Audit preview
Information on an upcoming audit

Maximising the benefits of the EU’s space assets

January 2020
Since the early 2000s, the Commission has had a space strategy and space policy, designed together with the European Space Agency. A common framework for funding and managing space activities followed in 2007. The EU’s three flagship space programmes – Copernicus, EGNOS and Galileo – guarantee the EU access to critical navigation and earth observation technology, but the deployment and operation of these space assets entails significant long-term costs for the EU budget.

With the EU’s space infrastructure now well advanced, the Commission is taking action, as part of its 2016 Space Strategy for Europe, to promote the use of the services and data these assets provide, in order to maximise the benefits of this public investment for citizens and the wider economy.

In view of this, the European Court of Auditors is currently conducting an audit to assess whether the Commission’s action to promote the uptake of the services provided by the EU’s main space programmes, Copernicus and Galileo, are effective. In particular, we will examine whether its activities have actually helped increase service uptake, whether the regulatory framework is favourable to this objective, and whether a well-designed strategy and a monitoring system are in place.

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Background

Since its foundation in 1975, the European Space Agency (ESA), an intergovernmental organisation supported by 22 Member States, has been in charge of developing Europe’s space capabilities. At the turn of the century, the European Commission established links with the ESA, devising a joint space strategy in 2000 and a space policy in 2003.

In 2004, the EU set up a supervisory authority to monitoring the new activities of the European Global Navigation Satellite System (GNSS) and to assist the Commission in GNSS matters.

In 2007, the EU, the ESA and their Member States created a common framework for funding and managing space activities and adopted strategic guidelines for Europe’s future activities in space. The objective was to coordinate civil space programmes more effectively, thereby ensuring better value for money.

Currently, the EU has three flagship space programmes (see Figure 1):

— **Copernicus** – the world’s largest earth observation programme. Operational since 2014, the programme currently has seven satellites (“Sentinels”) in orbit. It aims to provide accurate information from multiple sources, including satellites for use in the environment, agriculture, climate, security and maritime surveillance fields.

— **EGNOS** – the European Geostationary Navigation Overlay Service. Since 2009, this system has been supplementing the Global Positioning System (GPS) by reporting on the accuracy of its data and sending out corrections for aviation, maritime and land-based navigational use.

— **Galileo** – Europe’s global navigation satellite system (GNSS). Launched in 1999, the programme aims to provide very precise navigation services. Some services have been provided since 2016, with 26 satellites now in orbit. Galileo will achieve full operational capacity after the deployment of four further satellites planned for 2020.
Development, deployment and operation of the EU’s space assets entails significant long-term costs for the EU budget. From the programmes’ launch until the end of 2020, total EU expenditure will amount to around €19 billion. Galileo is the most expensive programme with a total budget of around €11 billion, followed by Copernicus with more than €5 billion financed from the EU budget and, lastly, EGNOS, set to cost more than €2 billion by 2020.\(^3\)

In the 2021-2027 multiannual financial framework (MFF), the operation and further development of the EU’s space assets will require considerable investment. To this end, the Commission has proposed a budget of €15.5 billion, which should ensure the continuity and evolution of services.\(^4\) Provided the MFF is adopted by the Council and European Parliament, expenditure earmarked for the three space programmes may increase by 26 % compared with the current MFF.

The primary justification for all three flagship space programmes is the need to guarantee the EU independent access to critical navigation and earth observation technology.

The rapidly growing global demand for earth observation data are strong economic arguments for investing in satellite-based earth observation. Similarly, the demand for highly accurate satellite navigation systems is increasing and provides significant potential for the development of new products and services. The Commission thus
expects the programmes to boost technological innovation and productivity, and to create jobs – not only in the space industry itself but also in other economic sectors making use of the data and services provided.

