



**DIRECTORATE-GENERAL FOR EXTERNAL POLICIES**  
**POLICY DEPARTMENT**



**THE GALILEO  
PROGRAMME :**

**MANAGEMENT AND  
FINANCIAL LESSONS  
LEARNED FOR FUTURE  
SPACE SYSTEMS PAID  
OUT OF THE EU BUDGET**

SEDE



DIRECTORATE-GENERAL FOR EXTERNAL POLICIES OF THE UNION

**DIRECTORATE B**

POLICY DEPARTMENT

STUDY

**THE GALILEO PROGRAMME:  
MANAGEMENT AND FINANCIAL LESSONS LEARNED  
FOR FUTURE SPACE SYSTEMS PAID OUT OF THE EU  
BUDGET**

**Abstract**

Galileo is the first large space programme and system managed and owned by the European Union (EU). Its strategic value rests on the political, operational, industrial and technological independence that it will guarantee in the field of global navigation and positioning. Although Galileo represents a priority for the European space policy, more than ten years on the declaration of its feasibility, the programme is still far from completion. Galileo has experienced a slow and problematic development due to concurrent and different factors, among which the failure of the envisaged public-private partnership (PPP) approach to financing, the ever increasing costs, the diverging opinions among EU Member States (MS) and within EU institutions, governance problems, and complex international negotiations still ongoing.

Given the new shared competence of the EU in space matters established by the Treaty of Lisbon, which paves the way for new EU space activities, the purpose of the study is first to examine specific and characterizing issues related to the management and financing of the Galileo programme, then to draw lessons learnt for future space systems funded out of the budget of the EU.

This study was requested by the European Parliament's Subcommittee on Security and Defence

### **AUTHORS:**

Anna C.VECLANI, Jr. Researcher, Security and Defence Department, ISTITUTO AFFARI INTERNAZIONALI (IAI), ITALY

Jean-Pierre DARNIS, Vice-Director of the Security and Defence Department, ISTITUTO AFFARI INTERNAZIONALI (IAI), ITALY (Scientific Supervisor)

Valérie V. MIRANDA, Jr. Researcher, Security and Defence Department, ISTITUTO AFFARI INTERNAZIONALI (IAI), ITALY (Research Support)

### **ADMINISTRATOR RESPONSIBLE:**

Ulrich KAROCK  
Directorate-General for External Policies of the  
Union  
Policy Department  
WIB 06 M 06M095  
rue Wiertz 60  
B-1047 Brussels

Gerrard QUILLE  
Directorate-General for External Policies of the  
Union  
Policy Department  
WIB 06 M 06M081  
rue Wiertz 60  
B-1047 Brussels

### **LINGUISTIC VERSIONS**

Original: EN

### **ABOUT THE EDITOR**

Editorial closing date: 15 Octobre 2011.

© European Parliament, [2011]

Printed in [Belgium]

The Information Note is available on the Internet at

<http://www.europarl.europa.eu/activities/committees/studies.do?language=EN>

If you are unable to download the information you require, please request a paper copy by e-mail : [poldep-expo@europarl.europa.eu](mailto:poldep-expo@europarl.europa.eu)

### **DISCLAIMER**

Any opinions expressed in this document are the sole responsibility of the author and do not necessarily represent the official position of the European Parliament.

Reproduction and translation, except for commercial purposes, are authorised, provided the source is acknowledged and provided the publisher is given prior notice and supplied with a copy of the publication.

## **TABLE OF CONTENTS**

<b>EXECUTIVE SUMMARY</b>	<b>4</b>
<b>1. INTRODUCTION</b>	<b>6</b>
<b>2. CHRONOLOGICAL OVERVIEW</b>	<b>7</b>
<b>3. PROGRAMME MANAGEMENT AND FINANCING</b>	<b>12</b>
3.1 POLITICAL ISSUES	12
3.1.1 Rationale of the programme	12
3.1.2 Funding	13
3.1.3 Governance	15
3.1.4 Security and defence implications for Galileo	16
3.2 INDUSTRIAL AND TECHNOLOGICAL ISSUES	19
3.3 ECONOMIC AND SOCIAL ISSUES	21
<b>4. LESSONS LEARNED AND RECOMMENDATIONS</b>	<b>23</b>
<b>BIBLIOGRAPHY</b>	<b>31</b>

## EXECUTIVE SUMMARY

Galileo, the European global navigation satellite system (GNSS) and an EU flagship programme, represents at the same time a challenge and an opportunity for the EU. In fact, on the one side, it is the first large space programme managed by the EU, which is also the owner of the infrastructure totally financed by its budget. On the other side, the project bears a strategic importance as its value rests on the political, industrial and technological independence that it will guarantee in the field of global navigation. Launched more than ten years ago, Galileo has undergone significant costs overruns and delays due to combined and different factors, among which the failure of the envisaged public-private partnership (PPP) model of financing, the ever increasing costs, the diverging opinions among EU Member States (MS) and within EU institutions, governance problems, and complex international negotiations still ongoing (i.e. China).

The critical analysis of the management and financing of the programme shows that political, industrial/technologic, and economic motives underpinning the realization of Galileo also reflect the reasons for its increasing costs and delays.

First, political issues, such as different perceptions among MS on the **rationale** of programme – profitability vs. independence - played against the common interest of promptly launching the project and of delivering the system on time. The **funding** model was also a question of disagreement among MS and ranged from an initial PPP approach to a final complete public funding more suitable to a project of common interest characterized by high technical, liability and market risks. In fact, the expected investments from the private sector were based on forecasts predicting high financial revenues which eventually proved unrealistic and led to the re-profiling of the programme. In addition, the initial **governance** structure established for Galileo was little conducive, characterized by weak accountability lines, and by concurrent and contrasting roles of single actors. The reorganization of the public governance in 2007 has definitely clarified responsibilities and tasks, thereby becoming more advantageous to the delivery of the programme. Finally, the **security and defence implications** of Galileo, disputed both within the EU and the international arena, further delayed the programme.

Second, the **industrial** organization, its leadership and the share of work to develop innovative technologies, became a matter of division not only among companies themselves, but also MS siding their national enterprises. This is also due to the limited competitiveness in the European aerospace sector, where big industries are concentrated in a small number of MS, are subsidized and partly controlled by governments.

Third, the **economic** returns of Galileo were eventually recognized to be limited, thereby shifting the attention from the profitability of the programme to the public utility that the system will represent as well as to the economic and social benefits that it will provide in the long term for the European citizens.

The recommendations drawn reflect the lessons learned emerging from the analysis of these main elements influencing the management and financing of Galileo. Future space programmes paid out of the EU budget should be based on clear and shared rationales, to be mostly found in the European common interest, rather than on particular national interests and considerations. Indeed, the EU budget should serve the long-term interests and well-being of European citizens and should provide added value in areas where single MS cannot afford action, either for political or financial constraints, especially in times of economic crisis. Effective and simple schemes of governance, not only of single programmes but also of the whole European space sector (especially the relations within the “institutional triangle” including the EU, ESA, respective MS), should be the starting point of a successful programme, because it clarifies responsibilities and makes management linear, reducing the potential for delays. As for the

European aerospace industry, it should be supported in becoming more competitive through an effective space industrial policy, so as to capture large shares of the global market and to make Europe both technologically advanced and independent. Such an empowered industry would efficiently serve future space programmes.

