datasets could offer novel solutions to collect data operationally. The uninterrupted availability of sensor networks should be addressed, as well as their data production and linkage into networks in line with the GEOSS Data Sharing Principles. Activities should enhance the convergence with space systems, as well as the harmonisation of exchange mechanisms. Systems should strive towards semantic interoperability to facilitate data search and retrieval.

These activities should contribute to Europe's capability to set up pan-European and global networks, such as those dealing with carbon observation, marine observation and atmospheric sampling.

A recent FP7 coordination activity (GISC) undertaken by the European Environmental Agency has identified key dependencies of operational GMES capacities on in-situ data and networks. The document compiled by GISC[25] highlights R&D requirements of such networks. Technical developments undertaken in the scope of proposals should respond to these R&D requirements. The proposals should clearly identify the end-user communities which will benefit.

In the atmosphere domain, priority is given to R&D aiming at enhanced capabilities for monitoring network for fluxes and concentrations of greenhouse gases. Furthermore, sensor systems for observations of atmospheric composition, aerosol and cloud particles on a global scale, suitable to be placed in in-service aircraft of internationally operating airlines could be addressed.

In the marine domain, priority is given to R&D aiming at enhanced capabilities for data collection systems providing data for assimilation in ocean forecasting models, climate monitoring and seasonal to decadal forecasting. Developments could be aimed at enhancing the performance, durability and affordability of ocean-going and moored measurement systems.

Funding schemes: *Collaborative Projects* with an upper eligibility limit of EUR 2 000 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

The projects are expected to significantly contribute to the improvement of provision in line with the R&D requirements highlighted in GISC.

Support to the in situ component is a key to ensure the long-term sustainability of GMES.

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[25] Further information on FP7 project GISC is available from http://ec.europa.eu/enterprise/policies/space/research/fp7-call-for-proposals/index_en.htm

SPA.2012.1.3-02 GMES Climate Change – Coordination of Earth observation data validation for re-analysis

As regards **Climate and Climate Change monitoring**, space based observations provide a key source of data at global scales of the earth's environment, climate change, and the provision of Climate services. An identification of the key observables has been undertaken by the second Global Climate Observing System (GCOS) report 2003 in defining Essential Climate Variables (ECV), and these have been updated in 2010. The GMES services in the Land, Marine and Atmosphere domain include within their product portfolios a wide range of parameters which may already correspond to these ECVs, or may contribute to their determination and generation. More importantly though, space based observations processed by the GMES services will contribute to climate change analyses if the continuity of the underlying measured physical parameters with previously existing data records can be reconciled. In conjunction with GCOS, FP7 climate change relevant projects, and ESA Climate Change Initiative projects specific efforts are to be undertaken by the FP7 GMES projects to further upgrade their product catalogues to include this climate relevant validation and information.

It is proposed to support this effort through a *coordination activity*, devoted to coordinating the identification of available physical measurements, which can be reconciled with previously existing data records, to form long time series. This work should thus help to substantiate how GMES observations and products can contribute to climate change analyses, by establishing the extent to which observations complement existing Climate Data Records. Gaps in the ongoing activities should be identified, thereby contributing to the formulation of the GMES climate service theme and laying the observational basis for service activities. Re-analyses will be important for improving and synthesizing historical climate records, and for providing regional detail in a global context necessary for policy development & implementation. Hence an important goal is the integration of parameters into the re-analysis chain. Such re-analysis should go beyond that of existing re-analysis projects and should provide a truly coupled gridded re-analysis which incorporates full exchanges and interactions between atmosphere, ocean, land, including the hydrological cycle.

The Coordination activity should:

- Propose a structured process for delivering ECVs through the stepped and quality controlled elaboration of Climate Data Records (CDR), the latter being derived from prioritisation of the most appropriate input data sets;
- Propose a validation process aiming at qualifying the accuracy of the climate variables;
- Propose a feedback mechanism ensuring that the results of the re-analysis process get appropriately reflected into updates of the CDR;
- Propose a process to compare the results of different reanalysis techniques.

The proposal should engage with representative researchers in the GMES projects, ESA Climate Change Initiative projects, and operational EO agencies, such as EUMETSAT, forging closer links to Climate and Climate change researchers and modellers at national level

in Europe, as well as globally. Links will also be made with projects funded under the FP7 Theme Environment which are aimed at developing a more effective interface between climate change knowledge and the policy making process.

The dialogue mechanisms set up in this coordination action should provide a forum for providers of EO data and climate researchers to assess the status of available observational records, integrating space data with in-situ records, to establish the foundations for a validated base of EO data for climate research and long time period re-analysis. Already during the lifetime of the project, it should provide a continuous means for ongoing research projects and other funded activities to better coordinate their efforts.

Funding schemes: One *Coordination and Support Action (coordinating)* with an upper eligibility limit of EUR 2 000 000 requested EU contribution (up to one proposal can be selected).

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

The project is expected to significantly contribute to availability of validated space-based observational data embedded in long time series of climate data, which can provide a repository for re-analyses and service activities. This will substantially support (in combination with climate model predictions) Climate Change impact and adaptation action assessments, policy development and policy monitoring for global, European and national users. It will also be an important asset for the development of downstream sector specific, regional and local climate application services.

SPA.2012.1.3-03 GMES Climate Change – Data archiving and exchange

The behaviour of the earth's climate can only be understood on the basis of observational data collected, and the functional relationships established from climate modelling research. There is thus an ever increasing interest by scientists from different disciplines, decision and policy makers to access the available climate data in a systematic manner. Such climate data encompasses observational data (from in-situ and collected from space), hybrid model-observational data sets from re-analyses/assimilations, as well as output from climate models. These data need to be systematically characterised as to their origin, and associated uncertainties/confidence levels in order to allow systematic use. Best practices and common benchmarking methods for transparent intercomparisons and consistency checks, as well as time series analyses are required. Furthermore, there are growing concerns regarding open access to such data, the safekeeping and long-term maintenance of data repositories, and availability of tools to search and exploit the growing data volumes effectively. Systems should strive towards semantic interoperability to facilitate data search and retrieval.

Characterising, understanding and predicting climate change/variability is a priority common to both the US National Space Policy and the EU Space Policy. The importance of full and open access to data (possibly at minimum cost of reproduction) to serve climate science and its use in the context of internationally negotiated multilateral environmental agreements (and their associated policies) is recognised in these contexts.

Proposals are invited to develop systematic data archiving, intercomparison methods, quality-assurance and dissemination structures, which are able to integrate new and historical observational sources of data (satellite data and ground-based data). Activities will include access tools, recovery, logging, quality control, synthesize and digitally archiving of data records. This will contribute to improving the accessibility of climate data sets, and the development of value added climate monitoring products and climate impact indicators.

The activities proposed should be embedded in an international context, encouraging scientific exchanges between teams linked to product generation.

