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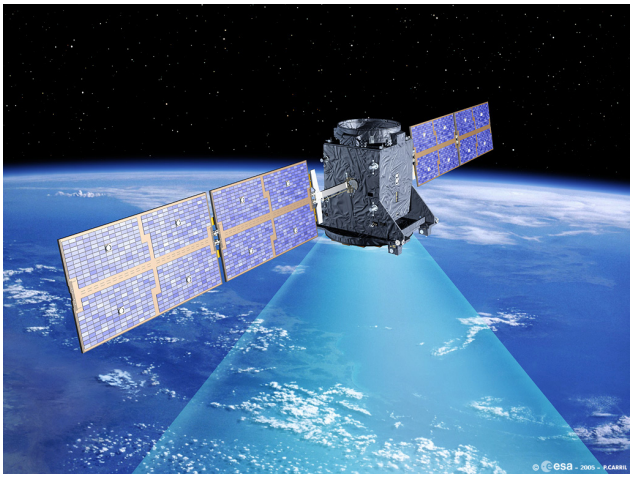
Towards an EU industrial policy for space

SUMMARY *The European space industry occupies a strategic niche in the EU economy. The development of a new EU space industrial policy can support innovation and efficiency in the space industry, while creating new opportunities for jobs and growth in other parts of the economy.*

An effective regulatory framework can foster new markets in commercial spaceflight and the re-use of space-based data. Continuing research and development will help industry stay at the leading edge of technology as well as to develop new applications. Effective procurement policies and increased standardisation can facilitate the participation of small and medium-sized enterprises in the space industry.

The EU needs to guarantee its independence in terms of critical technologies and launch capacity as well as ensuring the availability of radio spectrum for space use. With growing international competition, cost-efficiency will increasingly become important, and trade in space goods and services will be a priority in terms of international agreements.

Since the entry into force of the Lisbon Treaty, space has become an EU policy, with responsibility shared with the Member States. The European Commission (EC) is proposing to develop a space industrial policy to boost competitiveness and increase economic growth.



Artist's impression, Giove-a satellite © ESA, 2005

In this briefing:

The space industry

The space industry is a niche sector in the worldwide economy. It is considered to include 'upstream' activities such as space-related research and development (R&D), manufacturing, satellite launch and ground services, and (sometimes) 'mid-stream' activities such as the operation of satellite services and the supply of raw data. It attracts great interest because of its potential to stimulate technological innovation, to create efficiencies in public and commercial services and to generate growth and employment through new and improved products and services in a whole range of 'downstream' industrial sectors.

The main space applications are satellite broadcasting; navigation and positioning services; telecommunications including satellite broadband; and Earth observation (EO) services (formerly referred to as remote sensing).

The EU space industry

Eurospace[1] reports that in 2012 the European space manufacturing industry generated more than €6.5 billion a year in final sales, about one-third of world output in the space industry. More than half of 2012 sales (€3.4 billion) were to institutional programmes sponsored by European governments; of these institutional sales,

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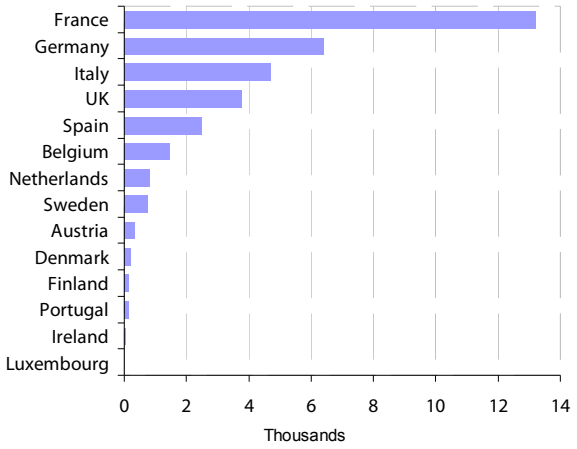
two thirds were to the European Space Agency (ESA). Military system sales were €636 million, a decline of 25% from 2011. Exports outside Europe (almost exclusively telecommunications systems) represented €1.3 billion or 20% of total sales.