## 1. INTRODUCTION

Galileo is a unique test case for the EU because it is the first large space programme and system that it manages and owns. In addition, the project bears a strategic importance as its value rests on the political, operational, industrial and technological independence that it will guarantee in the field of global navigation and positioning. Indeed, it appears clear that the significance of Galileo does not reside in the uncertain financial revenues it may foster, but rather, in the operational capabilities and autonomy it will provide to governments and institutions, including in the field of national and European security and defence, for instance in the context of operations within the Common Security and Defence Policy (CSDP); in the economic and social benefits generated by such a public infrastructure; in the innovative applications that will foster in the downstream markets. Although Galileo represents a priority for the EU, and is one of its flagship programmes along with the Global Monitoring for Environment and Security (GMES), more than ten years on the declaration of the feasibility of an independent navigation system by the European Commission (EC), only two test satellites have been placed into orbit. The first operational services will be available in 2014-2015 through a reduced constellation of eighteen satellites, while all services provided by the planned thirty satellites fleet will become operational in 2019-2020. As a matter of fact, Galileo has experienced a slow and problematic development due to combined and different factors, among which the failure of the envisaged public-private partnership (PPP) approach, the ever increasing costs, the diverging opinions among EU Member States (MS) and within EU institutions, governance problems, and complex international negotiations still ongoing (i.e. China). Moreover, as of today, other countries, such as the US, Russia, China, Japan, India, are operating or developing regional or global navigation systems, which not only will complicate the allocation, compatibility and interoperability of frequencies, but will also increase competition.

In the meantime, in a wider framework, the European space policy launched by the EC and the European Space Agency (ESA) in 2007 has set the strategic mission and the priorities for European space activities, while the Lisbon Treaty has established a shared competence of the EU in space matters. Such competence might increase the EU's financial and political commitments to new ambitious space programmes and systems.

The purpose of the study is first to examine specific and characterizing issues related to the development, management and financing of the Galileo programme, then to draw lessons learnt even for future space programmes funded out of the budget of the EU. To this end, the study is introduced by a chronological overview, followed by a critical analysis of the programme and concluded with lessons learned and recommendations.

## 2. CHRONOLOGICAL OVERVIEW

The early days of Galileo trace back to the mid-1990s when the EC proposed to commit to a Global Navigation Satellite System (GNSS) for Europe<sup>1</sup>. The EC soon elaborated a two-phase strategy to this purpose: one, the GNSS-1, envisaging the European Global Navigation Overlay System (EGNOS) aimed at providing a satellite-based augmentation system that improves the accuracy signals released by the American GPS, while guaranteeing the detection and corrections of errors; the other, the GNSS-2, including the development of an independent satellite constellation for a global civil navigation system, named Galileo. Such proposal was both launched by the EC and welcomed by the Council of the EU in 1994<sup>2</sup> paving the way for the first large European space programme. The initiative envisaged a tight cooperation between the EC and ESA: the first was to be in charge of policy making and the second was to be responsible for technological development.

GNSS-1 was implemented under a tripartite authority (European Tripartite Group, ETG) involving the EC, ESA and the European Organisation for the Safety of Air Navigation (Eurocontrol). GNSS-2 was itself divided into four steps: technical definition (1999-2000), development and validation (2001-2005), deployment (2006-2007) and commercial operations (2008 onwards). The complete system will offer five services<sup>3</sup>:

1. The Open Service (OS), which is a basic service comparable to that provided by the American GPS. While up to three separate signal frequencies are offered within the OS, cheap single-frequency receivers will be used for applications requiring only reduced accuracy. In general, OS applications will combine Galileo and GPS signals, supporting users in environments such as urban areas. The OS will not offer integrity information. This service will be of use to the general public for mass-market applications. For maximizing the utility and use of the OS the EC has recently provided free access to the technical information/specifications for receivers' manufacturers, applications developers and service suppliers.
2. The service Safety of Life (SoL), should be obtained by using certified dual-frequency receivers. This service will increase safety, and it is tailored to improve the efficiency of companies operating on a global basis, especially airlines and maritime companies.
3. The Commercial Service (CS) will support market solutions requiring higher performance than that offered by the OS, providing value-added services on payment. CS will benefit from two additional signals compared to the open access signals. This pair of signals will be protected through commercial encryption, which will be managed by the service providers and the future

---

<sup>1</sup> Communication from the Commission to the European Parliament and the Council, A European approach to Satellite navigation services, COM(94) 248, 16 June 1994

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/94/577&format=HTML&aged=1&language=EN&guiLanguage=en>;

Resolution of the Council of the EU on the European contribution to the development of a Global Navigation Satellite System (GNSS) 19 December 1994.

<http://eur-lex.europa.eu/Notice.do?mode=dbl&lang=en&ihmlang=en&lng1=en.it&lng2=da.de.el.en.es.fr.it.nl.pt.&val=303622:cs&page>

=

<sup>2</sup> *Ibid*

<sup>3</sup> Initially three services were planned: the General service, the Commercial service, the Public service. The Search and Rescue service was embedded in the Public service. See Communication from the Commission to the European Parliament and the Council on Galileo, COM(2000) 750, 22 November 2000

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2000:0750:FIN:EN:PDF>

Galileo operator. Access will be controlled at the receiver level, using access-protection keys. This service will be managed by Galileo commercial service provider.

4. The Public Regulated Service (PRS) will fulfil the security needs established by governments, such as for police, coast-guards and customs duties. Civil institutions will control the access to the encrypted PRS.
5. The Search and Rescue (SAR) service is Europe's contribution to the international cooperative effort for humanitarian search and rescue activities worldwide<sup>4</sup>.

The technical definition was funded by the EC and ESA through feasibility and pre-development studies, but the results presented by the EC in 2000<sup>5</sup> did not immediately lead to the decision by the EU Transport Council to shift to the development phase. In fact, until 2002, EU MS<sup>6</sup> were not able to endorse a strong, collective political commitment to the project and to reach a common position on critical issues such as funding, security, legal framework, as well as on more technical aspects, like the system of legal liabilities, allocation of frequencies, integration of EGNOS with Galileo, industrial participation, design of the ground segment<sup>7</sup>.

The technical definition results also included an estimation of costs: development and validation phase was to amount to 1,1 billion euro and the deployment phase to 2,15 billion euro.

Eventually, and after other studies were made to draw a suitable business plan<sup>8</sup>, the Barcelona European Council officially approved the project in 2002<sup>9</sup>. The EU Transport Council subsequently retained the abovementioned phases, with the EC and ESA funding the development and validation phase through the award of contracts<sup>10</sup>, and a public-private-partnership (PPP) based on a concession model of funding<sup>11</sup> for the deployment and operations phases. Then, the private concessionaire was to benefit of exclusive rights on the exploitation of the infrastructure for twenty years. The proportion of costs to be borne by the private sector was of 2/3 and that by the Community of 1/3. In this context, the Galileo Joint Undertaking (GJU, 2003) was founded by the EC and ESA as a coordination body in charge of managing the development and validation phase, guaranteeing the progressive integration of EGNOS with Galileo, and conducting the tender procedures for the deployment and operations phases.

---

<sup>4</sup> Description of services reported from the official website of ESA,  
[http://www.esa.int/esaNA/SEMTHVXEM4E\\_galileo\\_0.html](http://www.esa.int/esaNA/SEMTHVXEM4E_galileo_0.html)

<sup>5</sup> See Communication from the Commission to the European Parliament and the Council on Galileo, COM(2000) 750, 22 November 2000.

<sup>6</sup> If no differently specified in the text, "MS" indicates both ESA and EU Member States.

<sup>7</sup> Johan Lembke, The politics of Galileo, European Policy Paper No. 7, April 2001, European Union Center for West European Studies, University of Pittsburg  
[http://www.ucis.pitt.edu/euce/pub/policypapers/2001-Politics\\_of\\_Galileo.pdf](http://www.ucis.pitt.edu/euce/pub/policypapers/2001-Politics_of_Galileo.pdf)

<sup>8</sup> In particular the study by the private company PricewaterhouseCoopers, Inception Study to Support the Development of a Business Plan for the GALILEO Programme" released in November 2001 which strongly recommended a PPP concession model.