The participation of SMEs, the inclusion of international partners (from third countries (ICPC), countries which have signed an agreement with the EU covering Science and Technology, as well as other space-faring nations (such as the US and Japan) will help to enhance and broaden research partnerships on climate change and earth observation. These aspects should be taken into account in the proposal. International partners will be eligible to participate and to be funded.

Funding schemes: *Collaborative Projects* with an upper eligibility limit of EUR 2 000 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

The project is expected to significantly contribute to ensuring that the expanding climate data volumes becoming available can be exchanged readily and are accessible to a broad interdisciplinary community. A valuable impact will be also the enhancement and braodening of research partnerships. Efforts should help to strengthen the compatibility and to document the consistency of existing data repositories.

SPA.2012.1.3-04 Consolidation of user requirements for GMES

The GMES programme is a user-driven programme and it is of utmost importance to ensure that GMES service specifications and investments on space infrastructure match user needs. To this end, the GMES Regulation sets up a User Forum, and calls for a transparent consultation mechanism of users. The Forum and the consultation mechanism are seen as key elements in achieving and maintaining GMES user-driven.

The GMES Regulation entrusts the User Forum with the task of advising the Commission with regard to the following aspects:

- Definition and validation of user requirements (Article 17.1) at EU and national level; The Commission is also responsible for the coherency of user requirements and service specifications, and coordination with public sector users.

- Establishment of service data requirements (Article 4.3) arising from the service specifications. Service data requirements correspond to the input data from ground networks and space necessary to enable the provision of the defined services, and provide a basis for establishing the necessary GMES in-situ and space infrastructure, leading in particular to the definition of future satellite mission requirements.

While the User Forum appointed by Member States will provide the Commission with user advice on these aspects, the Commission will require additional technical support to translate the expressed needs and requirements into a coherent specification suitable for implementing actors, such as ESA in the case of the GMES Space Component.

Transparent mechanisms for consultation on such specifications will have to be foreseen as part of this support action, maintaining user involvement and consultation at EU and national level, as well as ensuring also coordination with relevant public sector users in third countries and international organisations.

It is proposed to fund a *Coordination and Support action* to help facilitate the effective consultation process with the User Forum, to be undertaken by the Commission in the GMES initial operation phase. The FP7 action is to focus in particular on guiding and structuring the user requirement drafting process with the User Forum, taking also reference to other relevant stakeholders, consolidating the user requirements, translating them into the corresponding service specification and service data requirements for the space infrastructure, and the technical requirements on the space infrastructure, if relevant, and validating the results with the stakeholders. This action should ideally be managed through an independent European public body, recognised and accepted by the user community.

For this 2012 call, the thematic domains of the future GMES Marine Service and GMES Atmosphere Service, including oceanography and atmospheric composition respectively, are to be specifically targeted in the proposal.

Funding schemes: One *Coordination and Support Action* project with an upper eligibility limit of EUR 2 000 000 requested EU contribution

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

This topic will directly support the policy activities of the Commission, and therefore, the management thereof will not be implemented by the Research Executive Agency (REA), but by the Commission.

- Expected impact:

The project is expected to provide a transparent mechanism for user involvement and consultation at EU and national level, and result in a coherent space infrastructure specification in the oceanographic domain.

Area 9.1.4 Development of earth observation satellites

This part will **not be open** for specific call topics in 2012, as this activity is covered by **the EU-ESA Delegation Agreement.** Specific funding support is provided by the theme Space of the 2012 Work Programme.

Area 9.1.5: Continuity of GMES services in the areas of Marine and Atmosphere

This part will **not be open** for specific call topics in 2012, as these topics were covered in 2011.

Activity: 9.2. Strengthening the foundations of Space science and technology

Area 9.2.1: Research to support space science and exploration

SPA.2012.2.1-01 Exploitation of space science and exploration data

Space based observations play a leading role in Earth, Planetary, Universe, Environmental, Physical and Life sciences, providing a privileged vantage point of our planet and objects of the universe, especially when taken in synergy with ground based and planetary surface observations, data analysis, visualisation and modelling tools and other research in laboratories. Collaborative proposals in the field of data exploitation are of particular importance since ESA has supported many science missions, but data analysis has mainly been limited to efforts on a project by project basis, therefore limiting a full exploitation of raw data. Missions currently in operation produce data sets of potentially immense value for research, and the funding support from FP7 should add to this value through a more comprehensive interpretation.

A focus is to be given in 2012 to research and analysis of **astronomical and astrophysical data** obtained from space missions, including exploitation of space mission data in combination with data collected from ground based observations. The use of scientific space data available at the European Space Astronomy Center (ESAC)[26] is of particular significance, as is the data collected from collaborative efforts of NASA and European space actors. Research and analysis projects are intended to strengthen cooperation on scientific problems, which are for instance relevant to our solar system, internal constitution of stars and and stellar evolution, exoplanets, galaxies and interstellar media. Proposals covering research activities benefitting from exploiting satellite based astronomical measurements as well as orbiter and in-situ observations obtained during planetary missions are also invited. Proposals should clearly demonstrate how their proposed combination of data sets, from multiple instruments or mission sources, including combinations of space and non-space based data, leads to strong synergies, and adds value to the data obtained in space.

Projects should enhance the effectiveness and productivity of the European scientific community, and promote the contribution of space assets to scientific and technological knowledge, through:

- mobilising the best expertise, in particular academic researchers and scientists, in various fields of science for the analysis and interpretation and presentation of space data, selecting the most innovative and challenging objectives in emerging scientific fields;
- extending the usage of available space data (including archived data);
- developing better tools to process, access, archive and distribute and present data obtained from different sources such as space observatories and planetary missions.

[26] See http://www.sciops.esa.int/index.php?project=SAT

This topic is open to international cooperation and should focus on downstream R&D activities complementing space missions, such as the effective scientific exploitation of existing data. Cooperation with international partners from third countries (ICPC) , or countries which have signed an agreement with the EU covering Science and Technology,, as well as other space-faring nations (e.g. US, Japan) will help to expand the use of data, the corresponding data processing and management methods in third countries, and enhance research partnerships with established space powers. Therefore such international partners will be eligible to participate and to be funded.

Funding schemes: *Collaborative Projects (*small or medium-scale focused research project) with upper eligibility limit of EUR 2 000 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

Projects are expected to add value to space missions and earth based observations by significantly contributing to the effective scientific exploitation of collected data. They are expected to enable space researchers to take full advantage of the potential value of data sets. Projects are expected to expand the use of data, and/or contribute to dissemination of space mission data on a global scale, and/or enhance the relations with established international space powers.

Projects are expected to contribute to the much needed coordination and exploitation of existing and future data collections from space missions, and thereby enhancing the possibility to base research on datasets providing comprehensive or full coverage, while at the same time addressing the potential need for further analysis of existing datasets. It is also expected that the projects will facilitate access to, and appropriate use of data for those scientists who were/are not part of the team having obtained the space mission data (e.g. principal investigators).