In 2012, the space manufacturing industry employed the equivalent of 34 500 people full-time in EU Member States (MS), an increase of roughly a fifth since 2006. A few large companies dominate this sector: in Europe, 57% of employees work for the two largest groups, and small and medium-sized enterprises (SMEs) account for only 3% to 8% of total employment.

Fig. 1 - EU space manufacturing employees (FTE), 2012



Source: Eurospace, 2013

Satellite operations ('midstream services') accounted in 2009 for more than 4 000 direct employees and €3 billion in turnover, with half of this coming from exports.

The EU space industry, like space industries elsewhere, depends largely on public funding, and involves high technical and financial risks. It faces significant challenges, including low public investment compared to countries like the United States (which spends roughly ten times as much as Europe). It also faces increasing competition in commercial markets from emerging space-faring nations such as China and India, as well as from private US companies.

An EU industrial policy for space could help to overcome these challenges by supporting a strong and broad industrial base, establishing a coherent regulatory framework, encouraging cost-efficiency, guaranteeing European non-dependence in space technologies and stimulating new markets for public and commercial space-based products and services.

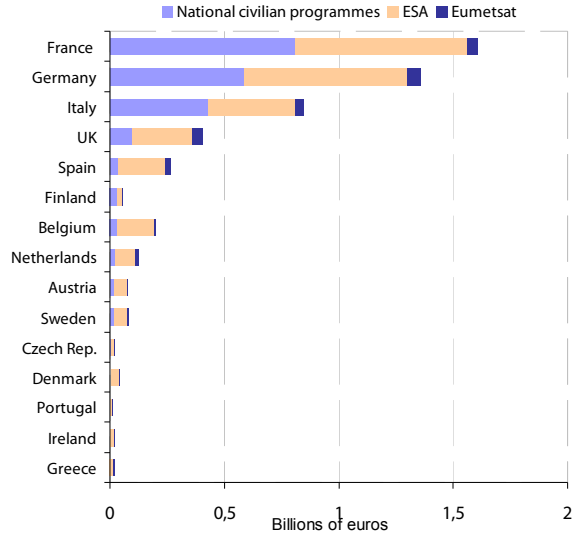
Current EU framework

Space activities in the EU are pursued by three groups of public bodies[2]:

Member States

A number of MS have space activities at national level, usually managed by a national space agency. Whilst MS are interested in military as well as civilian use of space technology, military investments remain limited.

Fig. 2 - Space funding of selected MS, 2011



Source: European Space Policy Institute, 2012

European Space Agency (ESA)

The European Space Agency (ESA) is an intergovernmental organisation of 20 countries, namely the EU-15 plus Czech Republic, Poland and Romania, as well as Norway and Switzerland. Some other MS (Hungary, Estonia, Slovenia) as well as foreign countries (Canada) formally cooperate with ESA. The agency aims to promote the peaceful use of space research, technology and applications. It offers a high level of technical skills, experience and expertise in space technology and operates

various centres in MS. ESA programmes are either mandatory (all members must contribute in proportion to their respective gross national products) or optional (each decides the extent of its participation).

European Union

The EU is funder and owner of two major space programmes:

- A programme for global navigation, positioning and time synchronisation services called Galileo, and its precursor, the European Geostationary Navigation Overlay Service (EGNOS)
- An Earth observation (EO) programme called Global Monitoring for Environment and Security (GMES), to be known as Copernicus in the future.

Governance

The EU and ESA cooperate through the annual Space Council (a joint meeting of ESA and the EU at ministerial level). In 2003 the European Commission (EC) and ESA negotiated a framework agreement on cooperation. ESA concentrates on space launches, science, exploration and human space flight while the EU focuses on space applications and coordination of the European space policy. ESA serves as an implementing agency for the Galileo and Copernicus programmes.

