

WORK PROGRAMME 2010

COOPERATION

THEME 9

SPACE

(European Commission C(2009) 5893 of 29 July 2009)

Table of contents

I	CONTEXT	4
	Policy context	4
	Approach	7
	1. Action areas in support of space-based applications (GMES)	8
	2. Action areas strengthening of foundations of Space science and technology	8
	3. Cross-cutting activities	9
II	CONTENT OF CALLS	11
	Activity: 9.1 Space-based applications at the service of European Society	11
	<i>Area 9.1.1: Pre-operational validation of GMES services and products</i>	<i>11</i>
	SPA.2010.1.1-01 Stimulating the development of downstream GMES services	11
	SPA.2010.1.1-04 Stimulating the development of GMES services in specific areas	15
	SPA.2010.1.1-05 Contributing to the “S” in GMES – Developing pre-operational service capabilities for Maritime Surveillance	20
	SPA.2010.1.1-06 Coordination of national activities for land monitoring	23
	SPA.2010.1.1-07 Fostering downstream activities and links with regions	24
	Activity: 9.2. Strengthening the foundations of Space science and technology	26
	<i>Area 9.2.1: Research to support space science and exploration</i>	<i>26</i>
	SPA.2010.2.1-03 Exploitation of space science and exploration data	26
	SPA.2010.2.1-04 Space transportation for space exploration	27
	<i>Area 9.2.2: Research to support space transportation and key technologies</i>	<i>29</i>
	SPA.2010.2.2-01 Space technologies	29
	<i>Area 9.2.3: Research into reducing the vulnerability of space assets</i>	<i>32</i>
	SPA.2010.2.3-01 Security of space assets from space weather events	32
	SPA.2010.2.3-02 Security of space assets from on-orbit collisions	33
	Activity: 9.3 Cross-cutting activities	35
	<i>Area 9.3.2: International Cooperation</i>	<i>35</i>
	SPA.2010.3.2-01 EU-Russia Cooperation in GMES (SICA)	35

SPA.2010.3.2-02	International Cooperation in GMES / Deforestation (SICA)	36
SPA.2010.3.2-03	EU-South Africa Cooperation in GMES (SICA)	36
SPA.2010.3.2-04	EU-Russia Cooperation for Strengthening Space Foundations	37
<i>Area 9.3.5: Studies and events in support of European Space Policy</i>		38
SPA.2010.3.5-01	European Space Policy Studies	38

III IMPLEMENTATION OF CALLS 39

IV OTHER ACTIONS 43

Activities implemented but not subject of a call 43

Indicative budget to be allocated as a result of calls and other activities 47

INDICATIVE PRIORITIES FOR FUTURE CALLS 49

Activity: 9.1 Space-based applications at the service of European Society 49

Area 9.1.1: Pre-operational validation of GMES services and products 49

Area 9.1.2: Integration of SatCom and SatNav with GMES for prevention and management of emergencies 50

Activities not part of calls: Coordinated provision of space-based observation data for GMES and development of Earth Observation Space Infrastructure 50

Activity: 9.2. Strengthening the foundations of Space science and technology 51

Area 9.2.1: Research to support space science and exploration 51

Area 9.2.2: Research to support space transportation and key technologies 51

Area 9.2.3: Reducing the vulnerability of space assets 52

Activity: 9.3 Cross-cutting activities 53

Area 9.3.2: International co-operation 53

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 EU considers the space field as a strategic domain as it can directly contribute to the implementation of a large group of policy objectives, such as:

- *Sustainable Development*, (e.g. through information gathering in support of the Kyoto-protocol monitoring and the actions resulting from the Johannesburg Summit on sustainable development, taking into account also the “Lisbon Declaration on GMES and Africa” adopted under the aegis of the Portuguese Presidency, as well as the EU-AU Dialogue on the "Implementation of the EU-AU Partnership for Science, Information Society and Space").
- *Common Foreign and Security Policy* (e.g. in support of borders control, conflict prevention and crisis management).
- *Lisbon Strategy* (e.g. through better opportunities for Space related industries and geo-information services, improved access to space-based data for services such as GMES).

The Communication on the European Space Policy¹, a joint document of the European Commission and the ESA Director-General, was adopted in April 2007. In contrast to the reception of the White Paper² published in 2003, the Member States of both the EU and ESA have given strong political support to the Policy at the fourth European Space Council of 22 May 2007. It provides the overall political **framework** for the development of a viable and strong European space sector which will allow to:

- Develop and exploit European **space applications**, such as Galileo, GMES and satellite communication applications to secure maximum political, economic and social return from the investments in space technologies;

¹ COM(2007) 212 final, 26 April 2007 “Communication from the Commission to the Council and the European Parliament : European Space Policy

² COM(2003) 673, 11 November 2003”Space: a new European frontier for an expanding Union”

- Establish appropriate **funding arrangements** for the operational phase of GMES, in order to ensure the sustainability of the services for users;
- Improve coordination of and to better exploit **synergies between civilian and military programmes** – of course, in full respect of respective competences. This will help to ensure that each sector can take maximum advantage of the investments of the other;
- Invest to **maintain technological expertise** as well as knowledge in space-based science and space exploration, for example through the International Space Station (ISS) and also to maintain independent access to space;
- Develop a more coordinated and coherent approach to **international relations** in space;
- Create for the first time, a **common European Space Programme**, serving as a basis for transparency of European and national space programmes.

A direct support by the EU in the field of Space should act as an incentive to exert leverage on other public players as well as on the private sector, and to encourage them to intensify their investments. Sustaining a competitive industry (including manufacturers, service providers and operators) and providing appropriate services and infrastructures requires new research into new technologies and their exploitation.

The action plan underlying the Space Work programme is based on the European Space Policy. The Work programme follows the direct recommendations of the ESP Communication, the Resolutions of the Space Council³, the “GMES Advisory Council” of Member States, the Space Advisory Group, as well as the User Implementation Groups for the GMES Core Services. All these bodies will also be 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.

The strategic role of GMES in the development of the EU’s role as a global actor has been outlined in the February 2004 Communication⁴ of the Commission, which also identifies the major EU policies to be addressed by GMES services. These can be summarised as follows:

- Europe’s environmental commitments, within EU territory and globally, by contributing to the formulation, implementation and verification of the Community environmental policies⁵, national regulations and international conventions;
- other EU policy areas such as agriculture, regional development, fisheries, transport, maritime policy, external relations with respect to the integration of the environmental dimension in the respective domains and their specific requirements;
- Common Foreign and Security Policy (CFSP), including the European Security and Defence Policy (ESDP);
- other policies relevant to European citizens’ security at Community and national levels⁶, notably the potential that exists for application to, e.g., policies related to Justice and Home Affairs activities of the European Union, such as border surveillance.

³ 4th Space Council Resolutions [also COM(2007) 212 final], 22 May 2007; 5th Space Council Resolutions, 25-26 September 2008

⁴ COM(2004)65 final, 3 February 2004

⁵ The 6th Environmental Action Plan (2004 to 2010) addressing climate change, nature and biodiversity, environment and health, natural resources and waste

⁶ "A secure Europe in a better world–European Security Strategy" Javier Solana 12/12/2003

A number of GMES services shall contribute to ‘achieving by 2008 an **operational** and **autonomous** European capability’, as expressed at the June 2001 Gothenburg summit and in a subsequent Council Resolution⁷.

In its November 2005 Communication⁸, the Commission has confirmed its intention to move *from concept to reality* in supporting a variety of EU policies with geospatial information through GMES, and it has outlined the roles and responsibilities of EU institutions, the European Space Agency (ESA), and their Member States. In particular:

The EU will define the priorities and requirements, aggregate the political will and user demand, and ensure the availability and continuity of services. ESA, its Member and Co-operating States will develop space technologies and systems in the scope of the European Space Policy, and will, in particular, support and define the technical specifications of the GMES space component, implement it, coordinating centres of excellence across Europe; and advise the EU on future space component requirements. In this context, Member States may strengthen internal co-ordination of related data collection and management activities and federate national demand, contribute to the implementation of the necessary spatial data infrastructures and in-situ components, and support the implementation of the space component.

As a consequence of the above roles and responsibilities, ESA should manage the development of those space infrastructures which are identified for support under FP7, in accordance with the rules of this programme, integrating these activities with its own in this area. The Commission will manage the development of GMES services supported through FP7 and assure optimal integration of data from in-situ monitoring. After the completion of the ESA GMES Service Element projects, the further development and consolidation of such services will be the responsibility of the EC, as an integral part of its Space programme within FP7.

In its November 2008 Communication⁹, the Commission has reaffirmed all the steps undertaken so far to move GMES from concept to reality and the planning for the GMES programme implementation. In 2009, the Commission will make a legislative proposal for an EU Earth observation programme; together with its proposal, the Commission will examine the operational funding necessary for GMES during 2011-2013. Decisions on funding and organisational arrangements after 2013 will have to be determined as part of the next multiannual financial framework of the EU.

Crucial to the success of the GMES service component is the compliance with the requirements and the guidelines included in the INSPIRE proposal for a directive¹⁰. FP7 research and development activities for GMES shall therefore contribute to the ongoing INSPIRE implementation, as far as practically relevant. 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 proposed¹¹ to improve, modernise and streamline the present information systems by establishing a European Shared Environment Information System, to which GMES shall contribute, as far as practically relevant.

Beyond GMES and in line with the European Space Policy other topics will be addressed in the current FP7 Space work programme, in particular in view of strengthening the foundations of European Space science and technology, without which it becomes impossible to develop truly autonomous and efficient applications.

⁷ Council Resolution 2001/C 350/02 (13.11.2001)

⁸ COM(2005)565 final, 10 November 2005

⁹ COM(2008)748 final, 12 November 2008

¹⁰ Directive 2007/2/EC

¹¹ COM(2008)46 final

These topics are driven in Europe by entities and agencies at European or national level. For this reason, support to upstream and exploitation actions in these topics will provide enhancement of scientific added value through synergies with the European Space Agency and Member States space agencies initiatives in the field of space science and exploration, space transportation and space technologies.

Approach

The following paragraphs define the activities and action areas covered by the Space theme of the Framework programme, and highlight a potential range of topics which could be funded during 2007-2013. The roadmap for the Space theme foresees annual calls with a final call in 2013. Some of the research topics mentioned in section I will be funded during 2010 as part of a call published in 2009 – these call topics are specifically elaborated in section II ‘Content of calls for budget 2010’, together with specific call topic codes (e.g. SPA.2010.1.1-01). Furthermore, some of the topics will be implemented through mechanisms other than a call for proposals (e.g. pre-defined beneficiary support actions, call for tenders) – these are identified in Section IV. Other potential research topics, having already been prioritised for a later call, are outlined in section V, in order to enable applicants to better plan ahead. Calls beyond the call conducted in 2009, however, will still be detailed in annual updates to the FP7 Space Work Programme. 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 Space theme Work Programme are given in Annex 3 of the Work Programme “Co-operation” 2010.

Research Executive Agency

Calls for proposals under this work programme part Space will be implemented by the Research Executive Agency (REA) once this is operating autonomously according to the provisions of the Commission decision C/2008/3980 of 31 July 2008 “delegating powers to the Research Executive Agency with a view to performance of tasks linked to implementation of specific Community 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 call for proposals will be implemented by REA, with the exception of:

- tender actions
- pre-defined beneficiary actions (being in support of policy)
- other specific topics explicitly identified as being of a strategic nature for the Commission.

Two main classes of activities will be undertaken to achieve the above policy objectives:

- Space-based **applications** at the service of the European Society, with **GMES** (Global Monitoring for Environment and Security) being central to this activity;
- Providing R&D support to the **foundations of Space science, exploration, space transportation and space technology** through synergies with initiatives of ESA or other European, national or regional entities.

The support for the **first activity**, the development of GMES, is to be expressed in four main *action areas*:

- i. 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 Fast Track Services.
- ii. Integrated use and application of satellite communication and satellite navigation solutions with space-based observing systems, and with related non-space systems, for instance for **prevention and management of all kinds of emergency**.
- iii. Support to the **coordinated provision of observation data**, both from space-based infrastructure and from in-situ observing systems.
- iv. Development of **Earth observation satellites**, which relate to the management of the environment and security, and which complement in-situ systems.

For the **second activity**, the strengthening of foundations of Space science and technology, the support is to be expressed in three more *action areas*:

- i. Support to research activities related to **space science and exploration**,
- ii. New concepts in **space transportation**, and **space technologies** including **critical components**,
- iii. Research into reducing the vulnerability of **space based systems and services**.