[http://ec.europa.eu/dgs/energy\\_transport/galileo/doc/gal\\_exec\\_summ\\_final\\_report\\_v1\\_7.pdf](http://ec.europa.eu/dgs/energy_transport/galileo/doc/gal_exec_summ_final_report_v1_7.pdf)

<sup>9</sup> Presidency Conclusions, Barcelona European Council, 15 and 16 March 2002,

[http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/ec/71025.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/71025.pdf)

<sup>10</sup> This included: the development by ESA of two experimental and four operational satellites, the respective ground segment, validation through in-orbit and ground-based tests. The EC was in charge of exploring users requirements and market development through a number of initiatives such as R&D projects and development of applications. ESA established the programme GalileoSat and the EC funds came from the trans-European network (TEN-T) and the 4th- 5th Framework Programmes (FP4, FP5). These bulk of public funds reached 1,94 billion euro from 1999 to 2007

<sup>11</sup> The private sector was to be responsible for building, financing and operating the system and would have repaid the investments out of users charges or availability payments.

The programme moved to the deployment phase only in 2004, but at the same time the development phase had undergone almost a three years delay<sup>12</sup>. In addition, the selection procedure of tenderers for the deployment and operations phases was also held-up due to a variety of reasons: initially two consortia presented their candidature, then proposed to merge into one. However, the composition of such enlarged consortium was matter of disagreement among MS and negotiations between the GJU and the group of bidders only started in 2006, however coming to a standstill in 2007.

As for the GJU, on the proposal of the EC in 2004, it was replaced in early 2007 by the European GNSS Authority (GSA) in charge of following the deployment and operations phases, signing the concession contract, acting as the licensing entity, thus representing the interest of the public sector in the framework of the PPP.

In the meanwhile, in 2006, the EC had updated the timetable, extending the development and validation phase to early 2009 and planning the deployment between 2009-2010<sup>13</sup>. This was necessary also in light of the technical and industrial organization problems experienced by ESA with EGNOS and Galileo respectively. Furthermore, the EC envisaged the growth of the budget for the development and validation phase, bringing the initial cost from 1,1 billion euro to 1,5. Due to the difficulties in concluding the arrangement for a PPP concession framework and, *de facto*, to the failure of the relative negotiations, the Council decided in that same year to bring the programme under complete EU management, ownership and funding.

The Regulation adopted by the European Parliament (EP) and the Council in 2008 on the further implementation of the European satellite navigation programmes therefore established the new legal framework and earmarked 3,4 billion euro for the period 2007-2013<sup>14</sup>. Financing was secured through the EU budget, thereby making it necessary to revise the respective Multi-financial Framework (MFF): the project was placed under Heading 1a – Competitiveness for Growth and Employment - and funds were redeployed as well as mobilized from different financing instruments and margins with a view to not impairing projects related to the Lisbon Strategy.

At this stage the deployment phase was to be completed by 2013 through the procurement of the infrastructure on competitive basis and divided into six work packages<sup>15</sup> with ESA as the delegated procurement agent. The final two contracts of this kind were awarded in June 2011.

Concerning the development phase, as of 2008, two experimental satellites, Giove A (2005) and Giove B (2008), had been placed into orbit so as to start emitting test calibration signals and to validate the technological features for the future satellites, while maintaining the frequencies allocation granted to the Galileo system by the international authorities (International Telecommunications Union, ITU).

The Regulation also envisaged new tasks for the GSA, which became an EU Agency following a further, specific Regulation adopted in 2010<sup>16</sup>. The agency is today in charge of assuring a sustainable and

---

<sup>12</sup> See European Court of Auditors, The management of the Galileo programme's development and validation phase, Special Report No. 7, 2009

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SRCA:2009:07:FIN:EN:PDF>

<sup>13</sup> Communication from the Commission to the European Parliament and the Council, Taking stock of the Galileo Programme, COM (2006) 272, 7 June 2006

[http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006\\_0272en01.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0272en01.pdf)

<sup>14</sup> Regulation (EC) No 683/2008 of the European Parliament and of the Council on the further implementation of the European satellite navigation programmes (EGNOS and Galileo), 9 July 2008

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:196:0001:0011:EN:PDF>

<sup>15</sup> The chosen procurement procedure is the competitive dialogue. Work packages concern: system engineering support, ground mission infrastructure completion, ground control infrastructure completion, satellites, launchers and operations

economically viable system through market development initiatives along with guarantees of its security through the works of the Security Accreditation Board (where MS are represented) and the preparatory activities of the Galileo Security Monitoring Centres (GSMC).

As established by the 2008 Regulation, the EC presented a Mid-term Review of the European satellite radio navigation programmes at the very beginning of 2011<sup>17</sup>, providing an updated picture on both EGNOS and Galileo. The report sheds light on new delays and costs overruns, on the progresses achieved, and on the next steps. With respect to Galileo space segment, the need to provide as soon as possible an Initial Operating Capacity (IOC) has brought to the decision of having a reduced constellation of eighteen satellites by 2014 delivering the OS, the SAR, and the PRS, though their expected performances in terms of accuracy and availability will not be at their optimum level. The Full Operating Capacity (FOC), nine satellite plus three spare units, will be reached by 2019-2020 and only then all the expected benefits will be assessable. What is already estimated is that the EU will have to fund other 1,9 billion euro to complete the whole infrastructure, that the average annual operating costs will reach 800 million euro, while envisaged long term revenues per annum will amount to 70 million euro. The latter shall be generated by the provision of the CS and the PRS, but revenues from the second largely depend on political decisions as to the EU charging public services (i.e. the police, coastguard, customs) for its use and on the rules for access that are currently under definition<sup>18</sup>. It should be borne in mind that initially four out of five services (that is, except for the OS) were supposed to come at a fee as a trade-off for the guarantee of the service, the latter representing Galileo's added value. However, with respect to the SoL, the EC recognized that a fee '[...] would be very likely to act as a disincentive for potential users, since similar systems, such as WAAS in the United States, are provided free of charge'<sup>19</sup>.

For the time being, EGNOS represents Europe's first concrete step towards satellite navigation, though on regional basis. Two services are currently available, the OS and the SoL, the latter having being launched in March 2011. A third and last service, the Commercial Service or EGNOS Data Access Server (EDAS), as of today provided on experimental basis, will be deployed along 2011 providing combined data from GPS, GLONASS and EGNOS itself, augmentation messages as well as air traffic control messages. The European Satellite Services Provider (ESSP), founded by seven air navigation service providers, is the contractor of the EC to deliver the EGNOS services.

The latest and most relevant development concerning Galileo coincides with the proposal released on 29 June 2011 by the EC on the next MFF that will cover a seven-year period (2014-2020). In such proposal, the EC placed Galileo within the EU budget, specifically under Heading 1 - Smart and Inclusive

---

<sup>16</sup> Regulation (EU) No 912/2010 of the European Parliament and of the Council setting up the European GNSS Agency, repealing Council Regulation (EC) No 1321/2004 on the establishment of structures for the management of the European satellite radio navigation programmes and amending Regulation (EC) No 683/2008 of the European Parliament and of the Council, 22 September 2010  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:276:0011:0021:EN:PDF>

<sup>17</sup> Though the Report was due, by Regulation, by the end of 2010

<sup>18</sup> In October 2010 the EC has submitted a Proposal for a decision of the European Parliament and the Council on the detailed rules for access to the public regulated service offered by the global navigation satellite system established under the Galileo programme, COM(2010)550, 8 October 2010

[http://ec.europa.eu/enterprise/policies/satnav/galileo/files/prs-proposal-com-2010-550-final\\_en.pdf](http://ec.europa.eu/enterprise/policies/satnav/galileo/files/prs-proposal-com-2010-550-final_en.pdf)

Such document is currently under the scrutiny of the EP and the Council.