Furthermore, projects are expected to add value to existing activities on European and national levels, and to raise the awareness of coordination and synergy efforts among stakeholders.

Area 9.2.2: Research to support space transportation and key technologies

SPA.2012.2.2-01 Key technologies enabling observations in and from space

Space represents a unique vantage point both to look out into the universe and to look down onto our own planet, enabling major discoveries with regard to our origins and the environment we live in. The development of next-generation observation and sensing technologies will lead to major advances in this field. Proposals are invited in the following areas:

- New types of observation missions: formation flying, satellite autonomy (including capabilities to control and coordinate EO instrumentation in real time), interferometry systems, measurement and relative positioning control, measure and transmission of high precision timing.

- Advanced imaging technologies: large or foldable mirror technologies and detectors for observation purposes in space, allowing for development of novel instrumentation in the longer term.
- The technologies and measurement methods for the future Earth observation missions: hyper-spectral imaging, spectropolarimetry, specific laser sources, synthetic aperture optics, observation from geostationary orbits, moving target detection and identification, compact radars.
- Methods for reducing delays in the delivery of Earth Observation payload data to ground processing facilities, enhancing near-real-time observation capabilities, especially in the context of moving target detection and identification.

Participants are expected to demonstrate how their proposals add value for Europe in light of developments at national level or ongoing activities at ESA.

The participation of SMEs is encouraged, as this could potentially enhance the innovative impact of proposals and could lead to strengthening of research alliances for space technologies.The inclusion of international partners (from third countries (ICPC), countries which have signed an agreement with the EU covering Science and Technology, as well as other space-faring nations (such as the US and Japan) could help to advance technology and enhance research partnerships with established space powers. These aspects should be taken into account in the proposal. International partners will be eligible to participate and to be funded.

Funding schemes: *Collaborative Projects (*small or medium-scale focused research project) with upper eligibility limit of EUR 2 000 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

Projects are expected to contribute to increasing innovative capacity of future developments by addressing new concepts and technologies, thereby broadening the range of technologies available for future European space activities and developments, and potentially leading to disruptive technologies, which may allow Europe to take the lead in certain key areas. Projects should contribute to new research alliances, and enhancing the relations with established international space powers is regarded to add value to European space activities.

SPA.2012.2.2-02 Key technologies for in-space activities

For Europe to be active in space in the long term, be it in earth-orbit or across the solar system, it is essential that space technologies with key capabilities are at its disposal. For space industry to be competitive with such technologies, not only on a European market, it is crucial to position itself in the market with products or components which are a generation ahead, leap-frogging competitors. Such developments should not be driven by incremental improvements, but rather by radical innovation which may then lead to “disruptive technologies”.

Proposals should thus address technologies which enable far-reaching space activities, addressing typical challenges already identified as key for a presence in space.

Key goals and associated challenges are:

- Accessing space - new concepts for low orbital flight and beyond, and subsequent re-entry, allowing also for re-usable vehicles, employing new thermal shielding and propulsion concepts and low risk return strategies, docking concepts, small satellites for demonstration of critical and disruptive technologies;
- Remaining active in space – addressing power generation and storage in space as well as (wire-less) power transmission, meeting the energy requirements for long duration missions, as well as making use of novel power sources and addressing high throughput deep space communications;
- Protection against the hazards of space – techniques for survivability in space including protection against environmental influences (such as radiation), new materials and shielding methods;
- Providing a base beyond earth - next generation space habitation modules, the ability to assemble and deploy large space structures in orbit or on planetary surfaces, propellant handling for in-space fuelling and storage, taking benefit from high degree of self-sustainability and autonomy.

To address these goals, components with highly advanced performances well beyond current available specifications are required, as well as new system concepts, thus providing a wide range of research opportunities for space industry to engage in.

In the domain of power generation and transmission, spacecraft currently rely to a large extent on the in-situ generation of electricity via solar panels for their on-board power needs, and on rocket propulsion for in-space manoeuvring and travel beyond earth orbit, both of which can impose significant limitations with regard to long-duration exploration missions. Proposals are invited to develop breakthrough concepts and technologies for the generation of electrical power in space and the development of associated electrical propulsion systems that may be suited to long-duration exploration missions beyond earth orbit and capable of catering for the power and propulsion needs of future human exploration missions. Proposals could examine novel technologies for the collection and utilisation of solar energy in space, for example through the remote collection and delivery of this energy to spacecraft. Proposals addressing technologies for more efficient energy storage and energy transmission are also welcome. To allow cross-fertilisation for these energy supply relevant topics, possible future terrestrial applications of technologies could be identified to meet power generation and storage needs, as well as adaptation of technologies currently used on earth for enhanced performance in space.

Proposals should address research topics which demonstrate a clear long term vision that is far beyond the state of the art, by engaging with high-risk ideas rather than the refinement of current approaches.

Participants are expected to demonstrate how their proposals add value for Europe in light of developments at national level or ongoing activities at ESA.
The participation of SMEs is encouraged, as this could potentially enhance the innovative impact of proposals and could lead to strengthening of research alliances for space

technologies. The inclusion of international partners (from third countries (ICPC), countries which have signed an agreement with the EU covering Science and Technology, as well as other space-faring nations (such as the US and Japan) could help to advance technology and enhance research partnerships with established space powers. These aspects should be taken into account in the proposal. International partners will be eligible to participate and to be funded.

Funding schemes: *Collaborative Projects (*small or medium-scale focused research project) with upper eligibility limit of EUR 2 000 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

Projects are expected to open new avenues of research. They should strengthen also the future potential for high-risk/high-impact research and innovation, and contribute to new research alliances. Enhancing the relations with established international space powers is regarded to add value to European space activities.

Area 9.2.3: Research into reducing the vulnerability of space assets

This part will **not be open** for specific call topics in 2012.

Activity: 9.3 Cross-cutting activities

Area 9.3.1: SME specific research

SPA.2012.3.1-01: Bringing terrestrial SME-research into the space domain

A major priority for the final years of FP7 implementation is the adaptation and response to the new orientations given by the Europe 2020 strategy and its Innovation Union flagship initiative. The innovation dimension across the whole of FP7 is to be strengthened, also by continuing the efforts to increase the SME participation, in particular through defining SME relevant research areas in the calls.

Many SMEs are spear-heading advanced technologies addressing terrestrial applications, linked for instance to instrumentation, information technology and signal processing, or robotics. Their specific knowledge may lead also to breakthroughs for specific space applications, and collaborative projects which bring together SMEs not traditionally working in space projects with Space industry or space research organisations are being sought.