Nevertheless, in the words of one expert, there remain 'two captains on the European spaceship'. The 2007 European Space Policy and a Communication from the EC in 2012 highlighted differences between ESA and the EU in terms of policy approaches, political accountability, legal processes, financial rules and security and defence concerns, as well as in the membership of the two organisations.

Copernicus

In May 2013, the Commission adopted a funding proposal for the Copernicus programme (formerly GMES) for the period 2014-2020. The proposal aims to provide EO data services for use by the public sector in the areas of transport, environment, civil protection, energy and humanitarian aid. It would provide €3.8 billion in funding over the course of the programme and proposes EU ownership of major Copernicus assets with the possibility for the EC to assign implementation to one or more EU agencies or bodies. The EO data from Copernicus will be made available on a full, open and free-of-charge basis.

Various reforms have been proposed, including bringing the ESA under EU authority as an agency; the EU becoming a member of ESA; and some type of improved cooperation under the *status quo*, allowing ESA to serve as the executive arm of the EU for space while preserving its technical and managerial competence. EU MS have different views on the best way forward[3].

Legal framework

With Article 189 TFEU, the Lisbon Treaty introduced a new shared competence in space for the EU and Member States (MS), while excluding any harmonisation of national policies.

In early 2013, the European Commission for the first time set out its priorities for a specific EU industrial policy for space. Its Communication proposes a number of ways to stimulate economic growth by enabling new markets, building up the industrial base, ensuring non-dependence in space technology and increasing competitiveness.

Council's initial reaction

In May 2013, the Competitiveness Council gave what one observer has characterised as a 'lukewarm reception' to the EC's communication on space industrial policy. For example, where the EC called for an EU policy on launchers to ensure European access to space, Council asked for more study of the issue (France and Germany have differing views on the best approach).

Council did endorse a needs assessment of regulations for the suborbital flight market and urged special consideration for the space industry in trade negotiations. It also supported possible improvements in the procurement process and encouraged all European stakeholders to use European launchers.

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Developing new markets

Research and development

R&D is considered essential to ensure that Europe's technologies and services remain competitive and at the leading edge. Space research has been allocated increasing amounts in EU Research Framework Programmes (FPs), with €235 million in FP6 (2002-2006), €1.2 billion in FP7 (2007-2013) and a proposed €1.7 billion in the Horizon 2020 programme (2014-2020). ESA also includes technology research in its mandatory Science Programme budget line.

EU research areas focus primarily on navigation and positioning and EO, in line with the Galileo and Copernicus programmes. Research also helps to stimulate university-industry cooperation, attract talent from third countries and address the shortage of highly skilled aerospace engineers and technicians.

Galileo

A draft Regulation on the European satellite navigation programmes (Galileo and EGNOS), last considered in Council in late 2012, remains under discussion, with differing views in Council and the EP on the governance of the programmes, public procurement rules and inclusion of downstream services in the regulation. Under the MFF agreed in June, Galileo would receive €6.3 billion in funding for 2014-2020.

Private spaceflight

Commercial suborbital spaceflights (i.e. flights that do not complete a full orbit of the Earth) are of growing interest, not only for 'space tourism' but also for scientific purposes and eventually fast point-to-point transportation around the world. European companies such as Virgin Galactic and EADS Astrium are amongst those pursuing developments in this area.

Currently some, but not all, MS have ratified UN space treaties, and some have enacted national space legislation[4]. MS bear responsibilities to authorise spaceflights, to accept liability for damage and to certify the safety of private spaceflights. A consistent legal framework would ensure a level playing field in the single market and encourage investment, but harmonisation of national laws is excluded by the Treaties.

While carbon emissions vary widely depending on launch technology and fuel, experts consider the overall effects insignificant. However the effects of soot or of ozone-destroying compounds from a hundred-fold increase in spaceflight may require further study and future regulation.