<sup>19</sup> Report from the Commission to the European Parliament and the Council, Mid-term review of the European satellite radio navigation programmes, cit. p.14

[http://ec.europa.eu/enterprise/newsroom/cf/getdocument.cfm?doc\\_id=6321](http://ec.europa.eu/enterprise/newsroom/cf/getdocument.cfm?doc_id=6321)

Growth - with 7 billion euro for the whole lifecycle of the MFF<sup>20</sup>. This way, the importance of Galileo is attached to the Europe 2020 goals. These funds would allow completing the development and deployment phases, to operate the system starting in 2014 and possibly to step up a second-generation system.

The next important step in the very short term concerning the European radio satellite navigation programmes and strictly related to the future MFF, is represented by the legislative proposal to be tabled by the EC during 2011 which should also include an impact assessment complete of risks analysis, possible options for potential cost reductions, technical specifications of the future services.

---

<sup>20</sup> Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A Budget for Europe 2020, Part I, 29 June 2011, [http://ec.europa.eu/budget/library/biblio/documents/fin\\_fwk1420/MFF\\_COM-2011-500\\_Part\\_I\\_en.pdf](http://ec.europa.eu/budget/library/biblio/documents/fin_fwk1420/MFF_COM-2011-500_Part_I_en.pdf)

### **3. PROGRAMME MANAGEMENT AND FINANCING**

Political, industrial/technological, and economic motives have underpinned the will to develop a Global Navigation Satellite System (GNSS) for Europe. In particular, Galileo was aimed to:

- provide an independent European GNSS;
- empower the European aerospace industry to spawn and master cutting-edge space technologies and to become more competitive;
- bring economic and social benefits.

However, issues pertaining to these same three motives also largely reflect the delayed and problematic development, management and financing of this ambitious project. Political issues include the rationale of the programme, the funding schemes, the governance definition, the security and defence implications of Galileo; industrial and technological issues encompass the inherent characteristics of the European aerospace industry and the development of a downstream market for future applications; economic and social issues comprise the strong expectations on benefits to be delivered by the European GNSS. All these different matters are strictly related one another and have interested a variety of actors, ranging from European institutions to MS, from system developers to service providers, while creating interactions and overlaps to be critically analyzed in this study.

#### **3.1 Political issues**

##### **3.1.1 Rationale of the programme**

Political disagreements among MS marked the Galileo programme since its very beginning, notwithstanding it was referred to as a 'project of common interest'<sup>21</sup> by the EC, the EP and the Council. As in other fields of EU integration, like European security and defence, national interests often prevailed over the European collective interest to the detriment of the programme development. At the same time, and to some extent, "pro-Atlanticist" stances opposed "pro-European" drives. For instance, at the end of the 1990s, the UK remained sceptical about an independent system from that of the US, whereas France viewed it as a matter of European autonomy and sovereignty. Hesitations following the EC presentation of the definition phase results in 2000 prevented the approval by the Transport Council of the programme for two years.

The first political issue that emerged right at the outset of the GNSS initiative had to do with the merits of the system. Indeed, the straightforward doubts that arose in some MS related to the benefits Galileo would bring that could not be already delivered by the American GPS. As a matter of fact, the services were to be absolutely similar, but their quality, reliability, continuity and integrity were to reach higher levels. Beside the introduction of new breakthrough technologies, these characteristics derived from the advantage of having another satellite system in place which could guarantee redundancy when GPS satellites could not be able to provide an accurate signal or in the event of a switch off<sup>ff22</sup>.

---

<sup>21</sup> See Commission Communication to the European Parliament and the Council on Galileo COM(2000) 750

<sup>22</sup> GPS signals are less accurate in urban areas, under trees and in the proximity of the North and South Poles. See Gustav Lindström with Giovanni Gasparini, The Galileo satellite system and its security implications, Occasional Paper no. 44, April 2003, European Union Institute For Security Studies, Paris  
<http://ftp.infoeuropa.euroid.pt/database/000037001-000038000/000037511.pdf>

What was agreed on related to the principle of the civilian system under civilian control, in contrast with the US and Russian military rule over GPS and GLONASS. The latter implied that, as unlikely as it might be, the signals could be denied to the public for national security reasons, having disruptive economic and security consequences at the global level. This concern had in particular aroused in the 1990s, when GPS was made available to civilian users by Presidential Decision Directive (1996) and when the joint military operations in Iraq (1990-1991), Bosnia (1991-1995) and Kosovo (1999) had revealed the overdependence of Europe vis-à-vis the US space capabilities, navigation included. Thirty years earlier, the rationale of independence for both civil and military activities had been similarly applied to the decision of developing an autonomous European capability for access to space, Ariane, and a joint programme for aircraft development and production, Airbus.

Provided the civilian nature of the system, what was once more controversial related to the role of the public and private sectors in the project. In this sense MS were split between those, *in primis* the UK, who privileged a primary and clear role of the private sector since the earliest phases based on free market logics; and those, France at the forefront, who were ready to commit to the common project on the basis of its strategic value<sup>23</sup>. In the same way, also the provision of the envisaged services was subject to such diverse reasoning, ranging from a commercial market to a public provision model. In this case the disagreement also stemmed from very different forecasts of revenues and size of the market available at that time. Diverging figures are interesting in two respects: first, there prevailed the assumption that Galileo in the long-term would have generated significant economic returns; second, the disparity of the optimistic projections demonstrated that such assumption did not take into account the uncertainty characterizing the early phases of the project<sup>24</sup>.

### 3.1.2 Funding

The funding of Galileo has been a major issue of disagreement among MS from the outset and, once more, when in 2007 the EC acknowledged the failure of the PPP negotiations suggesting to publicly fund the programme.

At the inception of the project, the PPP concession model was strongly supported by the EC, the EP and the Council and deemed an essential element for the success of Galileo. This kind of reasoning was backed by a number of MS such as the UK, Germany, the Netherlands, and Sweden who had a commercial vision of the project. On the contrary, France, emphasized that Galileo should have not relied on precise cost analysis and on the commitment of the private sector, rather on the European will to develop an independent capability for global navigation. Such view was shared by Italy, Norway, Portugal, Spain and Switzerland<sup>25</sup>.

In 1999 the EC viewed public contribution to Galileo as necessary for the definition and validation phase and to a lesser extent for the deployment phase. There were two reasons for partial public investments: the project was a key element of the Common Transport Policy, therefore interesting and benefiting all EU MS; the US provided the basic GPS signal on a free basis, hence it was illusory that Galileo could be developed and exploited by the private sector alone<sup>26</sup>. At the same time, the EC was also convinced that once potential revenues had been identified, the private sector would have poured significant

---

<sup>23</sup> See Johan Lembke, The politics of Galileo

<sup>24</sup> See for instance the revenues comparison prepared by PricewaterhouseCoopers in "Inception Study to Support the Development of a Business Plan for the GALILEO Programme"

<sup>25</sup> See Johan Lembke, The politics of Galileo

<sup>26</sup> See European Commission, Galileo: Financial Aspects, in «Air & Space Europe», 1:2, 1999

investments in the project since its early stages. On the contrary, the industry rather conceived that public commitment should have accompanied the system to a level comparable to that of the US before handing it to the private sector. In addition, the latter considered the EC forecasts on both costs and revenues too optimistic as it was later demonstrated by facts. It emerges that the public and private sectors not only disagreed on profitability figures, but also on respective goals and expectations. In fact, the EU was determined to deliver the system, while the private sector was rightly motivated by profits. By 2007, when the negotiations between the GJU and the merged consortium stalled, the industry was perfectly aware that the EU, having politically committed to Galileo and spent taxpayers' money for its development phase, was probably not willing to give up the project. This might have limited the engagement of the private sector to the success of negotiations, as the industry had clear in mind that it was still going to be awarded with contracts under an eventual procurement scheme fully funded by public money.