Activities could be in the areas of:

- (nano-) instrumentation/robotics (micro-sensors, micro-payload or modular avionics for Unmanned Aerial Vehicles, unmanned under-water vehicles, or CubeSats, drill-core instruments, sample handling);
- Information handling (geomatics, data mash-ups, signal processing, data processing, end-user toolboxes, data fusion, wireless sensor networks, real-time data fusion of multiple satellites and of multiple space systems, e.g. SSA, vision based 3D surface reconstruction and navigation, hand-free interfaces);
- Decision support systems, interfaces for crowd sourcing, operations planning and scheduling software (e.g. MECA project), prognostic system health management;
- Lab-on-a-chip for space (e.g. Life Marker Chip on ExoMars);

Support will be given to proposals conducting basic research on extending existing capabilities for deployment in space.

Funding schemes: *Collaborative Projects* with an upper eligibility limit of EUR 1 500 000requested EU contribution per project. SME[27] participation in these proposals is mandatory, preferably in a leading or coordinating role. More than 50% of the requested EU contribution shall go to SMEs.

[27] Attention is to be given to the definition of SMEs: SMEs employ fewer than 250 persons and have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million. Additional conditions for autonomy apply. More information see: http://ec.europa.eu/enterprise/enterprise_policy/sme_definition/index_en.htm

Note: Limits on the EU financial contribution apply, SME participation is mandatory. Projects will only be selected for funding on the condition that the estimated EU contribution going to SME(s) is 50% or more of the total estimated EU contribution for the project as a whole. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded. These criteria are implemented strictly as formal eligibility criteria.

- Expected impact:

Projects are expected to bring experience on advanced technologies addressing terrestrial applications to research problems in the space domain. The project should strengthen also the future potential for engaging in high-risk/high-impact research and innovation, and contribute to new research alliances.
The results of research in this area/topic should clearly be of interest and potential benefit to SMEs. A strong participation of SMEs in the project itself should help contribute to the realisation of that benefit.
The mandatory SME participation is expected to contribute to enhancing the overall SME participation in FP7, and particularly in the Theme Space.

Area 9.3.2: International cooperation

This part will **not be open** for specific call topics in 2012.

Area 9.3.3: Dissemination: Transnational and international cooperation among NCPs

This part will **not be open** for specific call topics in 2012.

Area 9.3.5: Studies and events in support of European Space Policy

SPA.2012.3.5-01 Studies and events in support of European Space Policy

The Europe 2020 flagship initiative Innovation Union links R&D funding in the EU strongly to innovation. In view of this, the Space Work Programme 2012 supports studies focusing on the **implementation of the European Space Policy**. Of particular interest are studies related to the link between space and innovation (forming the basis for a series of brainstorming sessions or workshops with industry representatives and the different innovation actors in Europe leading finally to a roadmap for space and innovation), and the socio-economic benefits attached.

Furthermore, the implementation of a European Space Programme requires organisational and governance issues to be resolved through dialogue with all stakeholders contributing infrastructure elements. The definition of harmonised information exchanges, data handling

processes, operational interfaces and best practices need to be agreed upon. Coordination and support actions contributing to such efforts can be supported. Proposals will have to demonstrate how they will contribute and add value to specific implementation processes already taking place at European level.

Funding schemes: *Coordination and Support Action* projects (supporting or coordinating) with an upper eligibility limit of EUR 500 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

Projects are expected to contribute to the coordination and organisation of space activities as part of a European Space programme. They should add value to specific implementation processes already taking place at European level, and contribute to ensuring coherent and effective approaches.

SPA.2012.3.5-02 Research agenda definitions and research activity road-maps for a European Research framework programme (workshop activities)

The 2012 work programme is to contribute to the definition of common research objectives and coordination of research activities in specific space research areas. In order to facilitate better planning, support and **workshop activities** are to be funded which aim at coordination of different R&D activities and drawing up research agendas. These may serve to define specific research goals beyond the current Framework Programme. With regard to Topic "SPA.2012.2.1-01 Key technologies for in-space power generation and transmission", and in light of the recommended actions for Europe in the conclusions of the Second International Conference on Space Exploration, proposals addressing long-term roadmaps in the area of "novel energy sources and storage and advanced propulsion" are particularly welcome.

With the end of FP7 and preparation of a new Framework programme it is time to take stock in which areas of research the instruments offered specifically by the European Research Framework programme can provide added value through its strongly collaborative and pre-competitive research character. Specific research gaps and next-generation technologies should be identified in the different areas of space R&D through dialogue with the research communities active in the space domain (conference and workshop activities). Separate proposals are invited to concentrate on specific research communities such as for example planetary exploration, astrobiology, robotics, navigation and control, remote sensing, power generation and propulsion. Synergies between space and terrestrial domains should be highlighted, in particular in the context of energy provision (generation, transmission, storage).

Funding schemes: *Coordination and Support Actions* (coordinating) with upper eligibility limit of EUR 500 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

Projects are expected to contribute to the coordination and overall organisation of European R&D and innovation in space. They should contribute to a consensus on existing research gaps and next-generation technologies, and identify research areas for which funding support at European level will be particularly effective to allow Europe to take the lead in certain key areas. Projects should also contribute to forging of new research alliances.

SPA.2012.3.5-03 New emerging research needs - reduction of vulnerability of space infrastructure

The discovery of the Stuxnet malware, and subsequent evolutions, have drawn attention to a new form of cyber attack, which is targeted against specific organisations and critical infrastructures. In contrast to common-place malware or virus attacks through internet connections, directed attacks, possibly initiated by highly specialised experts, going after critical industrial infrastructure fall in a different category and heightens the risk for highly strategic infrastructures. The emerging details show an increasing complexity and professionalism of intentional and targeted cyber attacks, which further highlights the concern that also Europe's space infrastructure of GALILEO and GMES might come under similar attacks in the future.

A *support action* is called for, which draws together space infrastructure stakeholders and researchers from space and different non-space disciplines to examine the types of vulnerabilities of complex space systems such as the GMES Space component or the Galileo system, from satellites to ground station control and payload data reception systems. The risk analysis study should identify in which technology areas specific development activities need to be initiated, allowing research and development addressing this security challenge to be included in the next European research themes. In line with one of the key features identified in an OECD study[28] for such research responses, the proposal should "compel researchers from very different backgrounds to appreciate each other's work, and in particular to understand their respective use of terminology". Attacks which exploit vulnerabilities built into specific hardware and operating systems, flight operation systems, distributed transmission and processor systems, interference detection technologies for data transmission between satellites and ground based receivers, and weaknesses in prevalent data handling processes and procedures must be considered.

Close cooperation with ongoing infrastructure projects at space agencies at European or national level is expected in order for the project to have the necessary relevance.

Funding schemes: *Coordination and Support Actions* (coordinating) with upper eligibility limit of EUR 500 000 requested EU contribution per project.

Note: Limits on the EU financial contribution apply. These are implemented strictly as formal eligibility criteria.