The space programmes’ value chain distinguishes between upstream and downstream activities: upstream we find activities leading to the development of space infrastructure, including research, the production of satellites and their deployment in orbit, the construction of ground stations and the day-to-day operation of this infrastructure. Downstream we find activities such as:

— the transformation and processing of raw data,
— the manufacture of GNSS-enabled devices, or
— the commercial or non-commercial activities of end users of earth observation-based products, GNSS services or both.

*Figure 2* depicts the value chain of the EU’s space programmes.

Wide use of the services provided by the EU’s space assets in Member States would therefore help create a single market for such data and services. The benefits of this would include:

— the creation of space-related jobs;
— growth of the downstream market with the development of new technologies, or technological transfers to other sectors (such as agriculture, mobility and transport), leading to productivity gains;
— better policies thanks to more accurate and complete earth observation data, for example in the environmental or security sector.

Back in 2013, the Commission estimated that Galileo and EGNOS could generate economic and social benefits worth around €90 billion over the next 20 years. A 2017 study put the overall benefits that the Copernicus programme would yield by 2035 at between €71 billion and €134 billion, of which between €60 and €123 billion would be achieved downstream and benefit end users\(^5\). Therefore, the Commission estimates that the impact of the services provided by the EU’s space assets on economic growth and employment in the EU will eventually outweigh the substantial public investment\(^5\).
Challenges and opportunities

Copernicus is currently the largest provider of high-quality earth observation data in the world. New Sentinel missions are currently being built and further concepts assessed to respond to needs. Galileo provides more accurate signals than any other GNSS currently available. However, the EU is not the only provider of such services. The United States deployed its Landsat earth observation satellites back in the 1970s and GPS in the 1980s, and made the services available to everybody. These systems therefore benefit from first-mover advantages, resulting in high market penetration\(^7\). Other countries such as China, Russia or India also operate their own global satellite navigation and/or earth observation systems. Some of these may soon be able to match the quality of services provided by the EU’s satellites.

In view of these challenges, and the large public investment involved in manufacturing, deploying and operating the EU’s space infrastructure, the Commission is laying
emphasis on the need to promote a strong uptake of EU space services by both public and private sector users.

EU action aimed at promoting the uptake of services

Under the current multiannual financial framework (2014-2020), the budget for EU activities to promote the uptake of services through grants or service contracts, partly in cooperation with national and international partners, is around €260 million. This budget is shared among a number of initiatives or programmes, which can roughly be divided into two categories (see Table):

Table – EU-funded activities for promoting uptake of space services

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples for EU supported activity</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make space data available to users</td>
<td>Funding the deployment of cloud-based online platforms</td>
<td>Facilitate centralised access to Copernicus satellite data and information</td>
</tr>
<tr>
<td>Encourage user or market uptake</td>
<td>Framework Partnership Agreement</td>
<td>Fund action in cooperation with national partners that will increase the use of Copernicus data and support innovative businesses and start-ups in developing innovative products and applications</td>
</tr>
<tr>
<td></td>
<td>Horizon 2020 Programme</td>
<td>Support the development of innovative solutions using Galileo positioning data</td>
</tr>
<tr>
<td></td>
<td>Copernicus Incubation Programme</td>
<td>Boost the use of Copernicus data and/or services, and support the most innovative and promising business applications</td>
</tr>
</tbody>
</table>

Source: ECA.

Aside from via the direct public funding of action under the space programmes’ budget, the uptake of services may also be supported using financial tools. At the EU level, there are currently no dedicated funding instruments available for space companies or companies interested in the uptake of space services. However, many actors in the downstream sector are small and medium-sized enterprises (SMEs), which are potentially eligible for support under the EU’s COSME programme. In the framework of its Horizon 2020 programme, the Commission also set up the InnovFin Space Equity Pilot (ISEP) under the Single EU Equity Financial Instrument. ISEP is a pilot space fund
backed by the European Investment Fund. It aims to leverage a contribution from the EU budget in 2018-2020 to help improve access to risk finance for innovative enterprises in the space domain.

