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**SUMMARY OF THE IMPACT ASSESSMENT**

*Accompanying document to the the*

**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN  
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL  
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

**‘Global Monitoring for Environment and Security (GMES):  
Challenges and Next Steps for the Space Component’**

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{SEC(2009) 1439}  
{SEC(2009) 1440}

# SUMMARY OF THE IMPACT ASSESSMENT

## INTRODUCTION

This Impact Assessment accompanies a Commission Communication on the Space Component of Global Monitoring for Environment and Security (GMES). It was drawn up in consultation with a steering group of Commission services, following a wide-ranging stakeholder consultation carried out by the GMES Bureau. The present report has been analysed by the European Commission's Impact Assessment Board and amended accordingly.

GMES is an Earth observation capacity that makes it possible to manage natural resources more efficiently, and to monitor biodiversity and the state of the oceans and the chemical composition of our atmosphere — important factors for climate change —, to respond better to natural and man-made disasters and to improve border surveillance.

GMES comprises a service component and an observation infrastructure component, the latter consisting of a space infrastructure and in situ infrastructure. Benefits arise from the service component, which in turn depends on the observation data coming from the infrastructure. GMES should therefore be viewed as a complete system. While the 2008 Commission Communication 'GMES: we care for a safer planet'<sup>1</sup> addressed GMES as a whole, this present Communication zooms in on the Space component, with the aim of: (i) facilitating the co-decision procedure on the Commission proposal for a GMES programme and its initial operations in 2011-2013<sup>2</sup> and (ii) preparing the ground for the decisions covering the next financial framework (post-2013).

Space data constitute a key input into the GMES service component. If the flow of space data is interrupted or cut off, certain services cannot be provided. The thematic areas within the GMES service component will rely on access to data from existing Earth observation satellites owned by third parties<sup>3</sup> and space infrastructure developed specifically for GMES. As the EU does not want to duplicate existing capacities in Europe, it was examined to which extent the user requirements compiled by the EU could not be met by existing or planned infrastructure.

This gap analysis helped to define the content of the ESA GMES Space Component Programme, to which the EU contributes financially, and which is concerned with developing satellite missions known as 'the Sentinels'. The first constellations of Sentinels are currently being developed by ESA and include seven satellites (the first two units of Sentinel 1 to 3, the first two units of Sentinel 4 and the Sentinel 5 precursor) plus two instruments to be flown onboard EUMETSAT satellites.

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<sup>1</sup> COM(2008) 748, 11.12.2008.

<sup>2</sup> COM(2009) 223, 20.5.2009.

<sup>3</sup> Including EU Member States, intergovernmental organisations such as ESA and EUMETSAT, non-EU countries and private entities.

## PROBLEM DEFINITION

Once developed, the space infrastructure will have to be exploited and, in due course, renewed with a view to collecting the environmental data for the GMES service component. The problem addressed here is therefore how the following can be managed and financed:

- the exploitation of the initial constellations of Sentinels developed by ESA, after the end of the development phase, and
- renewing the Sentinels, many of which have a life span of around seven years, in parallel to the exploitation mentioned above, with a view to the long-term continuity of data collection.

In its proposal for a Regulation on the GMES Programme and its initial operations 2011-2013<sup>4</sup>, the Commission proposed that the overall financial envelope for GMES initial operations should be EUR 107 million, 40 million of which being for exploiting the Space component.

The financing and management of the exploitation of the Sentinels has been discussed in a number of documents, including the Commission Communication ‘Global monitoring for Environment and Security (GMES): we care for a safer planet’<sup>5</sup>. While it is expected that a future EU Programme should contribute to the sustainability of the space infrastructure, notably in terms of in-orbit availability and operations, no binding decisions on EU funding of Sentinels exploitation was possible, as the period in question goes beyond the current financial framework. A decision on financing the space component therefore needs to be prepared soon, as part of work on the next multiannual financial framework.

ESA Member States have made it clear that the Sentinel infrastructure represents their contribution to the GMES Space Component and that their financial effort is made on the assumption that the EU will take over responsibility for the exploitation and renewal over time of an equivalent infrastructure, under EU funding.<sup>6</sup> The same position has been taken consistently by several EU Member States in the GMES Advisory Council, an experts’ group assisting the Commission in GMES development. It is thus unlikely that, in the absence of EU commitment, an organisation other than the EU would assume responsibility for the GSC beyond 2013. Consequently, the GMES service component as currently conceived would not be viable<sup>7</sup>.

