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Evaluation on the European earth monitoring programme (GMES) and its
Initial Operations (2011 to 2013)

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

**Ex-post Evaluation on the European earth monitoring programme (GMES) and its
Initial Operations (2011 to 2013)**

{SWD(2016) 262 final}

1. INTRODUCTION

This report highlights the key findings of the ex-post evaluation of the European Earth monitoring programme GMES and its Initial Operations (GIO), 2011-2013. This final evaluation was carried out on behalf of the Commission to respond to its obligation imposed in Article 14.2 of the GIO Regulation¹, that "*the Commission shall submit to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions an interim evaluation report by 31 December 2012 and an ex-post evaluation report by 31 December 2015.*"

This report is accompanied by a staff working document providing more details. The Final Report of the contractor, on which the evaluation is based, is available at the OP (n. ET 0116321ENN)

2. BACKGROUND

The European Earth monitoring programme GMES GIO (renamed Copernicus in 2014) is a flagship programme of the European Union space activities in line with article 189 of the Treaty on the Functioning of the European Union enabling the EU to conduct space related activities. GMES GIO was also one of the programmes to be delivered under the Europe 2020 strategy for smart, sustainable and inclusive growth and it was included in the industrial policy initiative, given its benefits to a wide range of Union policies.

In order to respond to ever growing challenges at global level Europe needs a well-coordinated and reliable Earth observation system of its own. GMES GIO was that system.

GMES GIO was a long-term programme built on partnerships between the Union, the Member States, the European Space Agency (ESA) and other relevant European stakeholders. It was also a programme where the EU could play a more effective role than individual Member States in international cooperation through bilateral collaborations with other space faring nations or participation to global efforts in the field of Earth Observation (e.g. the Group on Earth Observations).

GMES GIO was delivering a better understanding of how and in what way our planet may be changing, and how this might influence our daily lives. It ensured an uninterrupted provision of accurate and reliable data and information on environmental issues, climate change and security matters to decision makers in the EU and its Member States. This information is needed by public authorities in the Member States and regions who are in charge of the policy conception and implementation. The Commission also needs this information for evidence based policy making and monitoring. GMES GIO was also contributing to economic stability and growth by boosting commercial applications in many different sectors through full and open access to Earth observation data and information services.

¹ REGULATION (EU) No 911/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 September 2010 on the European Earth monitoring programme (GMES) and its initial operations (2011 to 2013)

Since 1998 and until 2013, funding has been allocated to GMES by the EU and the European Space Agency (ESA) mainly for development activities, in the framework of research projects. The GIO Regulation presented a key step in the programme in allocating first operational funding for the transition to initial operations in the period 2011-2013.

The aforementioned GIO Regulation (Article 2) explains that the programme is building on activities funded through the 7th Research Framework Programme (FP7) and the GMES Space Component programme of the European Space Agency (ESA). These three elements are complementary and depend mutually on each other. The regulation further sets out the scope of the overall GMES GIO programme, which "*shall comprise the following*:"

- (a) *a service component ensuring access to information in support of the following areas:*
 - *atmosphere monitoring,*
 - *climate change monitoring in support of adaptation and mitigation policies,*
 - *emergency management,*
 - *land monitoring,*
 - *marine environment monitoring,*
 - *security;*
- (b) *a space component ensuring sustainable spaceborne observations for the service areas referred to in point (a);*
- (c) *an in-situ component ensuring observations through airborne, seaborne and ground-based installations for the service areas referred to in point (a)."*

A total budget of EUR 107 million was initially allocated to activities under this regulation (see Article 8). Compared to the budgets made available for the GMES Space component under FP7 (EUR 715 million) and ESA's GMES Space Component programme (EUR 1.6 billion), it is clear that the activities funded through GIO could only address a limited sub-set of the overall scope of the GMES programme as defined in Article 2. Nevertheless, the establishment of an even small operational budget line for GIO was an important signal in the preparation of what later became the Copernicus programme.

This fact has been acknowledged in the regulation in Article 3, in stating that the operational activities "*may comprise operational actions in the following fields*:"

1. *the service areas referred to in Article 2(2)(a);*
2. *measures to support take-up of services by users;*
3. *data access;*
4. *support for in-situ data collection;*
5. *the GMES space component."*

The exact scope of the activities carried out under the GIO programme were then defined in three Annual Work Programmes and approved by Member States in the GMES Committee.