In order to implement these activities, the work programme has been structured in three parts, however, not all parts will be open for specific call topics in 2010:

1. Action areas in support of space-based applications (GMES)

1.1 (Pre-)operational validation of GMES services and products

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

1.3 Support to the coordinated provision of observation data¹²

2. Action areas strengthening of foundations of Space science and technology

2.1 Support to research activities related to space science and exploration

2.2 New concepts in space transportation, space technologies and critical components

2.3 Research into reducing the vulnerability of space assets

¹² Coordination and Support Actions with pre-defined beneficiaries for these activities are regarded as policy related actions and will not be managed by the Research Executive Agency (REA)

3. Cross-cutting activities

3.1 SME relevant research

Activities in this domain will be embedded *in all the action areas* mentioned. Applications of GMES and other Space infrastructures 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 are to be found for instance in the development and/or adaptation of methodologies and tools for services tailored for specific applications (including socio-economic dimensions), especially in areas such as land management, biodiversity and the management of the NATURA 2000 sites, soil degradation, urban planning, coastal environment, land and marine resources, air quality. GMES service projects are expected, for instance, to actively integrate such capacities along the entire end-to-end service chain as well as networking actors distributed in the different Member States. SME participation in GMES *downstream services* is particularly encouraged. The use of service provider/User networks within projects is encouraged.

Concerning the space science, exploration, space transportation and space technologies spin-in and spin-off activities could be encouraged.

3.2 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 Ukraine. The European Neighbourhood Policy covers 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). The use of space applications can contribute to their economic and social development and support environmental protection.

International cooperation with third countries (ICPC)¹³ 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.¹⁴ In particular, African and European policymakers and stakeholders got together in Lisbon end-2007 calling for an Action Plan on *GMES and Africa* to be prepared during 2008-9 in close cooperation with the African Union¹⁵, along a wide consultation process with the objective of expressing African needs for the development of GMES-related services and capacities.

¹³ 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 of the Work Programme "Cooperation" 2007

¹⁴ COM(2005) 489 final, 12 October 2005, "EU Strategy for Africa: Towards a Euro-African Pact to Accelerate Africa's Development"

¹⁵ under the EU/AU Partnership on Science, Information Society and Space

Furthermore, for GMES to become the main European contribution to the global 10-year implementation plan for the 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.

All projects conducted in the Theme Space are open for such participation of third parties under the normal participation rules, with the topics mentioned above being of particular interest for international participation. In order to enhance international participation further, specific cooperation actions dedicated to ICPC under the SICA participation rules¹⁶ **are also foreseen in 2010** (see SPA.2010.3.2-01 to 04).

Additional activities, like the preparation of 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.

3.3 Dissemination actions

Activities in this domain will be embedded in all the activity areas mentioned in the previous section above. In particular, activities aimed at promoting the uptake of GMES services and related technologies will be an essential part of all major cooperative projects. Apart from these technological knowledge transfer actions, the GMES Advisory Council as well as a network of National Contact Points (NCP) are seen as instrumental in promoting dissemination to national public authorities and citizens alike. A suitable *Coordination and Support Action* (coordinating action) support in order to achieve better cross-border dissemination and trans-national cooperation is already receiving funding from the 2007 budget. Effective dissemination measures are also of importance as significant wider benefits are expected to arise from the research projects and actions supported under this programme, contributing for instance towards science education and general outreach.

3.4 European Space Policy implementation actions

The implementation of the European Space Policy (ESP) calls for activities defined in the ESP Communication and the Resolution of the May 2007 Space Council. In addition to the development of space applications defined earlier, these activities include the appraisal of the organisation of space activities in Europe, as well as the setting up of coordination mechanisms for space programmes in the framework of the European Space Programme, in the field of international relations and security and space.

Coordination and Support actions (supporting action) in order to better understand the opportunities and challenges associated with the implementation process of the European Space Policy will also be undertaken.

¹⁶ Art. 7 of the Rules for Participation – Regulation (EC) 1906/2006 of the European Parliament and of the Council of 18 December 2006: 2+2 participation rule, used in calls for Specific International Cooperation Actions (SICA) conducted by the FP7 programme of International cooperation activities

II CONTENT OF CALLS

The current planning foresees one call in 2009 covering an annual work programme, for projects to be funded from the 2010 Space theme budget. No further call on these activities is currently planned based on the commitment appropriations of 2010.

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

Area 9.1.1: Pre-operational validation of GMES services and products

SPA.2010.1.1-01 Stimulating the development of *downstream* GMES services

Development of *downstream services*, with the goal of reaching self-sustainability, remains a priority within GMES. This is also considered an area that is particularly suited for the participation of SMEs in the value-adding sector. Proposers ready to provide operational services following the completion of this R&D action are invited to submit to this section.

Geospatial products and services created by GMES are also of key importance to economic return, providing part of the base of the knowledge-driven economy. Among other potential support areas, new commercial spin-offs have to be stimulated, creating innovative services improving European competitiveness and sustainable development. **Small and medium sized companies** in the value-adding sector are to be given the opportunity to develop next generation service lines. **Such *downstream services* are positioned between the multi-purpose *core services* and a specific group of user clients, and take full benefit of the wide range of core services by making an extended use of adequate products made available by these.**

Dedicated **downstream service portfolios**, tailored for specific user needs, are to be stimulated to enable the maximum and efficient use of EO data in support of European policies, institutional users as well as local and private entities. Targeting user needs, the proposals could be focussing on a very specific application field serving a wider group of users (eg. across Europe), or address a multi-thematic application of a specific user (e.g. regional or local). In either case, the emphasis should be on users ready to fund services in the future.

In the proposals, the work plan should focus as much as possible on building on the existing achievements of GMES, especially *core service* geo-information provision, and develop and validate innovative new geo-information derived products and services, or upgrade existing service lines in the light of new geo-information products. Proposed projects should thus make a clear reference, where appropriate, to the five GMES core services for land, marine, emergency response, atmosphere and security resulting from the 1st call (Geoland2, MyOcean, SAFER, MACC and G-MOSAIC). They should also be complementary to the downstream service projects already funded through the 2nd call, and should not duplicate other research activities relevant to the development of GMES (e.g. ESA-GSEs, JRC direct actions, etc.).

This part of the Work Programme should also aim at evolving and strengthening those R&D actions which up to now have also been supported under ESA's 'GMES Service Element' Programme, which will be phased out.

Proposers should clearly indicate how benefit is taken of existing GMES capacities or developments, and what agreements with other operational services, pre-operational services or research projects are in place, or anticipated, for provision of input data streams. Suitable contingency plans and risk analyses with respect to such input data dependencies should also be provided, especially if product delivery is still in a pre-operational development stage.

It is foreseen to stimulate the emergence and establishment of downstream service activities, with the goal to be financially self-sustainable at the end of the project, ready to be based on non R&D resources, including commercial revenues whenever appropriate.

Existing and validated experimental practices or methodologies need to be turned into operational prototypes in close interaction and trade-off/validation process with the service users. Projects should be strongly user driven and take into account user needs concerning information and services, quality specifications, and orient themselves along existing guidelines established in previous GMES projects and by advisory bodies at European level. Successful integration into current user practices and their working environment need to be demonstrated.

Previous calls for proposals of the Community Framework Programme, as well as funding actions through ESA, target services for a wide range of GMES themes. Nevertheless, some thematic areas remain poorly covered by currently funded activities, and applicants are specifically encouraged to propose downstream services on snow and ice coverage (on land as well as sea-ice), fire warning and burnt area assessment, crop monitoring, renewable energy production (e.g. renewable sources, their planning, location and energy management and distribution), as well as services devoted to cross-cutting issues relevant in specific areas such as mountainous regions (e.g. energy production, tourism, agriculture, forestry, civil protection).

Downstream services strive to build up the pre-operational delivery capabilities, and hence proposals must demonstrate:

- **A structural capacity for providing a sustainable service on an operational basis (preferably supported through a proven record).**
- **A clear focus on the operationalisation of services, and thus sustainability of the service during subsequent operations, by defining and further consolidating the economic model for service provision (e.g. through a business plan).**

Furthermore, evaluator feedback in GMES has shown repeatedly that the following topics need to be included in the proposal:

- Description of the organisation and service architecture, including interface / coordination to be assured with the GMES core services providers if relevant.
- Demonstration of user-driven approach, with user representation appropriate to the targeted products and user communities, as well as a suitable mechanism to interact with these (service level agreements are an efficient tool in this respect¹⁷).
- A preliminary analysis of the added value of products derived from core services, in light of preliminary user requirements elaborated closely with the user, to be signed off by the user, including specification of quality requirements and tolerance levels (explicit and well-defined precision, reliability, availability and integrity requirements for the products/service).

¹⁷ A template is available on Cordis web page, as part of the 3rd SPACE call documents (<http://cordis.europa.eu/fp7/dc/index.cfm>)

- A preliminary version of a clear and scientifically sound validation plan including detailed methods for measuring quality of products, their viability¹⁸, and describing the test sites and their selection criteria.
- Description of the process for monitoring how activities (of research, development, demonstration, system implementation, service validation and data provision) trace back to the user requirements (user-driven approach).
- An unambiguous, detailed and realistic list of products to be delivered to the user: product description, time period and geographical coverage, delivery dates.
- Description of the process for feedback from and assessment of the service *by relevant end-users*, which demonstrates both the acceptance level of the products, the prototypical service, as well as scenarios for integration into the users' working methods and resulting decision-making processes.
- Description of the approach for achieving interoperability and interconnection of the data processing and delivery systems, taking into account harmonisation policies, directives such as INSPIRE, and standardisation initiatives (While demonstrating interoperability capabilities, also gaps and shortcomings may be identified which have then to be integrated in ongoing INSPIRE efforts. Furthermore, the impact of harmonisation and the INSPIRE implementation on the sustainability of the services could be examined). To facilitate efficient acquisition and exploitation by both service providers and users, activities will have to include R&D¹⁹ for:
 - improved accessibility to long-term data archives, implementation of meta-data standards, actions to facilitate information retrieval and dissemination;
 - improved accessibility to in-situ systems;
 - adoption of open standards for data documentation, data models and services;
 - integration of tools and services allowing anybody to query, view access and exchange the information held by distributed public and private bodies;
 - establishment of a data policy and appropriate security framework.
- Description of selected methods for data validation and fusion from multiple sources; techniques for data assimilation into models, validation of space derived products by means of in-situ data.
- Description of procedures for observation data collection (satellite, in-situ) and delivery, under consideration of both organisational aspects, as well as technical solutions offered by state-of-the-art communication methods (via terrestrial or satellite communication channels). Account should be taken of possible mechanisms of coordinated data delivery.

Projects should include activities aiming at disseminating knowledge and increasing public awareness of the results achieved through the integration of space technology and in-situ observation systems. Project output could include an assessment of the type of data and level of spectral, spatial and time resolution expected from the next generation of satellites and in-situ data sources.

¹⁸ It should be noted that activities designed to prove the viability of new technologies that offer a potential economic advantage, but which cannot be commercialised directly, **correspond to “Demonstration” activities rather than “Research and Development” activities** in the Framework Programme. Proposals should therefore provide a careful separation of these two types of activities in their work plan.

¹⁹ It should be noted that specific development and research on ICT for environmental management as well as mechanisms for rapid adoption of standards, protocols and open architectures are undertaken in FP7 theme 3 “Information and Communication Technologies” under Challenge 6 “ICT for Mobility and Environmental Sustainability”.

Space-based observation data necessary to the development of each project will have to be detailed in the proposals. It is not excluded that additional data **could be made available by ESA on the basis of the GSC-DA Coordination and Support Action** (details in Section I, Chapter 1.3). If such access is envisaged by the proposers, such requirements and their coherence with the existing DAP of the GSC-DA have to be clearly indicated. Further information on access to Earth Observation, including templates for requests, are available on the CORDIS call webpage in the "Additional Information" section.

With regard to ***in-situ data*** necessary to the development of each service, the proposals will have to foresee dedicated efforts for their provision, allowing for an interface with coordination activities of the EEA in this respect.

In general in-situ data could include:

- (i) data collected by networks of sensors deployed on land, sea, water and in the atmosphere aimed at measuring and providing a complete description of the Earth system.
- (ii) surveys aimed at collecting socio-economic data, land cover and land-use data, geology, soil conditions, bio-diversity information and other topographic or geographical data such as elevation, administrative boundaries, transport and utility networks etc.

In particular in-situ data should meet the immediate needs of the specific proposed service and should cover, inter alia, the following requirements:

- Timeliness, in function of the service requirements.
- The provision schemes and their corresponding delivery interfaces (FTP, other internet protocols, dedicated communication schemes);

Specific needs for dedicated in-situ data for the development of each service should be detailed in the proposals.

The participation of SMEs is particularly encouraged for this topic of the call; this aspect will be taken into account in the evaluation.

Funding schemes and projects size: small-medium size *Collaborative Projects* are expected, with an upper eligibility limit of EUR 2 500 000 Community requested contribution; also small *Coordination and Support Actions* (supporting or coordinating) are possible with an upper eligibility limit of EUR 500 000 Community requested contribution. Such *Coordination and Support Actions* could address the coordination of best working practices across GMES services and/or facilitate the networking of GMES users to support a wider uptake of GMES products and working practices.