- Expected impact:

[28] "Reducing systemic Cybersecurity Risk », January 2011, IFP/WKP/FGS(2011)3

Projects are expected to contribute to the coordination and overall organisation of European R&D aimed at reducing vulnerability of space infrastructure to cyber attacks. They should contribute to a consensus on the issues to be addressed by different research communities, industry and operators, and identify research for which funding support at European level will be particularly effective. Projects should also contribute to forging of new research alliances.

III. IMPLEMENTATION OF CALLS

- **Call title:** **Space Call 5**
- Call identifier: **FP7-SPACE-2012-1**
- Date of publication[29]: 20 July 2011
- Deadline[30]: 23 November 2011, at 17.00.00, Brussels local time
- Indicative budget[31]: EUR 84 million

The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:

- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary up to 10% of the total value of the indicated budget for the call.

- Topics called:

Activity/ Area	Topics called	Funding Schemes
9.1.1 **Space-based applications at the service of European Society** / Pre-operational validation of GMES services and products	SPA.2012.1.1-01 Testing and validating the intelligence-driven and high time-critical scenarios of the CONOPS	Collaborative Project (Small or medium-scale focused research project)
	SPA.2012.1.1-02 Testing and validating the low time-critical components of the CONOPS	Collaborative Project (Small or medium-scale focused research project)
	SPA.2012.1.1-03 GMES Security – Support to EU External Actions	Collaborative Projects (Small or medium-scale focused research project)
	SPA.2012.1.1-04 Support to emergency response management	Collaborative Project (Small or medium-scale focused research project)
	SPA.2012.1.1-05 Preparing take-up of GMES Sentinel data	Collaborative Projects (Small or medium-scale focused research project)

[29] The Director-general responsible for the call may publish it up to one month prior to or after the envisaged date of publication

[30] The Director-general responsible may delay this deadline by up to two months

[31] Under the condition that the draft budget for 2012 is adopted without modifications by the budget authority.

9.1.3 **Space-based applications at the service of European Society** / Support to the coordinated provision of observation data	SPA.2012.1.3-01 Research and development for In-situ component	Collaborative Projects (Small or medium-scale focused research project)
	SPA.2012.1.3-02 GMES Climate Change – Coordination of Earth observation data validation for re-analysis	Coordination and Support Action (coordinating)
	SPA.2012.1.3-03 GMES Climate Change – Data archiving and exchange	Collaborative Projects (Small or medium-scale focused research project)
	SPA.2012.1.3-04 Consolidation of user requirements for GMES	Coordination and Support Action (supporting or coordinating)
9.2.1 Strengthening the foundations of Space science and technology / Research to support space science and exploration	SPA.2012.2.1-01 Exploitation of science and exploration data	Collaborative Projects (Small or medium-scale focused research project)
9.2.2 **Strengthening the foundations of Space science and technology /** Research to support space transportation and key technologies	SPA.2012.2.2-01 Key technologies enabling observations in and from space	Collaborative Projects (Small or medium-scale focused research project)
	SPA.2012.2.2-02 Key technologies for in-space activities	Collaborative Projects (Small or medium-scale focused research project)
9.3.1 **Cross-cutting activities /** SME specific research	SPA.2012.3.1-01: Bringing terrestrial SME-research into the space domain	Collaborative Projects (Small or medium-scale focused research project)
9.3.5 **Cross-cutting activities/ Studies and events in support of** European Space Policy	SPA.2012.3.5-01 Studies and events in support of European Space Policy	Coordination and Support Action (supporting or coordinating)
	SPA.2012.3.5-02 Research agenda definitions and research activity road-maps for a European Research framework programme (workshop activities)	Coordination and Support Action (coordinating)
	SPA.2012.3.5-03 New emerging research needs - reduction of vulnerability of space infrastructure	Coordination and Support Action (coordinating)

- Eligibility criteria:

  - The general eligibility criteria for the different funding schemes are set out in Annex 2 to this Work Programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Funding scheme	**Minimum conditions**
Collaborative Projects	At least 3 independent legal entities, each of which is established in a MS or AC, and no 2 of which are established in the same MS or AC
Coordination and Support Actions (coordinating action)	At least 3 independent legal entities, each of which is established in a MS or AC, and no 2 of which are established in the same MS or AC
Coordination and Support Actions (supporting action)	At least 1 independent legal entity established in a MS or AC.

  - The following additional eligibility criteria and funding constraints apply in this call

  - For Activity 9.1, Topic 1.1.01, the maximum eligible EU contribution is EUR 4 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.
  - For Activity 9.1, Topic 1.1.02, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.
  - For Activity 9.1, Topic 1.1.03, the maximum eligible EU contribution is EUR 4 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.
  - For Activity 9.1, Topic 1.1.04, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.
  - For Activity 9.1, Topic 1.1.05, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.
  - For Activity 9.1, Topic 1.3.01, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.
  - For Activity 9.1, Topic 1.3.02, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CSA are requested.
  - For Activity 9.1, Topic 1.3.03, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.

- For Activity 9.1, Topic 1.3.04, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CSA are requested.
- For Activity 9.2, Topic 2.1.01, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.
- For Activity 9.2, Topic 2.2.01, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.
- For Activity 9.2, Topic 2.2.02, the maximum eligible EU contribution is EUR 2 000 000 per project, proposals requesting in excess will be ineligible. Only CP are requested.
- For Activity 9.3, Topic 3.1.01, the maximum eligible EU contribution is EUR 1 500 000 per project, proposals requesting in excess will be ineligible. These SME-targeted Collaborative Projects will only be selected for funding on the condition that the estimated EU contribution going to SME(s) is 50% or more of the total estimated EU contribution for the project as a whole. **This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.**. Only CP are requested.
- For Activity 9.3, Topic 3.5.01, the maximum eligible EU contribution is EUR 500 000 per project, proposals requesting in excess will be ineligible. Only CSA are requested.
- For Activity 9.3, Topic 3.5.02, the maximum eligible EU contribution is EUR 500 000 per project, proposals requesting in excess will be ineligible. Only CSA are requested.
- For Activity 9.3, Topic 3.5.03, the maximum eligible EU contribution is EUR 500 000 per project, proposals requesting in excess will be ineligible. Only CSA are requested.
- Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

- Evaluation procedure:

  - The standard procedures set out in the FP7 Rules for submission of proposals, and the related evaluation, selection and award procedures, will apply.
  - The evaluation criteria (including weights and thresholds) and sub-criteria, together with the selection and award criteria for the different funding schemes are set out in Annex 2 to this Work Programme.
  - For proposals submitted for Activity 9.3, Topic 3.1.01 the following <u>additional</u> aspects will be considered under the evaluation criterion relating to 'implementation':

    – Proposals are expected to have a substantial involvement of SMEs. As an indication of the expected level of involvement, evaluators should note that only proposals where at least 50% of the estimated EU contribution goes to SMEs will be eventually selected. This will be checked at the end of any negotiation. As regards a leading role of SMEs with R&D capacities: the coordinator does not necessarily have to be an SME for the project to qualify, but in such cases the participating SMEs should have the decision making power in the project management, and the output should be for the benefit of the participating SMEs and the targeted SME-dominated industrial communities.