3. MAIN FINDINGS OF THE EVALUATIONS

This document is based on the final evaluation of the Global Monitoring for Environment and Security (GMES) Initial Operations (GIO) programme (2011-2013), part of a wider evaluation, covering three related elements, namely the GMES Preparatory Actions, as well as the FP7-funded parts of the GMES Space Component as detailed in the accompanying Staff Working Document. The evaluation had two overarching objectives, which were: (i) to evaluate the relevance, effectiveness, coherence, efficiency, sustainability and European added value of the GMES GIO and (ii) to outline the overall societal value, in terms of the balance between the investments made in space infrastructures and services, and the value of data gathered for the selected services.

The evaluation was carried out by an external contractor who adopted a mixed methodology including desk research, stakeholder interview and a targeted consultation. The data collection included a desk-based review of existing documents (e.g. EU regulations, interim evaluations, GIO work programmes, administrative data, usage statistics), an online questionnaire directed to all categories of stakeholders, a small industry survey directed specifically to the contractors that 'built' the GMES space component and a programme of targeted, semi-structured interviews with relevant individuals among key stakeholder groups. More than 400 named individuals were approached for an interview or a questionnaire and 170 were consulted during the course of the study. The online consultation was however advertised widely through DG GROW, ESA, EEA and the JRC, and was open to the public. The stakeholder analysis emphasised four core groups: Policy lead and other key parties involved in the governance of the initiative; GMES service operators; GMES service users, in the public and private sectors; Industrialists that helped build the infrastructure. The interview and the consultation produced rather small number of responses, reflecting the particular nature of GMES and the small population of people and organisations with knowledge of the activities. The data analysed were limited to selected services, given that for all Copernicus services data had to be bought from existing National space missions until the first dedicated satellite (Sentinel 1) has been launched in April 2014, when the Copernicus programme replaced GIO.

Five years after the publication of the GMES GIO regulation (2010), the GMES programme, as well as each of its six services remains important to serving the information needs of Europe's policy makers and public services. In addition, new policy priorities, such as climate change or migration arise and may call for new earth observation capacities or earth observation-based services.

The GIO programme was broadly effective in contributing to its stated objectives, detailed in the annex of the Regulation No 911/2010. It had a positive impact on the build-up of the present Copernicus Programme, establishing two out of the six services, coordinating access to other space and in situ data, and contributing to developing, building, launching and operating the "Sentinels" satellites. However, the limited available funds did not allow the implementation of the other four services and the programme fell short on the objectives of user uptake and the development of the downstream sector. The majority of consulted stakeholders view this whole domain as a work-in-progress, so while most people are reasonably satisfied with the achievements of the GMES GIO initiative, there are numerous points where more needed to be done.

There have been many concrete operational successes as regards the GIO programme's contributions to EU policy, with the growing use of the Land Monitoring (LMS) and the Emergency Management (EMS) services by policy makers and public agencies in the

agriculture, environment and climate change areas. The EMS services have been used to support the information requirements of various government agencies around for example flooding, earthquakes, fires and other environmental hazards. The GIO programme has significantly broadened its user base and achieved an increased uptake in use of its Land and Emergency services. The space component provided data for the Initial Operation of services from GMES Contributing Missions, bought from commercial missions or contributed freely from public missions. As regards the Sentinel satellites, the programme fulfilled its objectives and underpinned the launch of the successor Copernicus programme, so also in that sense the GIO programme is considered as successful.

The required outputs were delivered by the programme at reasonable and proportionate costs.. The GMES Space Component produced substantial direct benefits for Europe's space industry, with more than 230 suppliers benefitting from €30M in ESA contracts, including 48 SMEs. By using generic industrial statistics to estimate the spill over effects for the investments, while keeping the estimates in the lower bound, the total societal benefits produced by the GMES infrastructure reach up to €3 billion. Wider socio-economic benefits are difficult to calculate at this stage, for instance the extent to which the GMES initial operations have enabled savings to be made through improved early warnings or better emergency response. However, given the scale of the economic disruption, even a 1% contribution across all types of emergencies, would produce annual savings of tens of millions, which is substantially more than the annual cost of running the whole Emergency Service (4-5 million/year).

The efficiency with which the GIO programme was created and service continuity assured is counterbalanced by the less positive support to take-up, access to data from contributing missions, support for downstream applications and coordination of data. This reflects on one side a priority choice for relevant financial commitments to the space component over the development of the services . The programme was however properly managed but under-resourced to devote more input and resources to solving data related obstacles or to launching extended services for particular user groups or innovative procurement strategies.

GMES also provides substantial added value through the provision of harmonised data and technology applied across EU Member States for cross-border issues and in aggregating the harmonised data reported by Member States up to EU scale in a harmonised manner. There is real added value for a wide set of European policies in accessing a homogeneous database and derived products for the whole of the EU and beyond.