What also impaired the PPP success was the interference of MS in the tender process, who in 2005 disagreed on the composition and leadership of the merged consortium as well as on the location of the Galileo ground infrastructures and centres. In fact, MS had placed major expectations on the share of work their national industries would have obtained, thereby consolidating their position at the European level. The controversy was stretched to the point that the EC appointed a mediator to help settling the question between MS (Spain, the UK, France, Germany and Italy) and the eight aerospace companies (AENA, Alcatel Alenia Space, EADS, Finmeccanica, Hispasat, Inmarsat, TeleOp, and Thales) to reach an agreement<sup>27</sup>.

Following the failure of the PPP negotiations in 2007, and in the run up to the re-profiling of the project, the question as to whether to continue on a PPP path was once more a matter of heated debate. Again, the main supporter of private funding was the UK that foresaw different, maybe smaller forms of PPP to re-launch Galileo: 'we do not believe a public-private partnership (PPP) method of delivery should be immediately ruled out'<sup>28</sup>. This position was backed by Germany and the Netherlands.

In addition, following the EC proposal of publicly financing Galileo, the UK opposed not only the additional funding, but also the re-opening of the MFF 2007–2013 because it made 'a mockery of the complex process of negotiations and compromises which form the basis for the Financial Perspective' and on this point also Germany, Sweden, Poland, Latvia, the Czech Republic, the Netherlands and Austria agreed<sup>29</sup>. Eventually, during the 2008 budgetary procedure, the strong commitment of the EP to the success of the project led to the revision of the MFF so as to include Galileo as indicated above, notwithstanding the prolonged opposition of the Council.

The recent EC proposal on the next MFF, which places Galileo within the EU budget with 7 billion euro, will be negotiated all along 2012. Based on the costs estimated in the Mid-term Review of the European satellite radio navigation programmes, which will be further addressed and specified in the impact assessment that should come with the new EC legislative proposal on Galileo in 2011, the envisaged funds appear sufficient to effectively respond to the exigencies of the continuation, completion and

---

<sup>27</sup> The agreement that followed established that Headquarters of the Galileo concessionaire would be located in Toulouse, France; the Operations Company in London, UK; the two Control Centres in Germany and Italy as well as the two Performance Evaluation Centres supporting the concessionaire headquarters; Spain would host facilities that include redundancy for the Control Centres, and are related to Galileo safety critical applications.

<sup>28</sup> Transport Committee, UK House of Commons, Galileo recent developments, First Report of Session 2007-08, Annex C, cit. p. 61

<http://www.publications.parliament.uk/pa/cm200708/cmselect/cmtran/53/53.pdf>

<sup>29</sup> See European Court of Auditors, The management of the Galileo programme's development and validation phase

operations of EGNOS and Galileo. As a result, it will be important to secure such financing as it happened in 2008.

In a retrospective view, looking back at the funding disputes over Galileo and taking into account that from 2008 on the project was publicly financed like it happened for the GNSS in the US and Russia, it appears clear that the PPP model was the sole viable option for Galileo to take off, thereby a means of obtaining support from sceptical governments. However, this politically imposed solution, contributed to the delays and extra costs that have affected Galileo.

### 3.1.3 Governance

Galileo is a large technological and infrastructural programme, the first of this kind under the aegis first of the EC and ESA, then of the EU. As such, it started from scratch and it involved a number of public entities (supranational, intergovernmental and sovereign nations) and private actors, namely the EC, ESA, MS and industry, all with different, but significant, roles and responsibilities. Cooperation between the EU and ESA in the development of Galileo represented the first concrete collaboration effort, reinforced by the Framework Agreement concluded in 2004<sup>30</sup>. The EP has played an increasing and determinant role too, especially since the programmes were placed within the EU budget and following the entry into force of the Lisbon Treaty.

As mentioned, initially, the EC was to be in charge of policy making and ESA of the technological development. MS obviously had a strong voice in the programme, both through the decisions adopted by the EU Council and by the ESA Council. Industry was supposed to have a leading role, as the concessionaire of Galileo responsible for designing, building, financing and operating the system. The share of responsibilities and division of roles resulted however unclear and susceptible to changes, as well as to politically imposed constraints, to the point that: 'Many decisions relating to Galileo were affected by the fact that no one actor (Commission, GJU, ESA, Member States) assumed full responsibility: the decision in favour of separate development and deployment phases, the choice of a PPP, acceptance of the bidders' merger proposal, the ESA/GJU agreement, incomplete budgeting, delays to EGNOS technological development and the IOV [in-orbit validation] industrial organisation'<sup>31</sup>.

The establishment of the GJU responded to the need of guarantying coordination between ESA and the EC, while supervising the development phase of the programme and managing the tender procedure to select the Galileo concessionaire. The GJU was established by an EC regulation in spring 2002, but only became operational in the autumn 2003. It emerged that the slow start of works was also due to a lengthy selection and approval process of the director, who was at the head of a newly-established team with no experience on space matters and on concession negotiations<sup>32</sup>. Further, it has been observed that the governance structure of the GJU lacked coherence, as ESA was at the same time a founding entity and the development manager of the project, to which funds were allocated<sup>33</sup>. Hence,

---

<sup>30</sup> The Framework Agreement between the EU (EC) and ESA sets the legal basis for cooperation between the two, including ESA's role as implementing agency for the EU in delivering the flagship programmes Galileo and GMES:

<sup>31</sup> European Court of Auditors, The management of the Galileo programme's development and validation phase, cit. p. 34. The IOV is aimed at validating the Galileo system technology and design through two experimental satellites (GIOVE A and GIOVE B) already in orbit, complemented by a constellation of four operational satellites to be launched starting in October 2011.

<sup>32</sup> See European Court of Auditors, The management of the Galileo programme's development and validation phase; Serge Plattard, What's the problem with Europe's flagships Galileo and GMES?, in Schrogler Kai-Uwe (ed.) et al., Yearbook on Space Policy 2006/2007, Springer, Wien, July 2010, pp.153-165

<sup>33</sup> See European Court of Auditors, The management of the Galileo programme's development and validation phase

the conflict of interest made it difficult for the GJU to effectively supervise the development phase under the responsibility of ESA.

As anticipated above, the work of the GJU was also constrained by MS intervention in its works. The political pressures put on both the industry and the GJU by MS to advantage of their national companies prevented the GJU from choosing between the first two bidder consortia and made it necessary to consider a merged consortium. Once more, the composition and share of responsibilities within the latter was not acceptable to MS, thereby requiring official mediation to reach an agreement.

At the end of 2006, once the GJU had agreed with the consortium some, but not all, of the core elements of the concession contracts (Galileo PPP head of terms) the responsibilities of the Undertaking were transferred to the GSA. The Authority was in charge of signing the concession contract which though needed further negotiations. The questions still opened regarded the share of risks between the private and public sectors, in particular those associated with the design and the market. With respect to design risks, the difficulty stemmed from the fact that the development and validation phase had been carried out by ESA but the respective risk on the operations were to be transferred to the concessionaire; concerning the market risk, as underlined, the industry considered the revenues forecasts too optimistic with no margin for return on their investments. In addition, eventual revenues would have come from receivers manufacture and sale, rather than from operating the system as proposed to the concessionaire. As a result, it was not acceptable to the private sector to bear the bulk of such risks.

As the negotiations stalled in 2007, the GSA never really operated and took over a new role following the redirection of the Galileo project by the EC, the EP and the Council.