  - A one-stage submission procedure will be followed.

- Proposals may be evaluated remotely.
- For Activity 9.1, seven ranking lists will be established; one for each of the topics (SPA.2012.1.1-01&02, SPA.2012.1.1-03, SPA.2012.1.1-04, SPA.2012.1.1-05, SPA.2012.1.3-01, SPA.2012.1.3-02&3, and SPA.2012.1.3-04)
- During final ranking, the procedure for prioritising proposals with equal scores described in Annex 2 to the work programme will be modified as follows for the proposals in GMES area 9.1 only:

  – "The following approach will be applied successively for every group of ex-aequo proposals requiring prioritisation, starting with the highest scored group, and continuing in descending order:

    (i) Proposals, that address topics not otherwise covered by more highly-rated proposals, will be considered to have the highest priority.

    (ii) These proposals will themselves be prioritised according to the scores they have been awarded for the criterion **impact**. When these scores are equal, priority will be based on scores for the criterion **scientific and/or technological excellence**. If necessary, any further prioritisation will be based on other appropriate characteristics, to be decided by the panel, related to the contribution of the proposal to the European Research Area and/or general objectives mentioned in the work programme (e.g. presence of SMEs, international co-operation, public engagement).

    (iii) The method described in (ii) will then be applied to the remaining ex-aequos in the group."

- CP and CSA will be ranked separately.

- Indicative evaluation and contractual timetable:

This call in 2011 invites proposals to be funded in 2012. The evaluation is to commence within 2 months of the call deadline, with negotiations of successful proposals commensurate with the 2012 budget expected to commence in the first half of 2012.

Proposals recommended for funding, which cannot be financed from the available budget will be put in a reserve list after evaluation, to allow for later funding in case of availability of additional budget or failure to complete negotiation of a proposal recommended for funding.

In order to reduce the time to signature of the grant agreement, participants are requested to also ready themselves for the negotiation phase. Attention should be given to eligibility of the costs expected to be covered, and to provide in the proposal appropriate justification of use of resources including a breakdown of the personnel and other direct costs per participant. Detailed information should be provided on eventual subcontracting and third parties intended to be included. Furthermore, attention should be paid to correctly define workpackages and activities according to the different type of activities: RTD; DEM; MGT[32]; OTHER; COORD or SUPP.

[32] Management activities cover the management of financial, legal and administrative issues but not scientific coordination of the project

A rapid response of the coordinator in supplying the necessary negotiation documentation will be expected if the proposal is recommended for negotiation. It is strongly advised that all new participants to FP7 request a temporary Participant Identification Code (PIC) at proposal submission phase and to prepare a draft Consortium Agreement if possible.

Details on above indicated issues are included in the Guide for Applicants.

- Implementation

Calls for proposals under this work programme Space will be implemented by the Research Executive Agency (REA) according to the provisions of the Commission Decision C(2008)3980final of 31 July 2008 “delegating powers to the Research Executive Agency with a view to performance of tasks linked to implementation of specific European Union programmes People, Capacities and Cooperation in the field of research comprising, in particular, implementation appropriations entered in the Community budget”.

All activities under 9.1 to 9.3 are included in this delegation, only public procurement actions and Activity 9.1, Topic 1.3.04 (being in direct support of policy) are excluded from this delegation and will be managed by the Commission.

- Consortia agreements

The conclusion of a Consortium Agreement is required for any action under the Space Theme.

- The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

- **Flat rates to cover subsistence costs:** In accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions as outlined in Commission decision C(2009)1942 of 23 March 2009. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

IV. OTHER ACTIONS

Activities implemented but not subject of a call

The following activities will be supported through funding by the Space theme in 2012, but **will not be subject of a call**[33] under the Space theme:

1) Development of GMES-dedicated space infrastructure
2) Support to GMES Initial Operations
3) Communication and Conferences
4) Monitoring, Evaluation, Studies and Impact Assessment
5) Risk-sharing Finance Facility (RSFF).

These activities are supplementary to the activities undertaken as a result of the calls for proposals in the FP7 Space theme. Applicants are invited to take benefit of these as appropriate in their proposals (for instance make use of access to the coordinated provision of observation data for GMES, or include the possibility of EIB loans to fulfil the Commissions co-financing requirements).

Development of GMES-dedicated space infrastructure

As stated in the GMES Communication of 2005, FP7 funding is foreseen to provide a significant part to the *GMES Space Component* (GSC) Programme of ESA, in particular regarding the development of GMES-dedicated space-based infrastructure.

Overall, of order 47% of the FP7 'Space' budget[34] could be made available for this action over the period 2007-2013. Based on the specific capacities provided by ESA in this domain, the Commission has decided to **delegate to ESA the management**[35] of the implementation of the FP7 funding of the GMES Space Component (GSC) Programme of ESA.

The respective annual financial contributions to be provided from FP7 shall be foreseen in the annual updating cycle of the Work Programme, taking account of any update or revision of the GSC. For 2012, a contribution of EUR 159 million is foreseen.

Financial support from FP7 should contribute to the activities proposed by ESA in the GMES Space Component Programme.

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[33] In accordance with Articles 14, 17 and 27 of Regulation (EC) No 1906/2006 of 18 December 2006 laying down the rules for the participation of undertakings, research centres and universities in actions under the Seventh Framework Programme and for the dissemination of research results (2007-2013).

[34] Including the corresponding share of support to the horizontal support to cross-cutting activities, as well as of the relevant administrative expenses.

[35] Commission Decision C(2008)563 of 8 February 2008

EU funding to ESA will be contingent upon the effective implementation of the GSC programme in the ESA framework and compliance with the administrative and financial regulations applicable to the general budget of the European Union[36] and with the EC/ESA Framework Agreement[37].

With a view to ensuring the efficient and coherent monitoring and evaluation of the implementation of actions carried out by ESA on behalf of the Commission under FP7, an adequate monitoring and control process is put in place. It is in fact assumed that the GSC Programme continues to be developed by ESA in a way that is demonstrably coherent with the emerging user requirements being aggregated by the Commission. ESA shall also regularly inform the Commission of the overall progress of the implementation of the Specific Programme, as well as on the specific results of procurement actions, and shall provide timely information on allocations proposed or funded under this programme.

The issues of security of space infrastructure (e.g. in terms of encryption of data transmission, where necessary) and optimised data relay solutions (e.g. inter-satellite and satellite-to-ground transmission technologies) should also be examined in this context.

It is essential that best use of existing and planned European satellites and ground systems is being made – including those existing in other European agencies and organisations such as EUMETSAT – in order to efficiently ensure the continuity of data necessary to the establishment of GMES services on an operational basis - to the development of which this Work Programme is aimed.