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

- Expected impact:

The projects are expected to establish innovative new GMES service capacities targeting specified user communities. In the context of already existing capabilities, projects are expected to contribute to the integration of new service lines into (pre)operational service chains of GMES downstream services.

The proposals are expected to have a demonstrable impact of the proposed service on the operations and capacities of the involved user communities. The resulting projects are expected to show

significant uptake of products and to conclude on suitable business models for long-term operational supply. The developed services are consequently expected to be self-sustainable from an economic perspective when EC funding ends. Strong evidence that the involved user organisations are likely to pay for the service after the end of the project should therefore be given. Significant progress to establishing a directory of other potential users likely to be willing and capable to pay for the service should also be demonstrated.

The evolution and trends of future sensor needs shall be demonstrated. The results obtained shall contribute directly to the sustainability and competitiveness of European value-adding services.

The proposals should also examine the impact that the products and services could have in a socio-economic context. The projects are expected to reflect the mutual dependency of technology, organisational dynamics, societal issues as well as related legal/economic aspects. This will enhance the European industry's potential to create and take advantage of important market opportunities and to establish leadership in the field. Furthermore, projects are expected to ensure sufficient awareness and understanding of all relevant issues for the take-up of their outcome.

In order to boost downstream service and business activity, close collaboration with representative user communities throughout Europe is essential. The projects are expected to take into account and build upon relevant past and ongoing activities in the field. Optimum use of existing products and services or other project results is therefore expected.

The impact of the validated system should also be demonstrated through pilot tests and exercises, based both on simulation data and on real events, when possible and appropriate.

SPA.2010.1.1-04 Stimulating the development of GMES services in specific areas

Scientific development of specific *service capabilities* as extensions to core and/or downstream activities, with the goal of supporting European policy objectives remains a priority within GMES. This topic is considered an area that is particularly suited for operationalisation of novel laboratory techniques and scientific methods.

Previous calls in the FP7 Space Theme have concentrated efforts in GMES firstly on the development of *core services*, secondly stimulating specifically the development of *downstream services*, and thereby validating the GMES architecture concepts of core and downstream, especially in Europe. As the R&D phase of GMES is reaching maturity, gaps in the European service capacity have been identified (e.g. in the GMES Implementation Groups), and research is now to be devoted to extension of such services, **through scientific development of additional new capabilities** suitable for services, their pre-operational validation in a service environment, and the **broadening of applications to areas outside Europe or to global coverage**.

European and national policy makers and institutions, as well as local and private entities need services within the environment and security domains. It is recognised that not all such services can be funded directly by end-users. However, these services (in particular if they respond to European policies or international agreements with a strong political priority) may still have a significant European added value. Therefore the development of such services should be stimulated.

Due to the global nature of many of the issues addressed by such services, international cooperation may also represent an important dimension of the activities carried out under this topic. Thus, the active participation of relevant third country partner(s) is desirable for cases where they could contribute to the scientific and technological excellence of the project and/or lead to an increased impact of the project's results.

The following areas are considered as priority areas:

(A) WATER MANAGEMENT/HYDROLOGICAL CYCLE/WATER SCARCITY

Reliable information on water quantity, quality and usage (primarily in agriculture) is key information for appropriate water management and flood protection at European level. It is also of crucial importance in most developing countries and at a global level, especially where water has a profound impact on social and economic well-being and where climate change will exacerbate existing pressures on the water resources (including water scarcity, droughts and desertification). Snow monitoring to aid operational hydrology is important in mountainous regions. Services could for instance be customised for snow monitoring to aid operational hydrology and climate change research for northern Eurasia and focused hot spot regions. Projects may develop products and services for efficient water resource management and usage (including issues relating to agricultural production, river basin characteristics, monitoring changes in the state of irrigated areas, the ecological environment and flood management) or for identifying vulnerabilities related to water based on relevant long-term observations (including trends on available water resources and support to projections of changes in floods and droughts).

(B) BIODIVERSITY

Biodiversity is a main priority of the EU environmental policies, with monitoring of ecologically sensitive sites (such as of NATURA 2000 sites) and their surrounding being a necessity for effective conservation. Proposals should be based on a combination of remote sensing and on-site in-situ monitoring (where possible drawing on the results of relevant passed and ongoing EU research projects) to assist Member States in their conservation efforts. Pilot projects could be considered, which focus on a series of multi-annual surveys of 'sampling' sites under 'pressure' and should foresee the option of delivering Natura 2000 site satellite images 'on demand' for EU policy makers. At global level, the Convention on Biological Diversity is particularly highlighted in the context of 2010 as "International Year of Biodiversity". Support to the provision of biodiversity indicators associated with the "2010 Biodiversity Indicators Partnership" coordinated by the UNEP World Conservation Monitoring Centre (WCMC) could be developed. Even if the major biodiversity data needs are provided from in-situ sources, reliable global land observations based on remote sensing can also be used to monitor changes in the distribution and status of ecosystems. In particular, effective and timely monitoring of changes in the land cover within and along the borders of protected areas is needed to judge the effectiveness in protecting and conserving the regions from human impacts such as poaching, hunting, logging, urbanization, agriculture, mining, and road construction.

(C) FOREST MONITORING

Global monitoring of deforestation and forest degradation is becoming extremely important in the context of Reducing Emissions from Deforestation and forest Degradation (REDD) and quantifying carbon credits in a post-2012 effort on fighting climate change. A pilot service project laying the groundwork for such a monitoring system of forest cover and forest cover changes over tropical areas, building on and complimenting the TREES-3 action currently carried out by the JRC, as well as ESA forest monitoring Service Element, and taking advantage of new EO technologies and the available in-situ data, would be desirable to support the EU's efforts to fight climate change.

Involvement of third countries concerned by this issue is considered an asset to improve the global reach of expected results.

(D) AGRICULTURE AND AGRI-ENVIRONMENT

Knowledge relating to the main agricultural crops (for countries both inside and outside the EU) is indispensable to adopt appropriate policies concerning sustainable development planning and food security. Activities at global, European and national level concerning crop statistics and yield forecasts using EO data already exists. However, agriculture statistics and yield forecast need to be improved through more systematic observation on the ground. Projects could focus on extending the methodological capabilities of the *core services* within the European area, or on diversifying to regions outside Europe, for instance by

(i) deriving agricultural land maps from EO data using existing Area Frame Sampling information (e.g. from LUCAS, from national inventories and other sources);

(ii) improving vegetation and land cover change monitoring, crop forecast models and agri-environmental indicators by exploiting data from in-situ observation networks providing near-real-time information on crop status (phenology, vegetation status) and combining that with space data.

Although areas (A) to (D) are regarded as priority areas, and proposals addressing these will be prioritised in recommendation for funding, proposals in other application fields are also welcome.

Proposed service projects should as much as possible build on the existing achievements of relevant activities, including past and ongoing FP projects relating to GMES, and develop and validate innovative new geo-information derived products and services, or upgrade existing services in the light of new geo-information products. The services should be complementary to the five GMES service projects for land, marine, emergency response, atmosphere and security resulting from the 1st call (Geoland2, MyOcean, SAFER, MACC and G-MOSAIC), to the downstream services funded through the 2nd call, and should not overlap with other research activities relevant to the development of GMES (e.g. ESA-GSEs, JRC direct actions, etc.).

Proposers should clearly indicate how benefit is taken of existing GMES capacities or developments, and what agreements with other services or research projects are in place. Suitable contingency plans and risk analyses with respect to input data dependencies should also be provided.

Existing and validated experimental practices or methodologies need to be turned into operational prototypes in close interaction with the service users. Projects should be strongly user driven and take into account user needs concerning information and services, and orient themselves along existing guidelines established in previous GMES projects and by advisory bodies at European level. Successful integration into current user practices and their working environment needs to be demonstrated.

Evaluator feedback in GMES has shown repeatedly that the following topics need to be included in the proposal:

- Description of the organisation and service architecture.
- Plans for the development of a structural capacity for providing the service on an operational basis.

- Demonstration of user-driven approach, with user representation appropriate to the targeted products and user communities, as well as a suitable mechanism to interact with these (service level agreements are an efficient tool in this respect²⁰).
- A preliminary analysis of the added value of products, in light of preliminary user requirements elaborated closely with the user, to be signed off by the user, including specification of quality requirements and tolerance levels (explicit and well-defined precision, reliability, availability and integrity requirements for the products/service).
- A preliminary version of a clear and scientifically sound validation plan including detailed methods for measuring quality of products, their viability²¹, and describing the test sites and their selection criteria.
- Description of the process for monitoring how activities trace back to the user requirements (user-driven approach).
- An unambiguous, detailed and realistic list of products to be delivered to the user: product description, time period and geographical coverage, delivery dates.
- Description of the process for feedback from and assessment of the service by relevant end-users, which demonstrates both the acceptance level of the products, the prototypical service, as well as scenarios for integration into the user working methods and resulting decision-making processes.
- Description of the approach for achieving interoperability and interconnection of the data processing and delivery systems, taking into account harmonisation policies, directives such as INSPIRE, and standardisation initiatives (While demonstrating interoperability capabilities, also gaps and shortcomings may be identified which have then to be integrated in ongoing INSPIRE efforts. Furthermore, the impact of harmonisation and the INSPIRE implementation on the sustainability of the services could be examined). To facilitate efficient acquisition and exploitation by both service providers and users, activities will have to include R&D²² for:
 - improved accessibility to long-term data archives, implementation of meta-data standards, actions to facilitate information retrieval and dissemination;
 - improved accessibility to in-situ systems;
 - adoption of open standards for data documentation, data models and services;
 - integration of tools and services allowing anybody to query, view access and exchange the information held by distributed public and private bodies;
 - establishment of a data policy and appropriate security framework.
- Description of selected methods for data validation and fusion from multiple sources; techniques for data assimilation into models, validation of space derived products by means of in-situ data.

²⁰ A template is available on Cordis web page, as part of the 3rd SPACE call documents (<http://cordis.europa.eu/fp7/dc/index.cfm>)

²¹ It should be noted that activities designed to prove the viability of new technologies that offer a potential economic advantage, but which cannot be commercialised directly, correspond to “Demonstration” activities rather than “Research and Development” activities in the Framework Programme. Proposals should therefore provide a careful separation of these two types of activities in their work plan.

²² It should be noted that specific development and research on ICT for environmental management as well as mechanisms for rapid adoption of standards, protocols and open architectures are undertaken in FP7 theme 3 “Information and Communication Technologies” under Challenge 6 “ICT for Mobility and Environmental Sustainability”.

- Description of procedures for observation data collection (satellite, in-situ) and delivery, under consideration of both organisational aspects, as well as technical solutions offered by state-of-the-art communication methods (via terrestrial or satellite communication channels). Account should be taken of possible mechanisms of coordinated data delivery.

Projects should include activities aiming at disseminating knowledge and increasing public awareness of the results achieved through the integration of space technology and in-situ observation systems. Project output should include an assessment of the type of data and level of spectral, spatial and time resolution expected from the next generation of satellites and in-situ data sources.

Space-based observation data necessary to the development of each project will have to be detailed in the proposals. It is not excluded that additional data **could be made available by ESA on the basis of the GSC-DA Coordination and Support Action** (details in Section I, Chapter 1.3). If such access is envisaged by the proposers, such requirements and their coherence with the existing DAP of the GSC-DA have to be clearly indicated. Further information on access to Earth Observation, including templates for requests, are available on the CORDIS call webpage in the "Additional Information" section.

With regard to **in-situ data** necessary to the development of each service, the proposals will have to foresee dedicated efforts for their provision, allowing for an interface with coordination activities of the EEA in this respect.

In general in-situ data could include:

- (i) data collected by networks of sensors deployed on land, sea, water and in the atmosphere aimed at measuring and providing a complete description of the Earth system.
- (ii) surveys aimed at collecting socio-economic data, land cover and land-use data, geology, soil conditions, bio-diversity information and other topographic or geographical data such as elevation, administrative boundaries, transport and utility networks etc.

In particular in-situ data should meet the immediate needs of the specific proposed service and should cover, inter alia, the following requirements:

- Timeliness, in function of the service requirements.
- The provision schemes and their corresponding delivery interfaces (FTP, other internet protocols, dedicated communication schemes);

Specific needs for dedicated in-situ data for the development of each service should be detailed in the proposals.

The participation of SMEs, and the inclusion of international partners from third countries (ICPC)²³ as well as other space-faring nations (e.g. US, Canada, Japan), where appropriate, is particularly encouraged for this topic of the call. Such international participation will be supported in view of expanding the use of earth observation data, and the corresponding data processing and management methods in third countries. These aspects will be taken into account in the evaluation.

Funding schemes and projects size: small-medium size *Collaborative Projects* are expected, with upper eligibility limit of EUR 2 500 000 Community requested contribution; also small *Coordination and Support Actions* (supporting or coordinating), with upper eligibility limit of EUR 500 000

²³ 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 of the Work Programme "Cooperation" 2010.