Use of data

Public policy on data dissemination has a major impact on downstream commercial services, particularly in the EO domain. As with other public-sector information where the principal costs of provision are borne by the taxpayer, making Copernicus spatial data available freely or at marginal cost has the potential to stimulate new public and commercial activities (particularly among SMEs and in the areas of meteorology, mineral exploration and urban planning). One study[5] projected that by 2030 such a policy would lead to the creation of 12 600 high-value jobs in downstream services which tailor raw information to a specific purpose, or add value through analysis or combination with other data sources.

Despite these promising projections, and some evidence from US Landsat policies that use increases significantly with open access, a consultant's report admitted there were no hard facts on the effects of making EO data freely available. At least some experts anticipate stiff competition to space-based EO data from aerial and land-based surveys using global navigation and positioning data.

Building the industrial base

Effective procurement

Because public procurement plays such an important part in the space industry, procurement policies are important for building up an industrial base. However ESA and the EU have different approaches to procurement.

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ESA uses a geographic return or 'fair return' policy, whereby a country's share in the weighted value of contracts must approximate its share of financial contributions over a period of time. The policy encourages national contributions (particularly in voluntary programmes) and promotes the distribution of space activities throughout its member countries. Analysts[6] say it has proven to be effective in creating an overall collaborative framework in a market that remains relatively small. ESA also maintains provisions to favour the participation of SMEs in procurement.

In contrast, EU procurement rules rely on best value for money, presuppose there will be multiple potential bidders, and are independent of the contributions that individual countries provide. This policy should result in greater cost efficiency, but it is less effective in the upstream market where levels of investment and risk are high and there are few potential suppliers (or only one). These procurement rules have been blamed by some for the early difficulties encountered by the Galileo programme which led to significant delays.

Space surveillance and tracking

In February 2013, the EC proposed to establish an EU space surveillance and tracking (SST) programme. The service will monitor space objects and debris in order to prevent damage to spacecraft or to objects or persons on the ground. Because it requires sharing of data from numerous, widely spaced sensors, it is inherently an international activity, while the security aspects of tracking satellites mean close cooperation with MS is needed.

Standards

Standardisation can also help to broaden the industrial base by making it easier for SMEs to build components which can be integrated into larger products. It can also encourage interoperability between national and European space and ground systems. The EC proposes to encourage the European Standards Organisations to do more in this regard.

Ensuring non-dependence

Access to space

Non-dependence is the ability to have free, unrestricted access to any space technology. Whilst more than 40 countries have satellites, only eight to ten have launch capacities, so many are dependent on foreign suppliers and governments to be able to access space. A country without unfettered access to launch facilities may be bound by restrictions imposed by the launching country (e.g. a Franco-German telecommunications satellite was restricted to non-commercial use by the terms of a US launch service contract[7]).

Europe currently has independent launch capacity with a range of heavy, medium and light payload launchers. However the heavy Ariane 5 launcher is becoming out-dated, and both an updated version and a new launcher with reduced operating costs are under development. Moreover Europe relies heavily on both public and commercial demand to maintain a sustainable volume of launches; if funding cuts or increasing competition from other countries reduce that demand, it may be difficult to maintain a full operational range of launchers.

Critical components / technologies

Non-dependence also applies to space components and technologies. Due to the high degree of specialisation in space manufacturing, there may be only one supplier of a particular type of component (e.g. atomic clocks) and that supplier may be from a third country. Supplies may be limited, constraining schedules and development and potentially raising prices. In addition, export regulations may hamper purchases and re-sales. Ideally non-dependence means having multiple European suppliers for essential technologies, but without specific procurement policies, it is difficult to direct orders to build up an alternative source of supply.

Increasing competitiveness

SMEs

Involving SMEs more in space manufacturing, a sector dominated by large firms, should in theory lead to greater competition, cost efficiency and ultimately competitiveness for the entire industry. Procurement processes that facilitate SME involvement, or are restricted to SMEs, can lower entry barriers. However some experts feel that vertical integration in the supply chain (as large companies absorb smaller ones to ensure access to critical technologies) means that policies encouraging SME participation in the space industry may have limited value.