## ANALYSIS OF SUBSIDIARITY

The EU contribution to the exploitation and, eventually, renewing the space infrastructure developed at European level is fully in line with the subsidiarity principle, for the following reason. The responsibility for the exploitation and possibly the renewal of space infrastructure developed with EU and intergovernmental funds cannot be sufficiently achieved by the

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<sup>4</sup> COM(2009) 223, 20.5.2009.

<sup>5</sup> COM(2008) 748, 12.11.2008.

<sup>6</sup> See e.g. the minutes of the 198th meeting of the ESA Council on 15 February 2008, p. 4, and the minutes of the 203rd meeting of the ESA Council on 15 and 16 October 2008, p. 6.

<sup>7</sup> See also recital 12 of the proposal for a GMES Regulation. Although it would be possible to provide some services only on the basis of *in situ* data, or data from missions other than the Sentinels, such services would not be comparable any more to the thematic areas in the GMES service component.

Member States because of the costs incurred. It is precisely for this reason that in the field of space-based observation for operational meteorology, European States have pooled their resources to develop and exploit meteorological satellites under the auspices of the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). European States have also developed demonstrator environmental satellites either through ESA or through national space agencies. They found no way, though, of cooperating on the funding of sustained operational environmental monitoring programmes similar to those in meteorology. Nonetheless the need for such observations is becoming critical, given the increasing political pressure for public authorities to take informed decisions on the environment, security and climate change.

## EU OBJECTIVES

The specific objectives of EU action relating to the GMES space component (i.e. the Sentinels) are to:

- ensure the continuous availability of environmental data collected through a set of space-based sensors as an input for the thematic areas in the GMES service component; through:
  - the continuous exploitation of the Sentinels and accompanying research activities through adequate governance and financing structures;
  - the timely definition, development and procurement actions for renewing the Sentinels as necessary;
- stimulate, by lowering the costs of access to earth observation data, the growth of the Earth Observation downstream sector in terms of jobs, innovation and international competitiveness.

## POLICY OPTIONS

The available policy options are as follows:

- **Option 1:** Option 1 corresponds to the baseline scenario. The EU would not assume responsibility for the exploitation of the Sentinels after the GMES initial operations (2011 – 2013). This means that the EU would not exploit the GSC at all beyond 2013. As no other entity would be willing to finance the totality of the Sentinel exploitation costs, no data collected through the Sentinels would be available for the GMES service component.
- **Option 2:** The EU would finance and manage the exploitation only of the first constellations of Sentinels, but not their renewal. No data from Sentinels will be available beyond the first constellation.
- **Option 3:** The EU would finance and manage (i) the exploitation of the initial constellations of Sentinels, and (ii) the renewal of space infrastructure to ensure sustained observation over time, given that most of the Sentinels currently developed have a nominal lifetime of seven years and that the thematic areas in the GMES service component rely on continuous access to the corresponding data. Decisions on renewal will have to be taken while the initial constellations are in operation.

The options incorporate a number of assumptions. First, exploitation activities will be accompanied by research activities. Secondly, access to data from existing Earth observation satellites owned by third parties is necessary. Thirdly, data produced by the Sentinels will be available under full and open access. Fourthly, no forms of co-financing are assessed for the GSC. As in the case of Galileo<sup>8</sup> and other EU infrastructure programmes, ownership of the Sentinels could be transferred to the EU at no cost, allowing the EU to impose for Sentinel data a full and open access data and information policy. Nevertheless, the Commission will continue to explore whether the development of market opportunities and cost-based user charges might eventually enable the proportion of public investment to be reduced in the long run. Generally speaking, the potential financial effort that can be deployed under the EU budget is not yet known, as priorities and allocations of funding under the new multiannual financial framework (beyond 2013) will come later.

## ANALYSIS OF IMPACTS

Consistent with the focus of the proposed Communication, all options are based on variations in the Space component only, and assume that all other components do not vary.