Community requested contribution, addressing cross-cutting coordination issues between GMES service projects are possible.

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

- Expected impact:

The projects are expected to establish innovative new GMES services responding to user needs.

The proposals are expected to have a clear impact on the operations and achievements of the involved user communities. The resulting projects are expected to show significant uptake of products. Strategies for achieving long-term sustainability should be evident. Progress to establishing a directory of potential users likely to be willing and capable to pay for the service in the future should also be demonstrated. The evolution and trends of future sensor needs shall also be demonstrated. The results obtained shall contribute directly to the sustainability and competitiveness of European value-adding services and SMEs.

The proposals should also examine the impact that their products and services could have in a socio-economic context, and in particular demonstrate the European added value. In order to develop suitable services, close collaboration with representative user communities throughout and possibly outside Europe is essential. The projects are expected to take into account and build upon relevant past and ongoing activities in the field. Optimum use of existing products and services or other project results is therefore expected, in particular from the FP7 Core Service projects and other elements of the GMES Services. The impact of the validated system should also be demonstrated through pilot tests and exercises, based both on simulation data and on real events, when possible and appropriate.

SPA.2010.1.1-05 Contributing to the “S” in GMES – Developing pre-operational service capabilities for Maritime Surveillance

The workshop on the security dimension of GMES held in 2007 at the Institute for Security Studies in Paris identified a number of areas where GMES could have a relevant role to play in facilitating, monitoring and implementing policies. Stakeholders worked together on the workshop follow-up, identifying *border surveillance*, *external actions* and *maritime surveillance* as areas where space-borne information could bring additional information increasing efficiency of operations in those domains, while not pre-excluding other future application areas. Following the first FP7 Space Theme call, the collaborative project G-MOSAIC (GMES services for Management of Operations, Situation Awareness, and Intelligence for regional Crises) has been selected and started early 2009 and aims at setting up EO-based services for the provision of information in support to EU *external operations*. On *border surveillance*, within the framework of the European Border Surveillance System (EUROSUR), GMES is currently finalising a technical concept with regard to the development and setting up of common applications of surveillance tools to provide the national coordination centres in the Member States with surveillance information on their external borders and on the pre-frontier area on a more frequent, reliable and cost-efficient basis. FRONTEX could act as facilitator in this regard, and in future the technical feasibility of the scenarios elaborated under this concept will need to be demonstrated. Both EU external operations and border surveillance can benefit from tools developed for surveillance in the maritime domain. It is therefore important for Europe to advance its technology in the surveillance of the maritime domain, and **only this dimension will be addressed in this call of 2010.**

Maritime surveillance is of strategic importance for the European Union, as approximately 90 percent of the goods entering and exiting the European Union is transported by sea. Effective monitoring of maritime traffic thus represents an important task in ensuring sea transport safety (including countermeasures to piracy, monitoring of transport of hazardous goods), management of pollution (such as oil spills), and countering illegal migration and cross-border crimes. Such tasks pose a number of challenges, for instance, to authorities responsible for border control in the Member States, or patrolling law enforcement authorities, which need to be provided with *more timely and reliable information* to improve their situational awareness and *increase their reaction capability*.

There have been several significant developments in maritime surveillance over recent years. In the context of the Community Vessel Traffic Monitoring and Information System (VTMIS) within the framework of Directive 2002/59/EC, the Commission has developed SafeSeaNet, a European network for the exchange of maritime data between Member States' maritime authorities which aims to prevent accidents, marine pollution as well as to increase the efficiency of the response in case of incidents/accidents at sea. The central part of SafeSeaNet, the European Index Server (EIS) is operated by the European Maritime Safety Agency (EMSA). The national systems are due to be fully implemented by EU Member States by the end of 2008. EMSA also manages a satellite based oil spill detection system for all European waters (CleanSeaNet) that has been operational since 2007. Furthermore, bodies such as the Maritime Analysis and Operation Centre–Narcotics (MAOC–N), could well benefit from better and timely tracking intelligence.

Under the framework of the European Integrated Maritime Policy, it is proposed to implement a common information sharing environment for the EU maritime domain. Amongst a number of issues of legal, administrative and technical nature, the development of further monitoring capabilities from space is needed, for example overcoming constraints in relation to new surveillance and tracking technologies such as the detection of small boats used for illegal migration and related cross-border crime by using satellite based radar and optical imaging. For this reason, in particular the improvement of capabilities for the detection, identification and tracking of small boats, through the development of new techniques and pre-operational processes should be addressed, thereby supporting the implementation of the planned demonstration ***SEC-2010.3.1-1 European-wide integrated border control system - phase II (see 2010 work programme of the FP7 security theme)***. In this context, space-based data may also lead to information on suspicious behaviour inside or outside EU waters, including Exclusive Economic Zone (EEZ) of EU member states globally. A typical information service capability to be developed is the detection and identification of undeclared boats inside or outside EU waters.

Services for maritime surveillance should be enabled to provide an enhanced situational awareness, based on latest technologies and available space-based assets, to be made available for combination and fusion with other monitoring capacities. Such services should provide easy access to toolboxes for applying space derived information in support to a diversity of policy areas at EU and national levels such as border surveillance, traffic safety, fisheries control, environmental protection and monitoring of critical infrastructure such as oil platforms and sea ports. Search and Rescue activities should also be supported. Such toolboxes should also include decision support systems, and take benefit from marine modelling and forecasting state of the art. Pre-operational validation on state of art algorithms and service chains, in terms of reduction of false alarms/identifications, should be addressed.

An important requisite for the development of services in this area is the availability of effective space-based information at EU level. This should be achieved by using for instance radar imageries from different sources (e.g. COSMO-SkyMed, TerraSAR, Radarsat2) to reduce revisit time and

improve the trade-off between swath and resolution. In addition, improvements on service performance resulting from novel capabilities such as Along Track Interferometry and polarimetric analysis should be investigated. Complementary information and control should be provided by integrating information from optical imagery, for example for better classification and identification. The range of space-based observation data necessary for such developments in this project will therefore have to be analysed and detailed in the proposals. The added-value of the service could also come from integration with declarative data such as VMS, VDS, AIS or LRIT where available. In such cases, access to these data and data security/confidentiality will be two major issues to be addressed, and measures need to be taken aiming also at preserving the availability and integrity of data and information. Services may be developed at local or regional levels. However interoperability with existing systems at national and EU level shall be taken into consideration. The services should as often as possible adopt open standards. Proprietary issues and data policy should be clearly established in full collaboration with end users. In this context, the development of user interfaces should be well defined.

The development of such services can be done only through a strong support of the user communities and such support should be clearly established in the proposal. Users may be gathered around a common geographic area of interest to provide specifications and validate the services. At EU level, coordination with activities undertaken by FRONTEX, EMSA and CFCA should be included.

The proposals should take into account information provided by existing capacities and services, such as the GMES marine core services²⁴, as well as parallel on-going activities under the FP7 Security theme. They should also take advantage of past R&D activities in the area; in particular some major building blocks could come from activities undertaken by the projects LIMES²⁵ (www.fp6-limes.eu), other FP7 projects²⁶ (e.g. GLOBE), MARISS²⁷ (www.gmes-mariss.com), MARNISS²⁸ (www.marnis.org) and TANGO²⁹ (www.teladnetgo.eu). In addition, general information on the structuring of the services may take into account the work done by the support action OPERAMAR³⁰, and pilot projects financed by DG MARE in the frame of the EU integrated Maritime policy (e.g. PASTA MARE www.pasta-mare.eu) and DG TREN in the frame of the maritime transport security.

The proposals should demonstrate their ability to develop generic and modular capacities, well adapted to user requests, also taking specific regional aspects into account. The proposals should allow for interfaces for coordination with developments of other key actors, such as the Marine Core Service, in order to provide a synergetic additional development to ongoing GMES activities. A sound methodology for service verification and validation should be developed, including long-duration demonstration pursued over several consecutive weeks. Provision must therefore also be made for resources needed to cover the required specific space-based data. Finally, proposals should include preparation for routine operations beyond the end of the project.

²⁴ http://myocean.oceanobs.com/html/services_en.html

²⁵ “Land and Sea Monitoring for Environment and Security”, an EC FP6 project (space domain)

²⁶ See for instance FP7 Security projects at ec.europa.eu/enterprise/security/articles/article_2008-09-19_en.htm and FP7 SPACE at http://ec.europa.eu/enterprise/space/index_en.html

²⁷ “European Maritime Security Services”, an ESA funded project (GMES Service Element)

²⁸ “Maritime Navigation and Information Services”, an EC FP6 project (maritime transport domain)

²⁹ “Telecommunications Advanced Networks for GMES Operations”, an EC FP6 project (space domain)

³⁰ “An InterOPERABLE Approach to European Union MARitime Security Management”, an EC FP7 project (security theme)

Funding schemes and projects size: medium size *Collaborative Projects* are expected, with an upper eligibility limit of EUR 4 000 000 Community requested contribution.

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

- Expected impact:

Proposals should have significant impact on advancing the state of the art of current detection capabilities in maritime surveillance. They should also provide for an extension of the current core service capabilities. The project is expected to establish validated service scenarios meeting specific GMES user needs in the field of maritime surveillance. It is expected to show significant uptake of products and services; and the evolution and trends of future sensor needs will be obtained. Project results are expected to serve as a sufficient basis for long-term, routine operations in this field.

Projects are expected to have a significant end-user involvement and to have a tangible and significant impact on the European user communities' capability to independently adopt and implement appropriate policy in the area of marine 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 maritime surveillance.

SPA.2010.1.1-06 Coordination of national activities for land monitoring

GMES aims at providing information services responding to needs both at the European, regional and the national (and sub-national) scale. Existing national activities responding to regional and national needs could also satisfy European needs, if these activities were to be coordinated and harmonised (e.g. nomenclatures and timing) in such a way that information from different Member States is readily comparable, to be integrated at European level. Such coordination could also have several benefits at the national level. The availability of harmonised information covering all Member States would enable each Member State to perform comparisons with other Member States. Exchange of best practices could decrease cost and increase the quality of the national activities. This could also result in the identification of common needs, for which provision of homogeneous input datasets or a Europe-wide service would be of particular value.

One of the main objectives of the Land Monitoring Core Service (LMCS) is to offer a portfolio of land use/land cover and land cover change products at various scales from local to global (e.g. Member States activities and Corine Land Cover at European level, ESA GlobCover/GlobCorine and FAO activities at global or international level). There are a number of such activities at national, European and global level which are not coordinated with each other. The GMES Land Fast Track precursor has been developed to improve Corine Land Cover with higher resolution classes and this approach will continue through on-going activities in FP7. However, in parallel there is still a need to better link European activities with national, regional and global activities.

At European level the synergy between national and European activities should be enhanced in terms of consistency between classification nomenclatures, synchronisation, combination of tasks (e.g. image pre-processing), following synergies already achieved in some countries. There is also a need

to define a method for deriving European land cover products from national products using a common European data model, in close relation with the implementation of INSPIRE Annex II.

Coordination and Support Actions are invited to foster coordination and harmonisation of existing national Land Use/Land Cover and Land Cover Change activities, to produce information at National level which can readily be integrated at the European level, identifying best practices and common requirements, and improving knowledge of GMES within national institutions, and authorities and agencies.

Funding schemes and projects size: *Coordination and Support Actions* (coordinating action) with an upper eligibility limit of EUR 1 000 000 Community requested contribution are expected.

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

- Expected impact:

Projects are expected to establish a network among European national authorities which are potential GMES stakeholders (either by contributing to service development or benefiting from data supply and associated services), building upon existing networks where appropriate.

Furthermore, projects are expected to identify commonalities among different Member States and to provide recommendations on how to improve user uptake of existing national activities and services. Improved harmonisation of national, cross-border and pan-European data-sets and requests for new GMES data and services is also expected.

Projects are expected to result also in exchange of best practices and to enhance cooperation between European actors in the field, resulting in increased cost-efficiency of national activities. Projects should result in harmonised Land Use/Land Cover and Land Cover Change information produced on the Member States level, to facilitate integration at the European level and thereby better responding to European needs. Projects are also expected to increase awareness of GMES services and their added value among national user communities.

SPA.2010.1.1-07 Fostering downstream activities and links with regions

GMES is foreseen to provide information services in support of European needs in several fields. These services are expected to respond not only to pan-European needs, but also to requirements that are identified at national or regional level, in particular in downstream applications. Individual activities responding to local requirements may already exist, but could be more effective if framed in the GMES perimeter through a concerted coordination of national or regional capacities.

For this reason it is highly important to involve the regional dimension in the implementation of GMES services. This involvement will, on the one hand, help to identify specific needs that could be similar in different regions and could form the basis for a cross-border and trans-national cooperation, and on the other hand promote GMES capabilities better in local administrations and thereby foster an increased demand.