Nevertheless, SMEs are considered better able to convert innovative research and new data sources into successful commercial products[8]. An open policy for space-based data can support SMEs in developing new products or services, or in integrating new space-related functionality into existing products.

Radio spectrum

Radio spectrum is a finite resource and needs to be shared both among countries (through the International Telecommunications Union) and among different applications. Pressure has increased as new communications technologies require more bandwidth.

Recently reforms have moved towards a more liberal, efficient and flexible allocation of frequencies. However satellite communications rely on fixed, secure bands that are free of risks of interference. Experts believe that the long-term planning and the technological requirements of the space sector need to be taken into account.

International trade

Trade in the space sector is constrained by political, military and security issues. Export restrictions on US-made components set by the US International Traffic in Arms Regulation (ITAR) can delay European development or impede further downstream European exports to other countries. Countries may also shield their own industries from competition for strategic reasons. International cooperation projects in space research and development can help to reduce barriers, but frequently security and technology transfer issues intrude, as with the failed attempts to foster China-EU cooperation in Galileo. To support exports, inter-governmental agreements may be needed to ensure access to foreign markets.

European Parliament

The EP has always supported the involvement of the EU in space[9]. In response to a 2011 Communication on a space strategy for the benefit of EU citizens, the EP underlined the need for coherent governance, highlighted the importance of an independent European launch capacity, urged financial support for the Galileo and GMES programmes and asked the EC to draw up strategies for space research and international cooperation.

In 2012, Parliament objected to the EC's plans to fund GMES through an intergovernmental fund outside the Multiannual Financial Framework (MFF), pointing out the detrimental effects of the investment uncertainty that this would create. (The compromise agreed in June 2013 brings GMES back within the MFF, however.)

The Industry, Research and Energy Committee is expected to adopt its report on the space industrial policy Communication in autumn 2013 (rapporteur Angelika Niebler, ALDE, Germany). It should also complete work on the individual 2014-20 funding programmes: Copernicus, Galileo, and Space Surveillance and Tracking.

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Further reading

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Economic and policy aspects of space regulations in Europe, Part 2: Space related regulations / M. Aranzamendi, ESPI, 2011.

Impact of the European space policy on space commerce / K-U. Schrogl, C. Venet in Contracting for space / L. Smith, I. Baumann, 2011. Available in the EP Library.

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Endnotes

[1] Figures are taken from The European space industry in 2012 / ASD-Eurospace, 2013. An abbreviated version, State of the European space industry in 2012, is available on the web.

[2] In addition, the European Organisation for the Exploitation of Meteorological Satellites (Eumetsat) is an intergovernmental body that operates meteorological satellites on behalf of 26 national services. A similar intergovernmental organisation, the European Telecommunications Satellite Organisation (Eutelsat) became a private company in 2001.

[3] National visions of European space governance: elements for a new institutional architecture / L. Marta, Space Policy v. 29 (2013), p. 20 - 27.

[4] European space governance: the outlook / C. Venet, Space Policy v. 28 (2012), p. 59-60.

[5] Assessing the economic value of GMES: European Earth observation and GMES downstream services market study (Publishable executive summary - final draft) / SpaceTec, 2012. Available on the Copernicus site.

[6] Towards a European space-specific procurement policy? J.-J. Tortora in Contracting for space / L. J. Smith, I. Baumann, 2011, p. 35-41.

[7] The geographic return principle and its future within the European space policy / B. Schmidt-Tedd in Smith, Baumann, *op.cit.*

[8] The impact of the European space policy on space commerce / K.-U. Schrogl, C. Venet in Smith, Baumann, *op. cit.* p. 7 - 24.

[9] The role of the European Parliament in the development of an EU space policy / E. Sigalas, Space Policy v. 28 (2012) p. 110-117.

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