Space-related projects may also be eligible for funding from the European Fund for Strategic Investments (EFSI).

Within the limits of its legislative powers, the Commission has also taken regulatory action to ensure that critical safety applications in the EU are compatible with positioning services provided by EU space programmes. Examples are the alert systems in passenger cars ("eCall"), which use Galileo and EGNOS signals to enable rescue services to locate a car in the event of an accident, smart tachographs, and emergency communication from smartphones.

It is not only the Commission that actively supports the uptake of services by the EU’s space assets. The ESA organises and finances, from its own budget, business incubation centres and programmes aimed at encouraging entrepreneurs to turn space-related business ideas into commercial companies. Under their national space programmes, or as part of other programmes supporting innovation, individual Member States may also seek to facilitate access to space-related data and encourage the uptake of space services. Typically, these include incentives to use the services provided by national satellites as well as the EU’s space assets.

Roles and responsibilities

The Commission has overall responsibility for managing the EU’s space programmes. Within the Commission, the new Directorate-General for Defence, Industry and Space now designs space policy and oversees programme implementation. Prior to this, responsibility was held by the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW).

For Galileo and EGNOS, responsibility for the deployment of satellites and ground stations and the provision of services is split between the ESA and the European Global Navigation Satellites Agency (GSA), an EU agency. The ESA is responsible for the acquisition and deployment of satellites in orbit. The GSA is in charge of systems operations and for promoting service uptake (see Figure 3).
The governance of Copernicus is more complex, because the programme is broader in scope. The Commission is in charge of overall coordination of the programme, develops the strategy to promote the uptake of Copernicus services and funds certain promotion activities. The acquisition and operation of infrastructures and the use of services have been delegated to a number of entities.

The ESA procures the satellites and deploys them in orbit. It shares responsibility for their operation with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) – another non-EU international organisation. Member States and other foreign partners are responsible for developing and maintaining the ground facilities collecting ancillary data from land-based, sea-borne and air-borne monitoring systems (“in-situ component”). The European Environment Agency (EEA) coordinates these activities.

The “services component” of Copernicus consists of six core areas: land, marine, atmosphere, climate change, emergency management and security. For each of these thematic areas, the Commission relies on various EU and non-EU entities, which, in their respective domains, are responsible for the technical management of services, including training, promotion and user uptake. These entities are: the EEA, Mercator Océan International (a private non-profit company active in ocean observation), the European Centre for Medium-Range Weather Forecasts (ECMWF), the EU Joint Research Centre (JRC), the European Maritime Safety Agency (EMSA), the EU Satellite Centre (SatCen) and FRONTEX, the EU’s Border and Coast Guard Agency.
Focus of the audit

In the audit on space assets, we will examine whether the Commission’s approach in promoting the services provided by the EU’s main space programmes (Copernicus and Galileo) has proven effective so far. In particular, we will examine whether:

— the Commission has devised a well-designed and comprehensive strategy, including the most effective financial tools, to promote the uptake of services provided by Copernicus and Galileo;

— the Commission’s activities have been effective in boosting the uptake of the services provided by Copernicus and Galileo in their initial phase of operation;

— the Commission has set up a regulatory framework that facilitates the uptake of the services provided by the EU’s space assets;

— the Commission has set up a proper monitoring system to assess the results achieved in promoting the uptake of services provided by Copernicus and Galileo.

The above underlying issues, which are the focus of our upcoming audit, should not be regarded as audit observations, conclusions or recommendations.
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The authority later became the European Global Navigation Satellites Agency (GSA).


Galileo and EGNOS are fully financed by the EU budget. Copernicus is an EU project which is financed two-third from the EU budget and one-third by the ESA and other third parties.


GPS currently has a lead over GNSS, with an estimated 4 billion users worldwide. The Commission estimates that there are currently 700 million devices enabled to use Galileo signals.


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