GMES-enabled downstream services are tailored service to business, government or citizens built by using one or more GMES core service(s), as well as other data or information, as basic inputs. Those services are very diverse and value chains may involve several actors such as public administrations, private investors, specialized companies, public agencies, etc.

Services based on Earth observation already exist in Europe and it is expected that the implementation of GMES will increase their number, their field of application and the stimulation of new potential users, in particular in the downstream market.

The following needs are identified in this context:

- support the regional dimension of GMES by fostering networking activities, improving knowledge of GMES at local level, identifying common or specific requirements, and preparing a favourable environment for the development of a downstream market in response to these needs.
- facilitate access to services for regional users: potential users may identify solutions appropriate for their specific needs. Users will have the possibility to raise new pertinent needs through expressions of interest. Users should have an exhaustive panorama of the GMES downstream sector, also by providing examples of success stories.
- foster partnerships for downstream service providers: establishment of a platform where the providers will be able to exchange their experience and where new partnership for the development of innovative products can be generated including up to date information about financing opportunities in particular in support of SMEs.

A *Support or Coordination action (CSA)* could be based on the following three-pillar approach:

- establish an observatory of the GMES downstream sector for the benefit of regional actors. Such observatory could become an appropriate tool in support to the organisation and development of the downstream sector.
- carry out communication, education and training activities aiming at bringing closer regional and downstream actors;
- improve participation of (small) regional actors and SMEs in GMES projects on specific themes; in particular land monitoring, emergency response, marine services, atmospheric monitoring, security and climate change.

This CSA should propose and implement an appropriate platform to cover the activities mentioned above. Recommendations on ways to optimise framework conditions for stimulating the downstream service industry's investment in Europe and to best mobilise EU policies and funds (including industrial policy, regional funds etc.) to stimulate downstream service market growth may be envisaged.

The participation of European Interest Groups (e.g. SME Associations) is particularly encouraged for this topic of the call. This aspect will be taken into account in the evaluation.

Funding schemes and projects size: *Coordination and Support Actions* (coordinating action) with an upper eligibility limit of EUR 1 000 000 Community requested contribution are expected.

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

- Expected impact:

Projects are expected to improve the knowledge, structuring and awareness of the GMES downstream sector at the regional level. Projects are also expected to support downstream service providers' ability to obtain a better market overview, to identify and assess market segments suitable for investment, and to identify potential partners. It is also expected that regional users of GMES services will benefit through facilitated identification of services and service providers with a capacity to respond to their needs. The activities are also expected to have a positive impact on the evolution of GMES governance by further determining how the EU should stimulate the downstream sector growth on the regional level.

It is foreseen that projects will establish a network among European regional and local authorities being potential users of GMES services. It is expected that communalities among needs of different regions will be identified, providing recommendations for the development and specification of new GMES products. Specific needs are expected to be identified and downstream market opportunities responding to them could be stimulated. Projects are expected to increase awareness of GMES services and their added value among regional user communities and, where possible, enhance the attraction for regional financial support to GMES related activities.

This networking approach is also expected to have a positive impact on dissemination of information between the European institutions and the European citizens, and thereby improving promotion and awareness of GMES among the latter.

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

Area 9.2.1: Research to support space science and exploration

SPA.2010.2.1-03 Exploitation of space science and exploration data

Space based observations play a leading role in Earth, 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 observations, data analysis and modelling tools and research in laboratories.

The Work Programme topic on space science and exploration is open to international cooperation and should focus on downstream R&D activities complementing space missions, such as the **effective scientific exploitation** of their data. Missions currently in operation produce data sets of potentially immense value for research.

Many valuable space science and exploration missions are conducted by the European Space Agency and by Member States, but the utilisation and exploitation of data from these remain fragmented, as it is predominantly done on a project by project level, often with little coordination across mission boundaries, or limited funding. Furthermore, the utilisation of data by scientists not part of a mission project is often difficult, and in many case there is little public awareness of the existence of particular data sets. Even where access to data does exist, significant high level data processing may be required before further thematic exploitation is possible. For example, the combination of different sets of space data taken by missions in different frequency bands (radio, infrared, x-ray, etc.) could significantly contribute to addressing specific scientific questions, thereby increase the value of existing data. This may also call for interdisciplinary research approaches.

Project proposals should therefore target specific space science domains (including astronomy and astrophysics) in which a strong need for further scientific analysis of combined data sets exists.

Proposers should clearly demonstrate this need, and clarify how advantage is taken of existing infrastructure at European or national level, thereby adding to their value for Europe.

The wider exploitation of data from studies on human exploration, including human adaptation to space flight, radiation, risk assessment and protection measures could also be supported, in order to further facilitate the preparation of human exploratory missions.

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 of space data, selecting the most innovative and challenging objectives in emerging scientific fields;
- extending the usage of available space data (including archived data), and promoting its transfer to educational bodies, as well as the general public;
- developing better tools to process, access, archive and distribute data obtained from different sources such as space observatories.

Increasing **public awareness** of such activities will also have to be addressed in the project.

Outreach activities promoting the dissemination and public awareness of exploration missions, astronomy and/or space data could also be proposed in the form of a Coordination and Support Action.

Projects should demonstrate complementarity with existing FP7 activities²⁶ (e.g., ULISSE).

The inclusion of international partners from third countries (ICPC)³¹, countries with S&T agreements, as well as other space-faring nations (e.g. US), where appropriate, is particularly encouraged for this topic of the call. Such international participation will be supported in view of expanding the use of data, the corresponding data processing and management methods in third countries, and enhancing the relations with established space powers.

Funding schemes and projects size: small size *Collaborative Projects* are expected, with upper eligibility limit of EUR 2 000 000 Community requested contribution; *Coordination and Support Actions* (supporting or coordinating) with an upper eligibility limit of EUR 2 000 000 Community requested contribution are expected.

Note: Limits on the EC 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.

³¹ 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 of the Work Programme “Cooperation” 2010.

Projects are expected to contribute to the much needed coordination of the exploitation of existing and future data collection, 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 are not part of the team having obtained it.

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.

SPA.2010.2.1-04 Space transportation for space exploration

Key elements for the next European steps in space exploration are robotic missions in order to explore our solar system and to prepare potential future human exploration missions. Planetary exploration conducted by orbiting and landing spacecraft or by sample-return missions will require a set of enabling technologies related to space transportation. Existing technologies need to be improved and new technologies developed. Research should focus on two independent technological fields: development of in-space propulsion, including landing and development of transportation related robotics technologies. Both fields should serve the same purpose to enable or benefit space exploration to significantly reduce the time, cost and mass required for spacecraft to reach their destinations, in order to increase the scientific return of space exploration missions.

(A) ADVANCED IN-SPACE PROPULSION TECHNOLOGIES

Effective and efficient *in-space propulsion* enables space transportation for exploration and is a key element in accessing planetary surfaces. Technological fields include advanced chemical propulsion technologies (throttleable engine technologies, advanced high-energy-density fuels, hybrid propulsion, cryogenic fluid storage and management for long-duration missions, simulation tools for micro- μ to high acceleration load fluid behaviour, propellant management and liquification devices and related lightweight components), electric propulsion, solar sail and electric sail technologies. System aspects, for integration of these new technologies for exploration, are included.

A strategic area of research is on systems analysis tools. Systems analysis is used during all phases of any propulsion hardware development and serves to help define the requirements for new technology development and the figures of merit to prioritize the return on investment, to develop new tools to easily and accurately determine the mission benefits of new propulsion technologies and to assist mission planners and users better understand and evaluate new propulsion options. For example, for a precise and soft landing adjustable (throttle) engines are required.

(B) TRANSPORTATION-RELATED SPACE ROBOTICS TECHNOLOGIES

While propulsion technologies enable the long-distance transportation to remote locations, the *transportation needs on planetary surfaces* are mainly enabled by robotic technologies. Robotics technologies enable the exploration of dangerous place and increase the flexibility to unexpected exploration environments on planetary surfaces. The scientific return of a planetary mission depends significantly on robotics. Beyond planetary applications, robotics might also enable and improve complex space exploration missions, for example in supporting the assembly of mission elements in space, during orbiting or planetary transfer

phases. The technological fields include planetary rovers, autonomous sample collection, manipulation and return technologies, and in-orbit servicing technologies.

(C) IN-FLIGHT NAVIGATION AND CONTROL

Until today guidance, navigation and control (GNC) systems have relied on widely used and mastered technologies such as star tracker, gyrometers, thrusters and reaction wheels. Future exploration missions, including cargo and manned missions, will involve both precision landings and rendezvous in planetary orbits. One of the most important requirements for space vehicles for exploration purposes is the adequate, accurate and robust control of the position and attitude. This is needed to be able to reach another planet or celestial body while optimising some parameters such as time, propellant consumption and scientific measurements. Those capabilities require the application of new GNC technologies, such as for example, LIDAR based GNC technologies and newer control algorithms.

The participation of SMEs, and the inclusion of international partners (from third countries (ICPC)³², countries with S&T agreements, as well as other space-faring nations such as the US), is particularly encouraged for this topic of the call. These aspects will be taken into account in the evaluation.

Funding schemes and projects size: small size *Collaborative Projects* are expected, with upper eligibility limit of EUR 2 000 000 Community requested contribution.

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

- Expected impact:

Projects are expected to improve in-space propulsion technologies, which enable robotic exploration missions with a higher scientific return. Accomplishment of this objective will allow future space exploration mission planners to shift their focus from the difficulty of the journey to the science challenges at the destination. Projects are expected to improve robotics technologies, which enable meaningful planetary science under harsh and unexpected environments, and they are expected to provide new concepts for in-orbit servicing, which will improve exploration mission concepts in terms of transportation time and reliability.

Projects are expected to complement planned space exploration missions by significantly contributing to the availability of advanced transportation, robotics and GNC technologies. It is expected that the project will be complementary to and clearly demonstrates an added value to the efforts already carried out in this field by ESA or national agencies. Furthermore, projects are expected to contribute to the potential long-term preparation of human space flights and settlements on planets for the benefit of life on Earth.

Area 9.2.2: Research to support space transportation and key technologies

³² 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 of the Work Programme “Cooperation” 2010.

SPA.2010.2.2-01 Space technologies

The space sector is a strategic asset contributing to the independence, security and prosperity of Europe and its role in the world. As underlined in the European Space Policy, recognised in the European Parliamentarian Resolution³³ and stressed and highlighted in the Resolutions from the Space Council from 2007³⁴ and 2008³⁵, Europe needs non-dependent access to critical space technologies, which is a conditio-sine-qua-non for achieving Europe’s strategic objectives. "Non-dependence" refers to the possibility for Europe to have free, unrestricted access to any required space technology.

Critical Technologies for European Non-Dependence are not restricted only to specific electric or electronic components, but include all those technologies which are surveyed and monitored by the Joint EC-ESA-EDA task force on Critical Technologies encompassing platform, payload and launcher technologies. A number of priority technologies have been identified for Framework Programme 7 support as summarised in a table of ESA Technology Domains and Keywords below. The table should only be regarded as a first guidance of the technologies which can be addressed - **proposers are required to consult the detailed table available on the CORDIS call webpage in the "Additional Information" section before drafting proposals, in order to ensure the correct alignment with European strategic challenges and technology readiness level (TRL and/or space qualification) required.** Careful coordination with ESA’s technology programmes is required, technologies not covered by the table will be regarded as out of scope of the call.

Technology Domain	Title
On-board Data Systems	Core processors for DSP computers for space application
	ASICs (Deep Submicron) for space application
	ASICs (Co-Processors) for space application
	Very High performance microprocessors .13/.09 micron technologies for space application
	Very high speed serial interfaces for space application
	FPGAs for space application
Spacecraft Environment & Effects	Components for coordinated radiation effects flight experiment
Space System Control	Solid state gyroscope technologies for space application
RF Payload Systems	Power amplification: TWT materials for space application
Space Debris	High power VHF and UHF transmission chain and beam control
Mechanisms & Tribology	Dry lubricated Harmonic Drives for space application
	Hold down and release mechanism (Non-explosive Hold-down and release device)
Opto-Electronics	Space-worthy solid-state laser sources
	Enhanced performance and space-worthy 1-D and 2-D Sensor focal planes operating from X ray to the Infrared

³³ Resolution of 20 November 2008 on the European space policy: how to bring space down to earth

³⁴ Space Council Resolution 22. May 2007, “RESOLUTION ON THE EUROPEAN SPACE POLICY”

³⁵ Space Council Resolution 26. September 2008, “Taking forward the European Space Policy”

FP7 Cooperation Work Programme: Space

	Optical Clock Time Referencing System for space application
Structures & Pyrotechnics	Development of Deployable space structures
	Development of pyrotechnic technologies
Thermal Components	Active Cooler for Detector Cooling below 260K for space application
	Miniaturisation of two-phase thermal control technology for space application
	Enhancement and extension of two-phase thermal control technology for space application
	Active Cooler between 10-80K for space application
	Smart TPS Technologies for space application
	Thermal Control Technologies for space application compatible with new structural materials
EEE Components and Quality	Very High performance microprocessors .13/.09 micron tech for space application
	Passive Components for space application
	High performance computers, 0.18 micron tech for space application.
Materials & Processes	Advanced thermal control materials for space application
	PCB improvement for space application

To address the strategic challenges on space technologies, FP7 intends to complement current efforts of the space community and to contribute to the European Space Programme. Projects are expected to demonstrate their complementarity and possible synergies with national agency and ESA funded activities, as well as relevant Harmonised European Space Technology Roadmaps.