The programme had positive effects on intra-EU and international cooperation and enabled the creation of a permanent European earth monitoring system, in line with the Commission's Communication on Europe 2020, which saw GMES as a key component of European space policy and a means by which to help address key global challenges. The initiative provides high levels of European Added Value. No single EU country could have created a similar system on its own and national programmes naturally fulfil only a limited number of functions at lower levels of functionality. GMES offered higher levels of assured continuity of service, as compared with anything available worldwide: a full-scale, permanent coverage of earth observation sensors.

GIO demonstrated its usefulness through its support to Member States during various extreme flood events (e.g. in Poland) or forest fires, for data on crop yield forecasting, for

the monitoring of bio-diversity, urban development, water basins, rivers, lakes, ice-caps and much more.

Turning to the question of the sustainability of the changes brought about by the GMES GIO programme, the evaluation suggests there will be a legacy in terms of better policy choices or enhanced technological capabilities. However, the various services are akin to any utility, which is to say they are valuable while they are running; turn them off and the decision making and operational processes they supported will quickly need to revert to alternative inputs, or be degraded. Continuity of service provision is thus seen as a necessity. For the manufacturers and technical services companies that have built the infrastructure and delivered much of the services component, the contracts will have quite a lasting effect, conferring a competitive advantage that people anticipate may last for five years or more. The opportunities for value-added resellers and downstream businesses have yet to be crystallised in any serious scale.

4. MAIN RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The Regulation establishing the Copernicus programme (2013) is being implemented, and there is both a commitment to fund the Copernicus services and to complete investments in the Copernicus space infrastructure. The main concern of the GIO stakeholders, namely the sustainability of the GIO programme has been addressed by the creation of the Copernicus programme. The evaluators nevertheless underline several aspects where continued or further attention may still be worthwhile.

- *"Strengthen the user orientation of the core services, with explicit strategies that are driven by the information and functional needs of key market segments, and which are a little less in thrall to the technological ambitions of the space sector."*

In 2015 the Commission has launched a broad process for the capture of user requirements both, for current and future requirements. A part of their implementation, the Copernicus services are to carry out user satisfaction surveys which will in particular help to adapt to user needs at the working level.

- *"Continue to invest in user uptake, within both institutional and private sector client groups, and in particular strengthen the development of substantial impact case studies, which will showcase benefits."*

A framework contract and a first specific contract to increase user uptake has been signed and will allow a more systematic and sustainable approach to these aspects. Complementing service-specific measures have already been started by the Copernicus services.

- *"Increase interaction with Member States and regional authorities within the governance structures (and consultative processes) of the core services, in order to achieve improved coordination, promote greater synergy and support de-duplication of efforts among the territorial levels and increased integration of space and in-situ derived data, leveraging the INSPIRE process. Increased international cooperation and standardisation would be valuable too."*

Besides the formal interaction with the Member States as part of the programme committee, specific groups have been created which involve the Member States, as well as the implementing entities ESA, EUMETSAT, EEA, FRONTEX, EMSA, ECMWF, Mercator and soon the EUSC with the aim to harmonise and exploit all available assets to the maximum extent. International cooperation is an integral part of the Copernicus programme.

- *"Continue to support innovation in both the core services and their platforms, looking to make greater use of data linking (and big data more generally). The switch to a more operational funding vehicle is strongly positive, however, there is still an argument to continue to support more exploratory work and thinking about the third generation programme, both services and infrastructure. As such it would be helpful to retain some kind of research budget for this riskier blue skies activity, perhaps through Horizon 2020 and its successor."*

Significantly improved data linking and big data capabilities are expected from the Integrated Ground Segment. Further, activities of "applied innovation" are contracted by the Copernicus services to address specific, focussed short-term innovation needs. In parallel, the Copernicus programme gives guidance documents to the EU research programme managers, to drive the respective Horizon 2020 topics on space technology evolution, or Copernicus service evolution.

- *"Increase substantially the support available to develop downstream applications, including universal and easy access to Copernicus satellites and in-situ data and focusing in particular on incentives for smaller businesses, and ensure there is capacity / incentives for the public institutions at the heart of the core services to give access to those services / data, to enable research and development work, prototyping and demonstrators"*

The development of the downstream sector is a central element of the programme's uptake activities. For a number of reasons it is legally difficult and in most cases not even effective to directly fund specific local or national earth observations applications. Some funding accessible to those, specifically SMEs, exist in different programmes of Horizon 2020. Specific measures in Horizon 2020 aim at the public sector users. A survey of EU legal texts in the various policy domains has been conducted and is currently being analysed to identify barriers or obstacles for the uptake of Copernicus by public users.

- Beyond those recommendations, the access to Member States reference data and the related use conditions remains an obstacle for a better uptake. Efforts to create EU wide open geospatial reference data should be continued.