The options have been analysed both qualitatively and quantitatively. For the quantitative part, a cost-benefit analysis was based on available data. Benefits arising from GMES have been quantified in the study ‘Socio-economic benefits analysis of GMES’ by PriceWaterhouseCoopers (the ‘PWC study’)<sup>9</sup>. It sets out in monetary and present value terms the projected economic benefits (including societal, environmental and other economic benefits) with respect to a baseline scenario without GMES. In the PWC study, GMES benefits have been grouped into three high-level categories:

- **Category 1:** efficiency benefits linked to the use of GMES-related information in implementing or enforcing legislation or policies that are already in place. Nothing more than continuous availability of GMES services (and hence of the GSC) is needed for these benefits to materialise.
- **Category 2:** benefits linked to the availability of more and better information during the policy formulation stage. The result would be better policy making at European, national and regional level, easier and more efficient implementation, and ultimately improved delivery of policy objectives. There is however a built-in delay between the availability of information and the materialisation of the benefits, linked to the policy cycle.
- **Category 3:** as in category 2, but this time at global level, i.e. linked to the signature and implementation of international treaties (e.g. on climate change, desertification and deforestation). As a consequence, there is a much bigger time-lag before they materialise, but at the same time their magnitude is much greater than in the other categories. An example of this category is the contribution that GMES will make to climate change-related policies, through long-term data series on such parameters as sea surface temperature, sea level rise and CO<sub>2</sub> distribution.

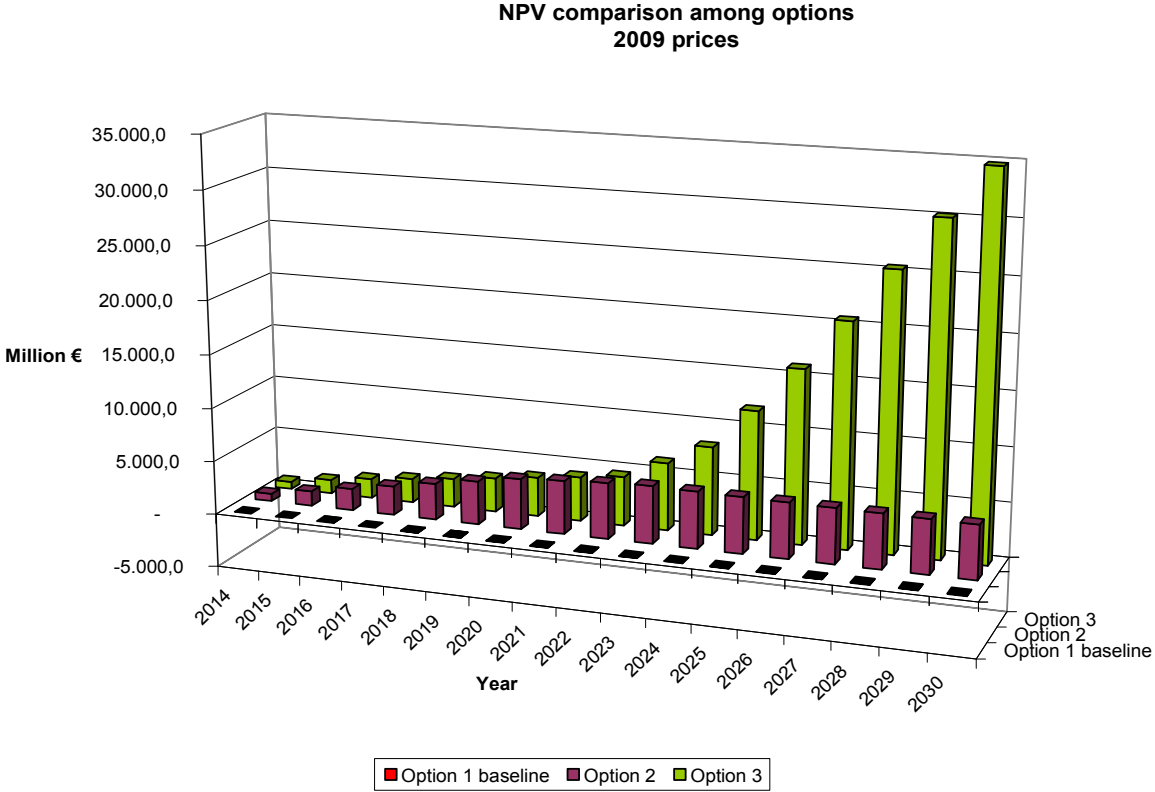
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<sup>8</sup> See Article 8 of Regulation (EC) No 683/2008 of the European Parliament and of the Council of 9 July 2008 on the further implementation of the European satellite navigation programmes (EGNOS and Galileo) (OJ L 196, 24.7.2008, p. 1).

<sup>9</sup> Available at [http://esamultimedia.esa.int/docs/GMES/261006\\_GMES\\_D10\\_final.pdf](http://esamultimedia.esa.int/docs/GMES/261006_GMES_D10_final.pdf).