Emphasis for these activities should not be on the advanced nature of their scientific innovation, but on the **expected medium term impact** for Europe to develop or regain the capacity to operate independently in space, e.g. by developing in a timely manner reliable and affordable space technologies that in some cases may already exist outside Europe or in European terrestrial applications.

The participation of SMEs is particularly encouraged for this topic of the call. This aspect will be taken into account in the evaluation.

Funding schemes and projects size: small size *Collaborative Projects* are expected, with upper eligibility limit of EUR 2 000 000 Community requested contribution.

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

- Expected impact:

The projects are expected, first and foremost, to reduce the dependence on critical technologies and capabilities from outside Europe for future space applications, as identified in the 2009 list of

technologies for urgent actions from the Joint Task Force on Critical Technologies for European non-dependence.

In addition, projects should enhance the technical capabilities and overall competitiveness of European space industry satellite vendors on the world wide market.

The projects are expected to open new competition opportunities for European manufacturers by reducing the dependency on export restricted components that are of strategic importance to future European space efforts. They should enable the European industry to get non-restricted access to high performance components that will allow increasing its competitiveness and expertise in the space domain. Projects should improve the overall European space technology landscape and complement the activities of European and national space programmes.

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

Area 9.2.3: Research into reducing the vulnerability of space assets

SPA.2010.2.3-01 Security of space assets from space weather events

Space weather gives us displays of the aurora, or northern lights. Aside from this visible effect on the atmosphere, solar activity modulated effects on the Sun and in the helio- and magnetosphere affect the entire Earth environment from the magnetosphere down to the ionosphere and even to the lower atmosphere climate system. At its worst, space weather is a natural hazard which does not only modify the atmosphere but also can catastrophically disrupt the operations of many technological systems, thus causing disruption to people's lives and jobs. **Space storms** (particles, plasma or electromagnetic) are a recognised aerospace hazard and can cause major failures, e.g. onboard spacecraft, in electrical power grids, in telecommunications links (satellite, launcher and ground-based) and in navigation systems. During the current approach of the next solar maximum (around 2012), more accurate prediction, assessment and early-warning capabilities of disruptive events that are to be expected as part of this cyclical phenomenon are particularly poignant.

Coordination and Support Actions are invited to support European research activities on forecasting techniques, to develop countermeasures, and to ensure the open exchange of information on emergencies that may have been caused by space weather events, with the goal of structuring international and European research efforts. The harmonisation of information exchange at international level should also be addressed appropriately. Complementarity with ESA activities³⁶ such as the ESA Space Situational Awareness Preparatory Programme (SSA) will have to be demonstrated.

Collaborative Research projects are invited to focus on research areas such as:

- early warning and forecasting methods to allow for a mitigation of space weather effects on humans in aerospace vehicles and on vulnerable technologies in space (in particular satellites, communication and navigation systems) and on the ground (communication and power nets).

³⁶ <http://www.esa-spaceweather.net/index.html>

- countermeasures to avoid or mitigate possible harmful space weather effects on humans and technological systems (including life science experimentation).
- space weather models to improve specification and prediction capabilities, with emphasis on the linkage of the different physical processes that occur simultaneously or sequentially in many domains.

The inclusion of international partners (from third countries (ICPC)³⁷, countries with S&T agreements, as well as other space-faring nations such as US), is particularly encouraged for this topic of the call. This aspect will be taken into account in the evaluation.

Funding schemes and projects size: small size *Collaborative Projects* are expected, with upper eligibility limit of EUR 2 000 000 Community requested contribution; *Coordination and Support Actions* (supporting or coordinating) with an upper eligibility limit of EUR 500 000 Community requested contribution are expected.

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

- Expected impact:

Coordination and Support Actions are expected to significantly contribute to the coordination and overall organisation of European R&D in this field, and thereby ensuring coherent and effective approaches and methodologies of future R&D efforts. It is expected that such coordination will be complementary to and clearly demonstrate a tangible added value to the efforts already carried out in this field by e.g. ESA's initiatives.

Collaborative Research Projects are expected to significantly contribute to the European capacity to **prevent damage / protect space assets** from space weather events. Projects are expected to significantly contribute to both **improving forecasts and predictions of disruptive space weather events**. Projects are also expected to identify **best practices to limit the impacts** on space- and ground-based infrastructures and their data provision.

Furthermore, projects are expected to facilitate and promote an open exchange of information on incidents potentially caused by space weather events between different European (and international) actors in the field.

It is expected that the project will be complementary to and clearly demonstrates an added value to the efforts already carried out in this field by ESA or national agencies.

SPA.2010.2.3-02 Security of space assets from on-orbit collisions

³⁷ 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 of the Work Programme "Cooperation" 2010.

In recent years our reliance on space-based systems has grown to include different fields: satellite communication and earth observation are ubiquitous, as is satellite navigation. A serious threat is posed by the **alarming growth of space debris**, left from launch activities, break-ups in space and obsolete space objects. Recent collision events have further exacerbated the threat posed by break-ups, highlighting the need for better space situational awareness. In response, activities will be undertaken to assess the associated risks, monitoring debris, reducing debris production by preventing generation of new debris and de-orbiting upper stages and spacecraft after mission completion. Additionally, better protection of spacecraft against damage caused by debris collision should be actively researched, as well as the future potential for active debris removal.

Space assets, and their associated ground facilities, are sensitive to external events that can endanger their proper functioning, such as space debris, jamming, viruses and natural or man-made electromagnetic 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. The research should focus on complementarity with the newly proposed ESA Space Situational Awareness (SSA) programme, and more specifically on options to reduce the vulnerability.

Coordination and Support Actions are invited to support coordination activities aiming to **structure research efforts undertaken internationally and at European level**, and research assessing vulnerabilities and their amelioration. These may also include studies related to the space-based infrastructure requirements of space surveillance. The harmonisation of information exchange at international level should also be addressed appropriately. Wider economic impact studies in relation to the impairment or loss of space assets could be considered, as well as the issues surrounding the potential introduction of an enforceable global regulatory framework for dealing with the creation and management of potentially hazardous debris. Complementarity with ESA activities in the field of space surveillance should be ensured.

Collaborative Research projects are invited to focus on options to reduce the vulnerability of space assets, such as:

- research on the effect of on-orbit collisions with medium to small particles, on spacecrafts in view of identifying mitigating solutions such as the design of distributed redundancy and array components, so that partial destruction does not impair the functioning of the affected sub-system;
- risk-minimizing architectures, including the use of other space assets to provide redundant functionality (without adding to the number of orbiting objects for this purpose only);
- advanced anti-jamming & anti-virus techniques.

Proposals will have to clearly demonstrate their complementarity with the ESA Space Situational Awareness (SSA) programme.

The inclusion of international partners (from third countries (ICPC)³⁸, countries with S&T agreements, as well as other space-faring nations such as US), is particularly encouraged for this topic of the call. This aspect will be taken into account in the evaluation.

Funding schemes and projects size: small size *Collaborative Projects* are expected, with upper eligibility limit of EUR 2 000 000 Community requested contribution; *Coordination and Support Actions* (supporting or coordinating) with an upper eligibility limit of EUR 500 000 Community requested contribution are expected.

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

- Expected impact:

Coordination and Support Actions are expected to significantly contribute to the coordination and overall organisation of European R&D in this field, and thereby ensuring coherent and effective approaches and methodologies of future R&D efforts. It is expected that such coordination will be complementary to and clearly demonstrate a tangible added value to the efforts already carried out in this field by e.g. ESA's initiatives.

Collaborative Research Projects are expected to significantly contribute to the European capacity to prevent creation of, detect and protect space assets from space debris. Results are expected to provide Europe with technologies and processes ready to be used for future space missions, preferably with a limited need for continued R&D support for development of technology and processes when EC funding ends.

It is expected that the project will be complementary to and clearly demonstrates an added value to the efforts already carried out in this field by ESA or national agencies.

Activity: 9.3 Cross-cutting activities

Area 9.3.2: International cooperation

SPA.2010.3.2-01 EU-Russia Cooperation in GMES (SICA)

In the framework of the EU-Russian Space Dialogues' Earth observation working group several activities to exchange methodology know-how in processing Earth Observation data have been identified for agriculture, forestry, earthquake precursors and arctic regions. For such proposals, ESA and ROSKOSMOS are offering limited parts of their satellite data archives for free use. Specific International Cooperation Actions (SICA) require a minimum participation of at least four independent entities. Of these, two must be established in different Member or Associated States, and the other two must be established in different regions of the Russian Federation. Additionally, Russian participation is required from at least two independent institutions.

³⁸ 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 of the Work Programme "Cooperation" 2010.

Support could be given to actions investigating and cross validating methodologies using both Russian and European Earth Observation data. Proposed projects are expected to improve methodologies and include applications in support of the development of a system of worldwide observation systems. Several data sources have therefore to be considered in an application.

In order to ensure a genuine EU-Russia cooperation, a balanced distribution of effort between the EU and Russian partners is expected.

Funding schemes and projects size: small size SICA *Collaborative Projects* are expected, with upper eligibility limit of EUR 500 000 Community requested contribution.

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

- Expected impact:

Proposals are expected to contribute significantly to the joint use of Russian satellite capabilities (i.e. the Russian Resurs DK satellites) and European satellites for enhancing the GMES Earth observation coverage, in particular in areas related to agriculture, forestry, earthquake precursors and arctic regions. Furthermore, projects are expected to take full advantage of the possibilities provided by integrating several datasets in a single application.

Projects should also result in enhanced collaboration between Russian and European actors in this field.

SPA.2010.3.2-02 International Cooperation in GMES / Deforestation (SICA)

In the context of Reducing Emissions from Deforestation and forest Degradation in developing countries (REDD), activities aiming at establishing national forest monitoring systems are crucial, involving key political and technical actors at the national level. In the framework of African Union / European Union partnership and the action plan resulting from the Lisbon declaration, collaboration with African partners is encouraged. With major forest areas located in equatorial regions of Africa, South America and South-East Asia, international collaboration on forest monitoring with participants from these three regions are of particular interest.

Specific International Cooperation Actions (SICA) require a minimum participation of at least four independent entities. Of these, two must be established in different Member or Associated States, and the other two must be established in different regions of Africa and/or South America and/or South-East Asia. Additionally, participation from these regions must be from at least two independent institutions.

In order to ensure a genuine international cooperation, a balanced distribution of effort between the EU/African/South American/SE-Asian partners is expected.

Funding schemes and projects size: small size SICA *Collaborative Projects* are expected, with upper eligibility limit of EUR 500 000 Community requested contribution.

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

- Expected impact:

Projects are expected to strengthen European/African/South-American collaboration, to build capacities in forest monitoring and related carbon emission assessments, and to significantly contribute to establishing national or regional forest monitoring centres with a focus on REDD.

Projects are also expected to positively impact the international collaboration in this field beyond the timeframe of EC support.

SPA.2010.3.2-03 EU-South Africa Cooperation in GMES (SICA)

In the framework of EU-South Africa Space Dialogue initiated in 2008³⁹, several activities to strengthen collaboration on GMES have been identified. African user requirements are often not sufficiently well defined in the GMES context, an issue also addressed already in GMES-Africa Coordination Actions started under the 2nd Space call. Access to a wider range of data from EO satellites (optical or radar) would be valuable to advance and extend existing application fields. Application fields of mutual interest are:

- Forest services and tree cover maps;
- Surface water, soil moisture and water vapour monitoring to provide a better understanding of the hydrological cycle for water management and/or flood prevention;
- Space based observations for managing Malaria.

Proposals are expected to be complementary to the ongoing GMES-Africa CSA activities and other GMES projects in the region.

Specific International Cooperation Actions (SICA) require a minimum participation of at least 4 independent entities. Of these, two must be established in different Member or Associated States, and the other two must be established in different parts of the Southern African Development Community⁴⁰ (SADC) region. Additionally, participation from this region must be from at least 2 independent institutions.

In order to ensure a more genuine international cooperation, a balanced distribution of effort between the EU/African partners is expected.

Funding schemes and projects size: small size SICA *Collaborative Projects* are expected, with upper eligibility limit of EUR 500 000 Community requested contribution.

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

- Expected impact:

³⁹ See also Joint Communiqué on South Africa – European Strategic Partnership from the Ministerial Troika Meeting, Kleinmond, South Africa on 16 January 2009 (Council of EU, 5462/09)

⁴⁰ See <http://www.sadc.int>

Proposals are expected to strengthen European/South-African collaboration, to build capacities, and to contribute significantly to establishing national monitoring centers. The results are expected to contribute to data shared within GEOSS, and show a clear added value with regard to ongoing projects in the region.