The new governance set up in the framework of a totally public programme implies a clear political role of the EU. In fact, based on the 2008 Regulation, the EC is responsible for the management of the programme and ESA is the delegated procurement agent, while the GSA became an EU agency in charge of commercial and security aspects. The political oversight rests on the EP and the Council, as annually the EC presents them with the preliminary draft budget and a report on the implementation of the programmes. In addition, the Galileo Interinstitutional Panel (GIP), composed by representatives of the EC, the EP and the Council, guarantees tight cooperation among the three institutions, while closely following the progress, management and governance of the programmes among other things. As recognized by the EC, this new governance structure is a major innovation in the EU history, since for the first time the EU becomes the owner of an infrastructure. All together the three EU institutions share the political responsibility of Galileo, which is also coherent with the EU shared competence in space matters established by the Lisbon Treaty (art 4(3) and art 189 of the TFEU). Such framework is also clearer and simpler in terms of division of responsibilities and roles, as control is now hierarchical rather than diffused. Although between 2008 and 2011 some progresses have been achieved, delays and cost overruns cannot be excluded in the future as the seriousness of the situation when the EC took over responsibility in 2008 has continued to have an impact on the project.

### 3.1.4 Security and defence implications for Galileo

Since its inception, Galileo has been envisaged as civilian system under civilian control, which made it different from the American and Russian GNSS. The security and defence aspects of Galileo have a twofold dimension: one external and one internal. The first, relates to the dispute that arose between the EU and the US on a number of security issues; the second reflects diverging positions among EU MS as to the use of PRS for military purposes.

MS had initially no interest in the military use of Galileo as they had, and still have, GPS signal embedded into many aspects of their armed forces, especially armaments systems, aircrafts, and vehicles. The transatlantic divide over Galileo structured around the traditional dynamics of EU-US relations: on the one side, the EU seeking deeper integration on economic and political grounds, as well as greater strategic independence; on the other, the US irritated by the EU ally that, though militarily weaker, proved less and less deferential<sup>34</sup>. Interestingly, it was the US first that launched a contentious reflection on the security and defence aspects of Galileo. Starting in 2001 the US directly expressed their concerns and opposition to the Galileo project, based on security reasons<sup>35</sup>. The question related to the eventual unfriendly use of Galileo by US' enemies and to the overlay between both the (encrypted) PRS and the OS signals and the American military M-Code signal in the high frequency band. In fact, the possibility of intentional degradation of GPS to the benefit of the US military and to the disadvantage of enemies was being made meaningless by the European civil GNSS. In addition, the overlap would have created degradation effects on GPS performance and reliability through accidental interference. The reluctance of the US was overcome after four years of intensive negotiations which allowed to move from competition to cooperation through an agreement reached in 2004. In fact, the EU agreed to change the modulation of the PRS signals so they would not interfere with encrypted GPS signals at the service of US military and/or NATO. This also guarantees that the US will be able to jam their GPS signals without affecting Galileo's and vice-versa. The final signal modulation was established in 2006 by the EU-US Working Group on GPS and Galileo compatibility and interoperability. Agreements on radiofrequencies allocation and compatibility were also concluded between the EU and Russia (2006) and the EU and Japan (2010), while tough negotiations with China are still ongoing with respect to military signals overlay as the country prepares to deploy its own navigation system, Beidou<sup>36</sup>.

Another motive of concern on the US side related to the EU opening Galileo to international cooperation. In particular, the EU had envisaged a collaboration with China which was aimed at increasing the possibilities of penetrating the promising Chinese aerospace market. In turn, China was to have a privileged access to European valuable know-how and space technology<sup>37</sup>. The US discontent was rooted in a security argument precisely tied to the danger of China acquiring sensitive technologies and using the European GNSS to become a direct competitor. Notwithstanding the EU-US 2004 agreement, the Chinese question remained open, with the US requiring guarantees that the cooperation remained within the limits of the arms embargo<sup>38</sup>. However, in the end, China's expectations as to technology transfers were deemed too elevated by the EU, thereby bringing to an end the cooperation with the wounding up of the GJU in 2006, of which China was a member. Cooperation talks with other countries, such as Israel, Brazil, Mexico, Chile, Canada, Argentina, and

---

<sup>34</sup> James A. Lewis, *Galileo and GPS: from competition to cooperation*, Centre for Strategic and International Studies (CSIS), Washington DC. June 2004

[http://csis.org/files/media/csis/pubs/040601\\_galileo\\_gps\\_competition\\_coop.pdf](http://csis.org/files/media/csis/pubs/040601_galileo_gps_competition_coop.pdf)

<sup>35</sup> In the US' view there were also economic and industrial reasons for opposing the system, which however cannot be treated here.

<sup>36</sup> Peter B. de Selding, *Europe, China at impasse on satellite navigation*, Space News, 20 January 2011

<http://www.spacenews.com/civil/110120-europe-china-impasse.html>

<sup>37</sup> Nicola Casarini, *Stars and Dragons: the EU and China*, Memorandum for the European Union Committee, UK House of Lords, April 2009

<http://www.publications.parliament.uk/pa/ld200910/ldselect/ldcom/76/76we03.htm>

<sup>38</sup> Looking Forward to interoperability, cooperation and market development, Proceedings of the Third Annual CFE Workshop on GPS and Galileo, IFRI, Paris, 14 December 2004

<http://www.ifri.org/files/CFE/GPSGalileo2004.pdf>

Australia were also interrupted, apparently having also proved counterproductive to the aim of strategic independence<sup>39</sup>.

From an internal point of view, the discussions related to the military use of PRS are still ongoing among MS<sup>40</sup>. However, today, it is more a matter of how to access the service, rather than putting into question the defence use as in the past. The intrinsic characteristics of space technology, being dual use, as well as of Galileo PRS, being encrypted and highly precise, has allowed since the beginning to envisage a military use of the system in the wider framework of public uses (police, customs, fire brigades, civil protection, etc.)<sup>41</sup>. The PRS was planned for serving civil governmental security and safety agencies, but its interest to military authorities has also emerged over the years. France did take into consideration the use of Galileo for defence purposes, in line with what it considered the aim of a European GNSS: strategic independence. Similarly, in 2006, Belgium, the Czech Republic, Greece, Italy, Luxembourg, Slovakia, Spain, Sweden, Poland, Portugal, the Netherlands, Denmark, and Ireland expressed their interest in defence uses<sup>42</sup>. On the contrary, the UK has always appeared sceptical on this possibility given the existence of GPS, also used in the NATO operational context. According to the UK, the civilian nature of Galileo thus excluded any military use<sup>43</sup>.

Following the re-profiling of the programme, it was the EP that took a decisive stance with respect to the PRS use. In its resolution on *Space and security* adopted in the summer 2008, the EP underlined 'the necessity of Galileo for autonomous ESDP operations, for the Common Foreign and Security Policy, for Europe's own security and for the Union's strategic autonomy; notes that, in particular, its public-regulated service will be vital in the field of navigation, positioning and timing, not least in order to avoid unnecessary risks'<sup>44</sup>. This resolution, adopted with a large majority, may have not only helped to shape a more positive dialogue among MS, but also led to a wider consensus on the use of the PRS. As mentioned, in 2010 the EC proposed rules on the service access which are currently under scrutiny of the EP and the Council. The latter has identified one of the main principles of PRS access as follows: 'Each of them [the member states, the Council, the Commission and the European External Action Service] will decide whether to use the PRS within their respective competences, and it is up to them to

---

<sup>39</sup> See Laurence NARDON and Christophe VENET, Galileo: the long road to European autonomy, The Europe & Space series, No. 2, December 2010

[http://ifri.org/index.php?page=contribution\\_detail&id=6510&id\\_provenance=103&provenance\\_context\\_id=7](http://ifri.org/index.php?page=contribution_detail&id=6510&id_provenance=103&provenance_context_id=7)