On the cost side, the costs of both the service component and the space component were taken into consideration. The latter are based on the ESA Long-term scenario, a cost assessment prepared by the ESA executive and recognised as a basis for cost estimations by the 6<sup>th</sup> Space Council<sup>10</sup>.

In quantitative terms, the options can be compared most easily on the strength of their generated Net Present Values in the period under consideration — see the figure below<sup>11</sup>.



Taking additional account of the impacts not included in the PWC study and therefore not in the above graph, the following comparison can be made (keeping in mind that costs refer to the GSC, while benefits arise from the whole GMES system):

<sup>10</sup> Council Resolution on ‘The contribution of space innovation and competitiveness in the context of the European Economic Recovery Plan, and further steps’ — 10500/09 of 29 May 2009.

<sup>11</sup> The figure shows, for each option, the cumulative net present value (in 2009) of a stream of payments and benefits starting in 2014 and ending in year X, where X can take on any value between 2014 and 2030.

|                            | <b>Effectiveness</b>  | <b>Efficiency</b>   | <b>Coherence</b>   |
|----------------------------|---|---|--|
| <b>Option 1 (baseline)</b> | <p>Does not achieve any of the objectives.</p> <p>Impact on the EU budget, however, would be zero, which means that funds would be available for other initiatives and programmes.</p>                              | <p>Some (low) costs to achieve no benefits (storage of developed satellites).</p>   | <p>No benefits therefore no trade-offs. Strongly inconsistent with earlier EU efforts to develop the GSC and with the positioning of the EU within the global Earth Observation EU over the past 10 years.</p> <p>Would be coherent only in the event of a major shift of policy priorities in the EU, i.e. relegating climate change and citizens' security down the political agenda.</p>  |
| <b>Option 2</b>            | <p>Achieves the objectives of provision of information services through sustainable infrastructure only for a limited period (up to 2020). Does not achieve objective related to sustainable downstream growth.</p> | <p>An EU budget contribution to the GSC of approximately €200m/year on average in the next financial framework would enable benefits of between €400m and 900m per year to be achieved until 2022. After 2020, benefits would drop to about €130m/year, approximately equal to costs in the following period.</p> <p>This option has important built-in cost inefficiencies linked to the 'stop-and-go approach'. The EU would not benefit from economies of scale in the production of recurrent satellite units, which are important in the space sector.</p> | <p>The impact on EU budget, although higher than in the baseline, is likely to be offset by limited environmental and economic benefits.</p> <p>Policy coherence would be dependent on the capacity of the EU and the rest of the European EO EU to bridge the gap after the lifetime of the first generation.</p> <p>Inconsistent with EU declared ambitions to lead in the climate change arena (in any event climate change will necessitate long-term monitoring activities).</p>  |
| <b>Option 3</b>            | <p>Achieves all policy objectives.</p>  | <p>An EU budget contribution to the GSC of approximately €430m/year on average in the next financial framework would enable benefits of slightly less than €1bn/year to be delivered until 2022, then peaking at more than €5bn/year as of 2027.</p>  | <p>The longer-term investment, higher than in the baseline, would generate positive trade-offs in political priority areas, such as climate change. Consistent with political agenda and EU objectives.</p> <p>Potential for strategic benefits for the EU as global player.</p> <p>The requisite budget and corresponding shift from research to operation would require GMES to be included among the financing priorities in the next EU financial framework and might imply corresponding adjustments in other policy areas.</p> |

## **MONITORING AND EVALUATION**

The Communication itself will not directly result in new activities being financed through the EU budget over and above what has already been decided or proposed through FP7, preparatory actions and GMES initial operations up to 2013. Should the next Commission choose one of the options requiring the exploitation of the Sentinels post-2014, the appropriate legislative proposal would be drawn up in line with applicable rules, in particular regarding the preparation of the next multiannual financial framework and impact assessments.

In line with standard Commission practice, evaluation will be in three phases (ex ante, interim and ex post). The interim and ex post evaluation will assess whether the operational objectives are being / have been met. Additionally, the Commission will evaluate the progress of exploitation activities before any major decision is taken, including the decision on renewing the Sentinels. This decision may have to be taken before the start of one or more financial frameworks due to the long development cycles for satellites. In each policy cycle, decisions will have to be informed by an update of the cost-benefit case for the various options and a broad stakeholders' consultation on the effectiveness and usefulness of the system.