Projects are also expected to positively impact the international collaboration in this field beyond the timeframe of EC support.

SPA.2010.3.2-04 EU-Russia Cooperation for Strengthening Space Foundations (SICA)

In the framework of the EU-Russian Space Dialogues' working group on Technology and Applied Science several activities for technology development have been identified:

1. Microbial detection and contamination understanding and countermeasures
2. Multiple laser ignition technology
3. EEE-Components mapping
4. Space Wire Real Time Protocol
5. Re-entry technologies and tools

Specific International Cooperation Actions (SICA) require a minimum participation of at least four independent entities. Of these, two must be established in different Member or Associated States, and the other two must be established in different regions of the Russian Federation. Additionally, Russian participation is required from at least two independent institutions.

In order to ensure a genuine EU-Russia cooperation, a balanced distribution of effort between the EU and Russian partners is expected.

Funding schemes and projects size: small size SICA *Collaborative Projects* are expected, with upper eligibility limit of EUR 500 000 Community requested contribution.

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

- Expected impact:

Projects are expected to contribute significantly to further joint space technology developments in areas of mutual interest EU and Russia, reducing duplication of research efforts, as well as technology dependencies on both sides.

Projects are also expected to positively impact the collaboration between Russian and European actors in this field beyond the timeframe of EC support.

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

SPA.2010.3.5-01 European Space Policy Studies

The Council conclusions of 26 September 2008 set priorities for the future implementation of the European Space Policy, notably in the areas of climate change, security, space exploration and the

contribution of space to the Lisbon strategy. The conclusions of the European Council of December 2008 call for the launching of a European plan for innovation encompassing all the conditions for sustainable development and the technologies for the future including space technologies and derived services. Thus, the European Council linked space to innovation and – in a wider sense to the need to prepare for European economic recovery. In view of this, the Space Work Programme 2010 supports studies focusing on the implementation of the European Space Policy following the September 2008 Space Council and the 2008 European Council. 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), the socio-economic benefits attached, and on questions related to space exploration, Europe's role in the global space exploration initiative as well as the European Union's role in this important field.

Funding schemes and projects size: *Coordination and Support Actions* (supporting or coordinating) with upper eligibility limit of EUR 500 000 Community requested contribution are expected.

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

III IMPLEMENTATION OF CALLS

- **Call title:** Space Call 3
- Call identifier: FP7-SPACE-2010-1
- Date of publication⁴¹: 30 July 2009
- Deadline⁴²: 8 December 2009, at 17.00.00, Brussels local time
- Indicative budget⁴³: EUR 114 million
- Topics called:

Activity/ Area	Topics called	Funding Schemes
9.1.1 Space-based applications at the service of European Society / Integration, harmonisation, use and delivery of GMES data ⁴⁴	SPA.2010.1.1-01 Stimulating the development of downstream GMES services	Collaborative Projects, Coordination and Support Action (supporting or coordinating)
	SPA.2010.1.1-04 Stimulating the development of services	Collaborative Projects, Coordination and Support Action (supporting or coordinating)
	SPA.2010.1.1-05 Contributing to the “S” in GMES – Developing pre-operational service capabilities for Maritime Surveillance	Collaborative Projects
	SPA.2010.1.1-06 Coordination of national activities for land monitoring	Coordination and Support Action (coordinating)
	SPA.2010.1.1-07 Fostering downstream activities and links with regions	Coordination and Support Action (coordinating)
9.2.1 Strengthening of Space foundations/ Research to support space science and exploration ⁴⁵	SPA.2010.2.1-03 Exploitation of science and exploration data	Collaborative Projects, Coordination and Support Action (supporting or coordinating)
	SPA.2010.2.1-04 Space transportation for space exploration	Collaborative Projects

⁴¹ The Director-general responsible for the call may publish it up to one month prior to or after the envisaged date of publication

⁴² The Director-general responsible may delay this deadline by up to two months

⁴³ Under the condition that the preliminary draft budget for 2010 is adopted without modifications by the budget authority. 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.

⁴⁴ For the Activity 9.1, five ranking lists will be established; one for each of the topics (SPA.2010.1.1-01, SPA.2010.1.1-04, SPA.2010.1.1-05, SPA.2010.1.1-06, and SPA.2010.1.1-07)

⁴⁵ For the Activity 9.2, four ranking lists will be established. Two for the area 9.2.1: one ranking list for each topic SPA.2010.2.1-03 and SPA.2010.2.1-04. One ranking list will be established for the area 9.2.2. And one ranking list for the area 9.2.3 covering the two topics SPA.2010.2.3-01 and SPA.2010.2.3-02.

FP7 Cooperation Work Programme: Space

9.2.2 Strengthening of Space foundations / Research to support space transportation and key technologies ⁴⁵	SPA.2010.2.2-01 Space technologies	Collaborative Projects
9.2.3 Strengthening of Space foundations / Reducing the vulnerability of space assets ⁴⁵	SPA.2010.2.3-01 Security of space assets from space weather events	Collaborative Projects, Coordination and Support Action (supporting or coordinating)
	SPA.2010.2.3-02 Security of space assets from on-orbit collisions	Collaborative Projects, Coordination and Support Action (supporting or coordinating)
9.3.2 Cross-cutting activities ⁴⁶ / International Cooperation	SPA.2010.3.2-01 EU-Russia Cooperation in GMES	Collaborative Projects with “Specific International Cooperation Actions” eligibility conditions
	SPA.2010.3.2-02 International Cooperation in GMES /Deforestation	Collaborative Projects with “Specific International Cooperation Actions” eligibility conditions
	SPA.2010.3.2-03 EU-South Africa Cooperation in GMES	Collaborative Projects with “Specific International Cooperation Actions” eligibility conditions
	SPA.2010.3.2-04 EU-Russia Cooperation for Strengthening Space Foundations	Collaborative Projects with “Specific International Cooperation Actions” eligibility conditions
9.3.5 Cross-cutting activities ⁴⁶ / European Space Policy Support	SPA.2010.3.5-01 European Space Policy Studies	Coordination and Support Action (supporting or coordinating)

- Eligibility conditions:
 - The general eligibility criteria for the different funding schemes are set out in Annex 2 of 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

⁴⁶ For the activity 9.3, two separate ranking lists will be established: one for areas 9.3.2, and one for 9.3.5.

	which is established in a MS or AC, and no 2 of which are established in the same MS or AC
Collaborative Project for specific cooperation actions (SICA) dedicated to international cooperation partner countries	At least 4 independent legal entities. Of these, 2 must be established in different MS or AC. The other 2 must be established in different international cooperation partner countries (ICPC).
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.

- The following additional eligibility criteria and funding constraints apply in this call
- For Activity 9.1, Topics 1.1.01 and 1.1.04, the maximum eligible EC contribution is EUR 2 500 000 for Collaborative Projects and EUR 500 000 for Coordination and Support Actions, proposals requesting in excess will be ineligible. CP and CSA will be ranked separately, and up to 12.5% of the budget of these two areas can be devoted to CSA.
- For Activity 9.1, Topic 1.1.05, the maximum eligible EC contribution is EUR 4 000 000, proposals requesting in excess will be ineligible. Only CP are requested.
- For Activity 9.1, Topic 1.1.06, the maximum eligible EC contribution is EUR 1 000 000, proposals requesting in excess will be ineligible. Only CSA are requested.
- For Activity 9.1, Topic 1.1.07, the maximum eligible EC contribution is EUR 1 000 000, proposals requesting in excess will be ineligible. Only CSA are requested.
- For Activity 9.2, Topic 2.1.03, the maximum eligible EC contribution is EUR 2 000 000 for Collaborative Projects and Coordination and Support Actions, proposals requesting in excess will be ineligible. CP and CSA will be ranked separately, and up to 25% of the budget of this area can be devoted to CSA.
- For Activity 9.2, Topics 2.1.04 and 2.2.01, the maximum eligible EC contribution is EUR 2 000 000 for Collaborative Projects, proposals requesting in excess will be ineligible. Only CP are requested.
- For Activity 9.2, Topics 2.3.01 and 2.3.02, the maximum eligible EC contribution the maximum eligible EC contribution is EUR 2 000 000 for Collaborative Projects and EUR 500 000 for Coordination and Support Actions, proposals requesting in excess will be ineligible. CP and CSA will be ranked separately, and up to 20% of the budget of these two areas can be devoted to CSA.
- For Activity 9.3, Topics 3.2.01, 3.2.02, 3.2.03 and 3.2.04, the maximum eligible EC contribution is EUR 500 000, proposals requesting in excess will be ineligible. Only SICA Collaborative Projects are requested.
- For Activity 9.3, Topic 3.5.01, the maximum eligible EC contribution is EUR 500 000, 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.
- Participants may use flat rates to cover subsistence costs of travel in their FP7 Grants Agreements as outlined in Commission decision C(2009)1942.

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. 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'.

- 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
 - A one-stage submission procedure will be followed.
 - Proposals may be evaluated remotely.
 - During final ranking, the procedure for prioritising proposals with equal scores described in Annex 2 of 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 2009 invites proposals to be funded in 2010. The evaluation is to commence within 2 months of the call deadline, with negotiations of successful proposals commensurate with the 2010 budget expected to commence in the first half of 2010.

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.

- Implementation

Calls for proposals under this work programme Space will be implemented by the Research Executive Agency (REA) once this is operating autonomously according to the provisions of the Commission decision C/2008/3980 of 31/7/2008 “delegating powers to the Research Executive Agency with a view to performance of tasks linked to implementation of the Specific Community programmes People, Capacities and Cooperation in the field of research comprising , in particular, implementation of appropriations entered in the Community budget”.

All activities under 9.1 to 9.3 are included in this delegation, only tender actions and pre-defined beneficiary actions (being in 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 topic.

- The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.
- Particular requirements for participation, evaluation and implementation:
 - The minimum number of participating legal entities required, for all funding schemes, is set out in the Rules for Participation. Please note, that for Coordination and Supporting Actions, different minimum participation rules apply depending on whether they are aiming at supporting or coordinating research activities and policies.
 - The forms of grant which will be offered and maximum reimbursement rates are specified in Annex 3 to the Cooperation Work Programme.

IV OTHER ACTIONS

Activities implemented but not subject of a call

The following activities will be supported through funding by the Space theme in 2010, but **will not be subject of a call**⁴⁷ under the Space theme:

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

They are regarded to supplement the activities undertaken as a result of the calls for proposals in the FP7 Space theme. Participants 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).

4.1 Development of GMES-dedicated space infrastructure

⁴⁷ Art. 14 of the Rules for Participation – Regulation (EC) 1906/2006 of the European Parliament and of the Council of 18 December 2006

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 45% of the FP7 'Space' budget⁴⁸ 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**⁴⁹ 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 2010, a contribution of EUR 97 million is foreseen.

Financial support from FP7 should contribute to the activities proposed by ESA in the GMES Space Component Programme, starting with Segment 1⁵⁰, and followed by Segment 2⁵¹.

EC 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 Communities⁵² and with the EC/ESA Framework Agreement⁵³.

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 the Seventh Framework Programme, 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 EC Financial Regulations and FP7 context. For these activities a variety of funding schemes in line

⁴⁸ Including the corresponding share of support to the horizontal support to cross-cutting activities, as well as of the relevant administrative expenses.

⁴⁹ COM Decision C(2008)563 of 8 February 2008

⁵⁰ ESA/PB-EO(2007)44 of 17 May 2007

⁵¹ ESA/PB-EO(2009)30 of 9 Feb 2009

⁵² Council Regulation (EC,Euratom) No 1605/2002 of 25 June 2002 and Commission Regulation (EC,Euratom) No 2342/2002 of 23 December 2002

⁵³ COM(2004)85. 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.*"

with the EC Financial Regulation may be used. Further information on opportunities is available on Space Theme CORDIS website.

Funding scheme: other actions⁵⁴

4.2 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 budget of 2010.

Support will be given to the organisation of events (conferences, workshops or seminars) related to the implementation of the European Space Policy and the priorities for implementation identified last year (see chapter above). 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 following the high-level conference on space exploration scheduled for June 2009 in Prague, and - at the same time - support the preparation of a second conference on space exploration to be organised during the second semester of 2009

The following funding from FP7 Space budget is foreseen during 2010:

A: Conference on GMES during the Spanish EU Presidency

A high-level 2-day conference is foreseen during the Spanish EU Presidency on Space Applications entitled “GMES: Towards operationality”, focussing on the transition from GMES research activities under FP7 to a new operational phase.