<sup>40</sup> MS are discussing within the Council on the rules of PRS access. In addition, Denmark, France and the UK have parliamentary scrutiny reservations on the EC proposal on such rules. See Council of the European Union, Interinstitutional file 2010/ 0282, Report from COREPER to the Council, 24 March 2011

<http://register.consilium.europa.eu/pdf/en/11/st07/st07725.en11.pdf>

Furthermore, in April, French defence authorities were reported being reluctant to order PRS receivers given the doubts on Galileo schedule. See Peter B. de Selding, *France reluctant yet hopeful on cooperative military space programs*, Space News, 5 April 2011. <http://www.spacenews.com/military/110405-questions-euro-coop-milspace.html>

In addition, Denmark, France and the UK have parliamentary scrutiny reservations on the EC proposal on PRS rules. See Council of the European Union, Interinstitutional file 2010/ 0282, Report from COREPER to the Council, 24 March 2011

<http://register.consilium.europa.eu/pdf/en/11/st07/st07725.en11.pdf>

<sup>41</sup> See Xavier Pasco, Galileo: the cornerstone of the European space effort, 2003

<http://www.frstrategie.org/barreCompetences/espace/doc/GALILEO.pdf>

<sup>42</sup> See EC proposal for a decision of the European Parliament and the Council on the detailed rules for access to the public regulated service offered by the global navigation satellite system established under the Galileo programme, p. 6.

<sup>43</sup> See Transport Committee, UK House of Commons, Galileo, Eighteenth Report of Session 2003-2004, 17 November 2004

<http://www.publications.parliament.uk/pa/cm200304/cmselect/cmtran/1210/1210.pdf>

<sup>44</sup> European Parliament resolution on Space and security, 10 July 2008, cit. par 12

<http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P6-TA-2008-0365&language=EN>

authorise users and the uses that may be made of the PRS<sup>45</sup>. The last part of the sentence implicitly refers to defence authorities and military uses.

In line with this stance, but also addressing the question of costs, the EP's Industry, Research, and Energy Committee, in its Report on the same proposal preceding a vote by the Parliament in September 2011, has taken the view that: 'Participation in the PRS is optional for each Member State. By the same token, the Member States take individual decisions about the way the PRS is to be used and whether users should pay for this service (in that connection, it should be borne in mind that GPS is free)<sup>46</sup>. In any case, the EP suggested that MS should bear the cost and not users<sup>47</sup>. The question of costs then is not yet clarified<sup>48</sup>, as the options range from operating costs of PRS to be borne by users on a non-commercial basis, as pointed out by the Transport Council<sup>49</sup>, to MS discretion on whether charging or not their governmental users, always on non-commercial basis. In addition, some more reservations and disagreements with respect to specific rules on PRS access remain among MS, the Council, the EP and the EP<sup>50</sup>, however the main issue of using the PRS for military purposes is today overcome.

### 3.2 Industrial and technological issues

The European aerospace industry plays a fundamental role on the global market, as it meets a significant share of the world's commercial orders for satellites manufacture and launch, delivering systems and launch services in the fields of telecommunications, navigation and Earth observation. In the last thirty years, the space sector in Europe has been considerably shaped by ESA, which through its science and technology programmes funded by MS has allowed national industries to participate in space systems and related applications development. Such involvement has been based on the core principle of ESA's industrial policy, that is, the **geographic return rule**. The latter has allowed industries in the different ESA countries to receive industrial contracts proportional to the financial contributions channelled by the respective MS. Though consolidating the capacities of the aerospace industries, such practice is considered little conducive to competitiveness across Europe.

On different grounds, the EC has tried to favour the emergence of a more competitive aerospace industry bringing space into its policies, such as Galileo for its transport policy, as well as in its research and development (R&D) programmes, such as the Space Theme in the 6<sup>th</sup> and 7<sup>th</sup> Framework Programmes. Albeit participation by European companies in these programmes is consistent across the EU, these R&D efforts appear to be little conducive to the effective procurement of related space systems, applications and services. In any case, all EC's initiatives, including procurement, are based on

---

<sup>45</sup> Press Release, 3080th Council meeting Transport, Telecommunications and Energy Brussels, 31 March 2011, cit. par. "Rules for access to the Public Regulated Service offered by the Galileo navigation satellite system"

<http://europa.eu/rapid/pressReleasesAction.do?reference=PRES/11/84&format=HTML&aged=0&lg=en&guiLanguage=en>

<sup>46</sup> European Parliament Draft Report on the proposal for a decision of the European Parliament and of the Council on the detailed rules for access to the public regulated service provided by the global navigation satellite system established under the Galileo programme, 10 January 2011, cit. p. 15

<http://www.europarl.europa.eu/oeil/file.jsp?id=5878432>

<sup>47</sup> *Ibid*, Amendment 1, Recital 2, pp. 5.6

<sup>48</sup> *Ibid*

<sup>49</sup> See EC proposal for a decision of the European Parliament and the Council on the detailed rules for access to the public regulated service offered by the global navigation satellite system established under the Galileo programme, p. 2

<sup>50</sup> For instance, Denmark, France and the UK have parliamentary scrutiny reservations on the EC proposal. See Council of the European Union, Interinstitutional file 2010/ 0282, Report from COREPER to the Council, 24 March 2011

<http://register.consilium.europa.eu/pdf/en/11/st07/st07725.en11.pdf>

**competitive rules**, in compliance with the normative of the internal market and with the principles of transparency, non-discrimination, and proportionality.

Since the 1990s space companies have constantly increased their activities, while consolidating through mergers and acquisitions. However, as of today, the European aerospace industry is characterized by both fragmentation across Europe and concentration of big industries, often referred to as “aerospace giants”, in a small group of ESA countries, namely France, Germany, Italy, and the UK. This is particularly true in the manufacturing sector, embedded in a broader and evolving aerospace, security and defence reality, and in the launchers sector, vital for an independent European access to space. Such companies develop both civilian and military space technologies and systems, therefore operating in a strategic industrial sector that clearly raises national interests, making MS real stakeholders. For this reason governments are at times represented in these companies’ shareholdings, a factor affecting a level playing field for all industries. This is the case of four of the major European aerospace undertakings: EADS, Finmeccanica, Thales, and Safran in which a number of MS governments are shareholders<sup>51</sup>. To these instances, it should be added the particular case of the launch services company Arianespace, where a number of MS play a direct role<sup>52</sup>. As for the space services sector, where satellite telecommunications operators have shaped a highly competitive environment, while Earth observation and navigation industries have at present only a certain potential for growth, SMEs (both space and non-space) are emerging as important actors, bringing diversification and dynamism to the sector. However, their role is still very limited in the space supply chain and they still face certain barriers to entry.

These features of the European space industry, as well as the conflicting rules of ESA and the EC, namely geographic return vs competition, reflect the difficulties encountered in the development phase of Galileo and in the negotiations for a PPP concession for the deployment and operations phases.