In addition to the GSC technical activities covering development of dedicated satellites, ground segment and data access, a number of additional accompanying activities will also be undertaken by ESA, notably to achieve a significant participation of the non-ESA Member States in FP7, stimulating the active involvement of their industries and research organisations, improving visibility, accessibility and understanding of the tender selection procedures of ESA in line with the EU Financial Regulations and FP7 context. For these activities a variety of funding schemes in line with the EU Financial Regulation may be used. Further information on opportunities is available on Space Theme CORDIS website.

Funding scheme: other actions[38] - Delegation Agreement to ESA

Support to GMES Initial Operations

Regulation (EU) No 911/2010 of the European Parliament and of the Council of 22 September 2010 on the European Earth monitoring programme (GMES) and its initial operations (2011 to 2013) makes funding allowances for a number of operational objectives, however, support of the research and development funding under FP7 will also be required, and a dedicated support from FP7 by an amount of EUR 43 million over the three year period

[36] Council Regulation (EC,Euratom) No 1605/2002 of 25 June 2002 and Commission Regulation (EC,Euratom) No 2342/2002 of 23 December 2002

[37] COM(2004)0085, 11 February 2004. The EC/ESA Framework Agreement specifies, inter alia (Art.5.3) that: "*Any financial contribution made by one Party in accordance with a specific arrangement shall be governed by the financial provisions applicable to that Party. Under no circumstances shall the European Community be bound to apply the rule of "geographical distribution" contained in the ESA Convention and specially in Annex V thereto.*"

[38] In accordance with Article 53(d) of the Financial Regulation and Articles 35 and 43 of the Implementing Rules.

is foreseen. For the budget year of 2011, an amount of EUR 10 million was set aside for this support, EUR 15 million have been earmarked in 2012, and EUR 18 million[39] are being provisionally earmarked for the budget year 2013.

GMES Initial Operations (GIO) have according to the Regulation the following 5 operational objectives:

(1) emergency response services, based on existing activities in Europe, shall ensure that Earth observation data and derived products are made available for the benefit of emergency response players;

(2) land monitoring services shall ensure that Earth observation data and derived products are made available for the benefit of European, national and regional authorities;

(3) measures to support take-up of services by users;

(4) data access, including support to in situ data collection;

(5) GMES initial operations shall ensure the operations of the GMES space component.

The 2012 Work programme will provide funding for GMES Data Access activities which are supporting these operational objectives and benefit the research community at large. The main objective of such GMES Data Access activities is to provide access to Earth observation data from all GMES Contributing Missions required by the user communities, such as the GMES Services, from the 4th quarter of 2010 until end 2013, and until the end of the commissioning phase of Sentinel-1A, -2A, and 3A:

- as a smooth continuation of the data supply started under the GMES Space Component Data Access EC FP7 grant no FP7-223001 (GSC-DA)
- with a smooth continuation towards the GIO and full operations phase later.

The detailed description of the way ESA will perform these GMES Data Access activities for the period Q4 2010 – end 2013 is described in a Project Implementation Plan complementing the EC-ESA Delegation Agreement. These activities will be based on technical requirements defined by the EC, aiming at serving with EO data the GMES services both identified in GIO supported through the FP7 programme, and the community implementing GMES at large, and which were elaborated following a user Hearing on Access to GMES Earth Observation Data on 17 December 2009.

The overall commitment appropriations for this activity in 2012 will be up to EUR 15 million.

Funding scheme: other actions[40] - Delegation Agreement to ESA

[39] subject to the draft budget 2013 and the adoption of the draft budget without the modifications by the budgetary authority

[40] In accordance with Article 53(d) of the Financial Regulation and Articles 35 and 43 of the Implementing Rules.

Communication and Conferences

Public events promoting the uptake of activities undertaken within the context of the FP7 Space, as well as fostering the implementation of the European Space Policy and the European Space Programme will also be funded from the FP7 2012 budget.

Support will be given to the organisation of events (conferences, workshops or seminars) related to the implementation of the European Space Policy, European R&D research agendas related to GMES and space technologies, and European space research, development and innovation after 2013. . 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 how space exploration could contribute to innovation as well as events on space exploration related to space exploration. These events should support the political debate and consensus building in Europe.

During 2012, it is envisaged to conduct communication actions (such dissemination material) and large events in support of the implementation of the European Space Policy in general, and GMES and European Space Exploration in particular. Support may be given to the organisation of conferences and information events to strengthen wider participation in the programme (including that of 3rd countries), and to disseminate results of European research in the Space sector.

The overall commitment appropriations for this public procurement activity (by using framework contracts and/or calls for tender) will be up to EUR 1.23 million.

Funding scheme: CSA – public procurement

Monitoring, Framework Programme Evaluation, Studies and Impact Assessment

The Space Theme will comply with the prevailing requirements for monitoring and evaluating the Framework Programme and its impact, both ex-ante and ex-post. In preparation of the period after 2013, activities will be conducted to prepare the implementation of the European Space Programme.
This may involve studies and 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.
The overall commitment appropriations for this Activity in 2012 will be up to EUR 1.0 million.

Funding scheme: CSA – expert contracts and/or public procurement

Risk-sharing Finance Facility

The preparation of operational service capacities, as well as development of the GMES space components correspond to large undertakings and projects, involving long-term investments, with considerable risks for participating industries. Promoters need access to additional cash-

flow to fulfil the Commissions co-financing requirements, enabling them to finance more (and more risky) projects. It is for such R&D actions that the European Union will improve the access to private sector finance by contributing financially to the 'Risk-Sharing Finance Facility' (RSFF) established by the European Investment Bank (EIB). The Space theme is contributing to this funding facility, from its budget, and participants are invited to make use of this FP7 supporting scheme.

Further information on the RSFF is given in the Annex 4 to this Work Programme.

Indicative budget to be allocated as a result of calls and other activities

A total of EUR 264.3 million is to be committed from the 2012 European Union budget, and budget received from Associated Countries. The indicative budget allocated to the activities from the 2012 budget is given in the following table:

	2012 EUR million[41]	total
Call FP7-SPACE-2012-1 Activity 9.1 Space-based applications at the service of European Society : 1.1&2 Border surveillance (CONOPS) 1.3 Support to EU external action 1.4 Emergency response management 1.5 Take-up of GMES Sentinel data	6 8 8 8	44
Call FP7-SPACE-2012-1 Activity 9.1 Space-based applications at the service of European Society : 3.1 R&D for in-situ component 3.2&3 Climate change – coordination, data archiving 3.4 Consolidation of User requirements for GMES	6 6 2	
Call FP7-SPACE-2012-1 Activity 9.2 Strengthening of Space foundations: 1.1 Exploitation of Space Science and exploration data	8	28
Call FP7-SPACE-2012-1 Activity 9.2 Strengthening of Space foundations: 2.1 Key technologies enabling observations in and from space 2.2 Key technologies for in-space activities	10 10	
Call FP7-SPACE-2012-1 Activity 9.3 Cross- cutting activities/SME specific 1.1 Terrestrial SME research in space	9	12
Call FP7-SPACE-2012-1 Activity 9.3 Cross-cutting activities/ studies and events 5.1 Studies and Events in support of European Space Policy 5.2 Research agenda definition and road-maps 5.3 Reduction of vulnerability	3	
ACTIVITIES NOT SUBJECT TO A CALL FOR PROPOSALS: 1 ESA Delegation Agreement (re. 9.1) 2 Space Data Access (via ESA Delegation Agreement) 3 Communication and Conferences 4 Monitoring, Programme Evaluation, Studies and Impact assessment	159 15 1.2 1.0	176.2
OTHER ACTIVITIES 1 FP7 Expert proposal evaluators payments	1.5	1.5
GENERAL ACTIVITIES (CF. ANNEX 4)	2.6	2.6
ESTIMATED TOTAL BUDGET ALLOCATION		**264.3**

[41] Under the condition that the draft budget for 2012 is adopted without modifications by the budgetary authority.

Summary of budget allocation to FP7 general activities for 2012 (cf. Annex 4)

	2012
Cordis	EUR 0.393 million
Eureka/Research Organisations	EUR 0.017 million
COST	EUR 2.087 million
Strat. Support Action	EUR 0.050 million
Experts	EUR 0.003 million
Total	**EUR 2.551 million**

These general activities will not be administered by the Space Theme, but through the proposed horizontal mechanisms described in Annex 4.

All budgetary figures given in this work programme are indicative. The final budgets may vary following the evaluation of proposals.

The final budget awarded to actions implemented through calls for proposals may vary:

- The total budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call.

For actions not implemented through calls for proposals:

- The final budgets for evaluation, monitoring and review may vary by up to 20% of the indicated budgets for these actions;
- The final budget awarded for all other actions not implemented through calls for proposals may vary by up to 10% of the indicated budget for these actions.

V. INDICATIVE PRIORITIES FOR FUTURE CALLS

The Work Programme evolution is foreseen to include follow-on activities from the current FP7 call, with the objective to

- strengthen further GMES service developments;
- integrate satellite communication and satellite navigation solutions with space-based observing systems fostering the convergence of these space-based capacities;
- provide an opportunity within FP7 for strengthening international cooperation activities started at the end of the previous Framework Programme, as well as preparing GMES as the European contribution to GEOSS.

Activity: 9.1 Space-based applications at the service of European Society

In order to ensure complementarity and consistency with the GMES Regulation on the European Earth observation programme (GMES) and its initial operations (2011-2013)[42], the particular importance of preparing GMES service capacities in the area of Climate Change has been recognised. A conference "GMES for climate change" to be held in Helsinki on 16/17 June 2011 explored whether there are still any gaps and, if so, which of these need to be addressed specifically by GMES and should be considered as components of a specific operational GMES climate change service. Following this consultation, the call for 2013 will be prepared to address this important thematic service domain of GMES.

It is also foreseen to open the final call to the development of **downstream services**. Specific sectors which could receive attention are sustainable energy management, also in the urban development context, and sustainable resource management.

As regards integrated use and application of **satellite communication and satellite navigation solutions with space-based observation systems** (action area 2), further FP7 support, including a wider range of (downstream) geo-information R&D needs, is envisaged in 2013.

Complementary R&D activities accompanying GMES Initial Operations will be supported from FP7 in the annual work programmes 2013.

Activities not subject to calls: Coordinated provision of space-based observation data for GMES and development of Earth Observation Space Infrastructure

As elaborated above in the section 'Approach', GMES service development, validation and operational scenario demonstration requires a comprehensive supply of data from space-based observation systems and the development of dedicated Earth Observation Infrastructure.

[42]OJ, L 276, 20.10.2010, p. 1.

Overall, of order 8% and 47% of the FP7 'Space' budget[43] could be made available respectively for these actions over the period 2007-2013.

First financial support from FP7 was foreseen in the 2007 budget line, for a preliminary pilot action with a volume corresponding to EUR 48 million over a three year period. Financial support from FP7 has been provided from the 2009, 2010 and 2011 budget lines for the development of Earth Observation Space Infrastructure, as described in section 4.2.

The GMES Regulation[44] makes funding allowances for a number of operational objectives, however, support of the research and development funding under FP7 will also be required, and a dedicated support from FP7 by an amount of EUR 43 million over the three year period is foreseen. Beyond the provisions described in section IV, for the budget year 2013 a funding of EUR 18 million[45] is being provisionally earmarked. This further funding to be devoted to data access is envisaged to become part of the delegation agreement of the Commission entrusting ESA with the technical management of the GMES Space Component.

Activity: 9.2. Strengthening the foundations of Space science and technology

It should be noted that for Strengthening Space Foundations, a similar level of funding as in 2012 is foreseen in addition to the GMES budgets for 2013 subject to the annual budgetary decision procedures of 2013.

In the short/medium term, Europe's ability to act in space is dependent on its uninterrupted or unimpeded access to space technologies which originate from outside the EU, and R&D is required to enhance European Non-Dependence. Such Critical Technologies for European Non-Dependence have now been covered in calls of four years running. It is time to take stock of the activities which have been started and their results before re-opening the topic in a further call, an approach which also has been taken with other areas in the FP7 work programme. Furthermore, the joint task force group (EC, ESA, EDA) will be engaging in 2011 in reviewing and updating the list of critical technologies and harmonizing the response of the three institutions. This list will then be considered for shaping the call in 2012 (i.e. for funding during 2013).

Space assets, and their associated ground facilities, are sensitive to external events that can endanger their proper functioning, such as space debris, jamming, viruses, natural or man-made electro-magnetic disturbances. These events might have transient effects that can be recovered or have permanent effects leading to the non-functioning of the asset and consequently of its expected services. Specific Research to reduce the vulnerability of space assets has been covered substantively in the previous call of 2009, and could be addressed again in 2013.

[43] Including the corresponding share of support to the horizontal support to cross-cutting activities, as well as of the relevant administrative expenses.

[44] Regulation (EU) No 911/2010 of the European Parliament and of the Council of 22 September 2010 on the European Earth monitoring programme (GMES) and its initial operations (2011 to 2013)

[45] subject to the draft budget 2013 and the adoption of the draft budget without the modifications by the budgetary authority

Activity: 9.3. Cross-cutting activities

In the framework of the European Development Policy space applications such as Earth observation or satellite communications have been recognized as a central tool to support Africa in its sustainable economic and social development.[46] In particular, the Action Plan on *GMES and Africa* has now led to a phase of implementation in the frame of the Joint Africa Europe Strategy under Partnership 8 on Science, Information Society and Space, which is expected to be supported in 2013.

[46] COM(2005) 489 final, 12 October 2005, "EU Strategy for Africa: Towards a Euro-African Pact to Accelerate Africa's Development"