In particular, the event will gather high representatives from all Member States to give an impulse to the GMES operational budget from 2014 onwards and the complementarity with GMES research budget in FP8. It will address the issues of

- coordination of National missions, and the sustainability of the Space component.
- review of the Status of the GMES pre-operational services from FP7.
- Present first results of the downstream services arising from the calls in FP7.
- Cooperation with other parts of the world, particularly Latin America

The conference will include an exhibition of key service projects financed by the Research Framework Programmes.

Predefined Beneficiary:

CDTI-Centro para el Desarrollo Tecnológico Industrial
C/Cid, 4

28001 Madrid (Spain)

Dates: February 2010

Location: Madrid (Spain)

Proposed EC contribution: 150 k€

Funding scheme: CSA – named beneficiary

These *Coordination and Support Action* proposals shall be evaluated in accordance with the standard FP7 evaluation criteria (including weights and thresholds) and sub-criteria, together with the eligibility, selection and award criteria for the different funding schemes as set out in Annex 2 to this work programme. Furthermore, the standard FP7 funding rates for *Coordination and Support Actions* shall apply. The Director General of DG Enterprise and Industry shall be empowered to conduct and conclude the negotiation process for the grant agreement.

⁵⁴ In accordance with Article 53(d) of the Financial Regulation and Articles 35 and 43 of the Implementing Rules.

Furthermore, 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 1 613 587.

Funding scheme: CSA – public procurement

4.3 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. 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 take the form 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 2010 will be up to EUR 500 000.

Funding scheme: CSA – expert contract, public procurement

5.3 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 Community 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 of this Work Programme.

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

A total of EUR 216.5 million is to be committed from the 2010 Community budget. The indicative budget allocated to the activities from the 2010 budget is given in the following table:

	2010 EUR million ⁵⁵	total
Call FP7-SPACE-2010-1		
<u>Activity 9.1</u> Space-based applications at the service of European Society :		
1.1 Stimulating the development of <i>downstream</i> GMES services	18	47
1.4 Stimulating the development of services in specific areas	18	
1.5 Contributing to the “S” in GMES – Developing pre-operational service capabilities for Maritime Surveillance	8	
1.6 Coordination of national activities for land monitoring	1	
1.7 Fostering downstream activities and links with regions	2	
Call FP7-SPACE-2010-1		
<u>Activity 9.2</u> Strengthening of Space foundations:	12	58
1.3 Exploitation of Space Science and exploration data	12	
1.4. Space transportation for space exploration		
Call FP7-SPACE-2010-1		
<u>Activity 9.2</u> Strengthening of Space foundations:	12	58
2.1 Space Technologies		
Call FP7-SPACE-2010-1		
<u>Activity 9.2</u> Strengthening of Space foundations:	22	58
3.1 Security of space assets from space weather events		
3.2 Security of space assets from on-orbit collisions		
Call FP7-SPACE-2010-1		
<u>Activity 9.3</u> Cross- cutting activities/International Cooperation		9
2.1 EU-Russia Cooperation in GMES	8	
2.2 International Cooperation in GMES/Deforestation		
2.3 EU-South Africa Cooperation in GMES		
2.4 EU-Russia Cooperation for Strengthening Space Foundations		
Call FP7-SPACE-2010-1		
<u>Activity 9.3</u> Cross- cutting activities		9
5. European Space Policy Studies	1	
ACTIVITIES NOT SUBJECT OF A CALL FOR PROPOSALS:		
1 ESA Delegation Agreement (re. 9.1)	97	99.3
2 Communication and Conferences	1.8	
3 Monitoring, Evaluation, Studies and Impact assessment	0.5	
OTHER ACTIVITIES		
1 FP7 Expert proposal evaluators payments	1	1
GENERAL ACTIVITIES (CF. ANNEX 4)		
	2.3	2.3
ESTIMATED TOTAL BUDGET ALLOCATION		216.5

⁵⁵ Under the condition that the preliminary draft budget for 2010 is adopted without modifications by the budgetary authority.

Summary of budget allocation to FP7 general activities for 2010 (cf. Annex 4)

	2010
Cordis	EUR 0.433 million
Eureka/Research Organisations	EUR 0.019 million
COST	EUR 1.764 million
ERA-NET	EUR 0 million
Strat. Support Action	EUR 0.063 million
Total	EUR 2.280 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.

Following on from the NCP specific action in the first call, further dissemination actions are envisaged to

- promote the uptake of GMES services amongst users;
- promoting science, education and general outreach;
- examining the implications of technological developments for the European Space Policy.

The following potential topics have been identified already for possible future calls starting in 2011 or 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

Development of GMES services (follow-on activities)

Previous calls in the FP7 Space Theme have concentrated efforts in GMES firstly on the development of *core services*, secondly stimulating specifically the development of *downstream services*, and thereby validating the GMES architecture concepts of core and downstream, especially in Europe. *Core service* projects funded as the outcome of the 2007 call are expected to come to an end of their activities in 2011. Apart from R&D funding, from EC FP7 or ESA GMES Service Elements, operational activities are also already being funded through the Preparatory Actions for GMES with a 3 million € budget in 2008, with a similar one foreseen for 2009, and further funding options under discussion.

Further, it is envisaged that in 2009, the Commission will propose a Basic Act concerning a “bridge financing” of operational activities in the period 2011 – 2013, accompanied by a detailed assessment of the costs and the impact of such activities. The funding of activities in the next financial perspective, starting in 2014, will be covered by an additional Basic Act to be adopted before the end of 2013.

GMES will thus rely on both a R&D budget and an operational budget in the years to come. During the course of 2009, a detailed analysis of actions funded through R&D budgets, at EC and ESA, as well as first emerging operational funding lines will be conducted, to structure further investments in a coherent programmatic approach. This analysis may identify needs and gaps in the service supply still requiring additional research and development investments.

Furthermore, as novel techniques and scientific methods are reaching technical maturity, new service capabilities not yet covered or included by these GMES information deliveries may become feasible. Therefore, development of **upgraded capabilities** to existing GMES service capabilities may be undertaken in order to extend the scope of such operational services, and to integrate and validate new capabilities within enhanced service delivery chains (e.g. through a wider geographical coverage, better spatial resolution, a wider range of information provided and improved time response)⁵⁶.

This part of the Work Programme should aim, through appropriate R&D actions, at providing the necessary R&D activities identified, taking into account all relevant earlier achievements, as well as remaining gaps, if any.

Area 9.1.2: Integration of SatCom with GMES for prevention and management of emergencies

Integration of SatCom and SatNav with GMES for prevention and management of emergencies

The objective is to integrate satellite communication and satellite navigation solutions with space based observing systems for prevention and management of all kinds of emergency. The target should be a service platform, with the objective of validating the technological concepts and acknowledging the benefits of an integrated communication/ navigation/observation infrastructure with the users. Complementarity of the satellite capabilities with terrestrial capabilities, where appropriate, should be assessed on the basis of a medium to long term view based on the foreseeable evolution of telecommunication technologies, the related economics and addressed as an integral part of the proposed action. The validation of specific test-beds, based whenever possible and appropriate on real situations, is encouraged.

Activities not part of 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. Overall, of order 8% and 45% of the FP7 'Space' budget⁵⁷ 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. First financial support

⁵⁶ Qualitative/quantitative parameters which track the project objectives should be utilised to assess the impact of supported actions: see also Section II on expected impact.

⁵⁷ Including the corresponding share of support to the horizontal support to cross-cutting activities, as well as of the relevant administrative expenses.

from FP7 has been provided from the current 2009 budget line for the development of Earth Observation Space Infrastructure, as described in section 4.2.

Based on the experience gained, further funding 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

Area 9.2.1: Research to support space science and exploration

Current space exploration programmes, in Europe and elsewhere, intend to extend the human presence, in a real or virtual way, through missions to the Moon and to Mars or through automatic missions in direction to objects of the solar system. Complementary to, and in close co-operation with respective activities undertaken by ESA and other interested national agencies in this domain, the FP7 Space Work Programme will support research aimed at improving the capability to access planets surfaces, to move, to select and collect and finally return samples to Earth in the frame of space exploration activities.

Further analysis and scientific exploitation of space data, adding further added value to the investments made in building European satellites will be supported.

New generations of technologies for space missions (science and exploration)

The Work Programme on space sciences and exploration should focus on space missions upstream activities for the strengthening of the technological base.

The R&D activities are crucial for the development of new capacities (vehicles, platforms, instruments) responding to the new generation of space missions. The research objective here is to maintain the network of expertise in order to consolidate the enabling technologies, in particular:

- The technologies allowing new types of observation missions: formation flying, satellite autonomy, interferometry systems, measurement and relative positioning control, measure and transmission of high precision timing.
- Nanosatellites.
- New sensors for the different spectrum windows for astronomy.
- The technologies and measurement methods for the future Earth observation missions: specific laser sources, low frequency radars, synthetic aperture optics for observation from geostationary orbits.

Area 9.2.2: Research to support space transportation and key technologies

Space transportation (follow-on activities)

The European Space Policy, as highlighted in the Resolutions from the 2007 and 2008 Space Councils, aims at guaranteeing the continuity of autonomous, reliable and cost-efficient access to space at affordable conditions for the EU, ESA and their respective Member States. This is based on

the availability of a set of adequate and competitive world-class launchers, and an operational European space port. Moreover, space has been recognised by the EU as one of the priorities and key building blocks of the European knowledge-based society. Scientific research should therefore also focus on new concepts and development for future Launcher technologies.

Innovation is the key factor for preparation of the future Space Transportation systems. Priority should be given to technologies enhancing reliability and cost efficiency of Space Transportation systems, reducing the cost of access to space for small, medium and bigger size payloads, also enabling new missions for the benefit of the society. Computer tools necessary for this trade-off analysis should be addressed.

Research should focus also on new concepts for emerging strategies such as direct injection to geostationary orbit by means of cryotechnic or heliothermic propulsion, advanced structures and new energy generation systems.

Reducing economical risks requires strong simulation capacity and technology validations. Consequently the research activities should address the modelling of combustion and complex fluid movements, behaviour of specific materials for launchers and propulsion, shock analysis, dynamics of the payloads, system integrity monitoring. Due to the technological complexity of the domain, in relevant cases, international cooperation may be considered.

Space technologies (follow-on activities)

The space sector is a strategic asset contributing to the independence, security and prosperity of Europe and its role in the world. As underlined in the European Space Policy, recognised in the European Parliamentarian Resolution⁵⁸ and stressed and highlighted in the Resolutions from the Space Council from 2007⁵⁹ and 2008⁶⁰, Europe needs non-dependent access to critical space technologies, which is a *conditio-sine-qua-non* for achieving Europe's strategic objectives. "Non-dependence" refers to the possibility for Europe to have free, unrestricted access to any required space technology.

Critical Technologies for European Non-Dependence are not restricted only to specific electric or electronic components, but include all those technologies which are surveyed and monitored by the Joint EC-ESA-EDA task force on Critical Technologies encompassing platform, payload and launcher technologies. Further calls addressing priorities identified in the task force are foreseen.

Area 9.2.3: Reducing the vulnerability of space assets

Security of space assets

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 men-made electromagnetic 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. The research should focus on complementarity with the proposed ESA Space Situational Awareness (SSA) programme, and more specifically on options to reduce the vulnerability of space assets.

⁵⁸ Resolution of 20 November 2008 on the European space policy: how to bring space down to earth

⁵⁹ Space Council Resolution 22. May 2007, "RESOLUTION ON THE EUROPEAN SPACE POLICY"

⁶⁰ Space Council Resolution 26. September 2008, "Taking forward the European Space Policy"

Activity: 9.3 Cross-cutting activities

Area 9.3.2: International cooperation

International co-operation in GMES

Proposals will be sought which develop activities to disseminate and implement outside the European Union (e.g. Latin America, and especially in developing countries) products and services derived or customised from current GMES development activities, for instance for risk management, resource management and land planning, marine and atmospheric environment monitoring, and in the domains of management of water resources and security. Proposals addressing Early Warning Systems linked to natural disasters, food security or disease prevention are also encouraged.

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.⁶¹ The pursuance of the objectives set forth at the initiative “GMES for Africa” and included in the “*Lisbon Declaration on GMES and Africa*” represents a special focus for the proposed research activities in GMES. For this reason, actions have been funded to support the preparation of an action plan of the European Commission and the Commission of the African Union for the endorsement at the next EU-Africa Summit (2010).

Support has been given to networking between information providers, user networks and centres of excellence in Europe and African Countries, along the priority lines being identified in consultation with the African Union under the '*GMES and Africa*' initiative, with the aim to coordinate better existing GMES research and services activities in Africa. The results of these activities should be the basis for further GMES service calls in the African context.

Priority will also be given to proposals to study the potential for current and foreseen GMES services to provide the building blocks for the EU contribution to GEOSS. Proposals should assess current services and information products against the GEOSS requirements, identify service/data gaps and barriers such as restrictive data use and re-use policies, and suggest actions.

⁶¹ COM(2005) 489 final, 12 October 2005, “EU Strategy for Africa: Towards a Euro-African Pact to Accelerate Africa’s Development”