The industrial organization of the development phase was characterized by a joint venture of leading European space companies, named Galileo Industries (Galn) and then renamed European Satellite Navigation Industries (ESNI), selected by ESA. The consortium represented the prime contractor for the development and delivery of the Galileo infrastructure, which however soon run into delays and extra-costs. It appears that ESA had no other choice, but to select such consortium in the absence of real competition. The same applied for the choice of subcontractors, which did not respond to cost and schedule efficiency, rather to political and industrial constraints<sup>53</sup>. The industrial group experienced internal disputes and lacked clear leadership, as well as efficient management. The selection process was also made difficult by disagreements between ESA MS as to the industrial leadership and share of work of their companies within the ESA programme dedicated to Galileo, which they were willing to heavily support with their financial contributions. In the end, France, the UK, Germany and Italy came to agree the equal share of 17% each<sup>54</sup>. In any case, following these difficulties, along with their associated

---

<sup>51</sup> The Italian government in Finmeccanica (30.02%), the French government in Thales (27%) and Safran (30.02%) as well as in EADS along with the Spanish government. In addition, Germany is considering to become, at least temporarily, a shareholder in EADS to replace the German company Daimler, which is willing to sell its share. See *German government to take a stake in EADS*, Security and Defence Agenda, 5 September 2011

<http://www.securitydefenceagenda.org/Contentnavigation/Library/Libraryoverview/tabid/1299/articleType/ArticleView/articleid/2881/German-government-to-take-a-stake-in-EADS.aspx>

<sup>52</sup> France, Italy, Spain and eventually Germany if it will become one of EADS’ shareholders (see note 51)

<sup>53</sup> See European Court of Auditors, The management of the Galileo programme’s development and validation phase

<sup>54</sup> See Laurence Nardon, Galileo and the profit motive, Note de l’IFRI, March 2007

[www.ifri.org/downloads/NardonGalileo.pdf](http://www.ifri.org/downloads/NardonGalileo.pdf)

delays and costs overruns, ESA decided in 2007 to resettle the industrial organization in charge of the in-orbit validation phase (IOV), acting itself as the prime contractor<sup>55</sup>.

As mentioned, a similar situation occurred in the context of the tender process managed by the GJU, though the selection was established on competitive basis. There again the intervention of MS contributed to the stall of negotiations for the PPP concession.

On the contrary, the current procurement system, which responds to the EC rules based on open access and fair competition, has allowed to award a number of European industries with contracts for the six work packages. Beside some of the European aerospace giants who have obtained contracts, smaller and emerging industries have also been awarded, in line with the principle of level-playing field for all potential bidders established by the 2008 Regulation<sup>56</sup>. This system of procurement is little appreciated by ESA MS who obviously favour the traditional geographic return principle.

As for the downstream sector, comprising services providers and SMEs, it was the one expected to largely benefit, both directly and indirectly, from the different and numerous applications to be developed and commercialized. The EC has tried since the beginning to foster the expansion of innovative applications and products through different initiatives, ranging from the Framework Programmes to the GSA activities. However, the FP have been considered little conducive to market development and results of the first projects were never really exploited or consolidated<sup>57</sup>. In order to involve the downstream sector in services and applications development and make it more aware of the opportunities generated by Galileo, the EC also published a Green Paper on Satellite Navigation Applications followed by a public consultation and the abovementioned Galileo Open Service Signal-In-Space Interface Control Document. However, the real and direct revenues provided by Galileo to the downstream sector will be only assessable once the system will be fully deployed and operational, in particular with the provision of the CS, the only profitable service beside the PRS. As mentioned, the EC has estimated that direct revenues from these services will annually amount to 70 million euro in the long term.

### **3.3 Economic and social issues**

When Galileo was launched at the end of the 1990s, figures on potential revenues were mostly based on assumptions and on innovative applications to be developed, as well as on the expectation that Galileo would have been operational by 2008, before competition from the American GPS and the Russian GLONASS could become stronger in light of their technological advancements and upgrades.

As mentioned, different business plan studies were conducted at the beginning of the 2000s by private consultancies and aerospace industries involved in the Galileo project, which estimated an annual global economic impact ranging from 7 to 9 billion euro between 2012 and 2027, while the aggregated market for products and services was envisaged to amount to 400 billion euro by 2025<sup>58</sup>. However, such figures soon proved too optimistic, thereby strongly limiting the willingness of the private sector to engage in the PPP concession and to accept the transfer of the market risk.

According to the GSA market report released in October 2010, the global annual market for navigation satellite products and services in the period 2010-2012 will range between 133 and 167 billion euro and

---

<sup>55</sup> See European Court of Auditors, The management of the Galileo programme's development and validation phase

<sup>56</sup> See Regulation (EC) No 683/2008, art. 17

<sup>57</sup> See European Court of Auditors, The management of the Galileo programme's development and validation phase

<sup>58</sup> See Laurence Nardon, Galileo and the profit motive

is expected to constantly grow over the next decade (11% annual growth rate)<sup>59</sup>. By 2020 it should reach a size of 244 billion euro, of which the core global GNSS market<sup>60</sup> should account for 165 billion euro. In this context, Europe is expected to capture 20% of the global market thanks to its own GNSS.

Beside these promising figures, which to some extent remain uncertain and based on a number of assumptions, the EC has recognized that the economic and social benefits deriving from the Galileo and EGNOS systems are similar to those ensuing from the wide use of the Internet and its services. In this sense, Galileo and EGNOS' services are estimated at an aggregate of between 60 and 90 billion euro for the period 2010-2027<sup>61</sup> and, contrary to the initial expectations on high profitability, today the EU has come to acknowledge and highlight the intrinsic public utility of the European GNSS systems and therefore the need for adequate EU funding to complete the programmes. As a result, beside direct revenues deriving from the core global GNSS market presented above, the European economy and society will also take advantage of:

- indirect benefits resulting from the emergence of innovative applications, like more efficient production cycles in agriculture or transport management;
- direct benefits resulting from the growth of the space sector, in terms of market expansion, job creation, and technology transfers.

As a matter of fact, today Galileo is better appreciated as a public utility with large economic and social benefits, rather than a profitable commercial system. The fragile initial assumption on elevated revenues therefore created misleading expectations for both the public and private sectors.

---

<sup>59</sup> GSA, GNSS Market Report, Issue No.1, October 2010, <http://www.gsa.europa.eu/files/dmfile/GSAGNSSMarketreportIssue1.pdf>

<sup>60</sup> Retail price that are directly attributable to GNSS, like chipset, maps, navigation software, etc. *Ibid*

<sup>61</sup> Report from the Commission to the European Parliament and the Council, Mid-term review of the European satellite radio navigation programmes

## 4. LESSONS LEARNED AND RECOMMENDATIONS

Although the Galileo programme represents both a unique European experience and test case in terms of space, technological and infrastructural projects, general but important lessons learned can be drawn from its management and funding for future space initiatives. Indeed, the positive and negative experiences gained throughout the ten-year programme, will be particularly valuable in the exercise of the new EU shared competence in space matters established by the Treaty of Lisbon. The critical analysis that preceded showed how political, industrial/technological, and economic aspects have influenced the management and funding of the Galileo programme. These issues could have similar effects on future space systems funded by the EU, but of course not all of them would necessarily be relevant at the same time or to the same degree to all programmes.

Following this analysis, four main lessons learned and related recommendations for future space systems are proposed, for which the political, legislative and budgetary powers of the EP can be determinant.

### Lesson learned 1: dual-use nature and civil-military synergies

The different perceptions on the **rationale** of the Galileo programme – profitability vs. independence - among MS played against the common interest of delivering on time an autonomous GNSS to the service of Europe for a wide range of needs. Concerning the latter, MS have only recently come to really accept the possibility of military use of the PRS, which being encrypted and dedicated to governmental use has naturally embedded such prospect. Though Galileo is a civilian system under civilian control, the dual-use principle goes in the direction of increased civil-military synergies in the field of the Common Security and Defence Policy (CSDP) as highlighted by the EP resolution of 2008 on *Space and security*. Of course this does not imply that the EU must always find a military use of space systems, rather that it can consider them advantageous in terms of rationalization of resources and technological advancement. As in the case of Galileo, the military use represents both an added value and an option on which MS can debate and decide based on European military capabilities needs.

The defence and security aspects of Galileo have entailed long and partly successful negotiations with a number of third countries, such as the US, Russia, and China. In addition, many others were also initially invited to cooperate in the programme in light of mutual benefits. This reality should stand as a reminder that in an interdependent globalised world, where space is considered a global common, compromise and international cooperation are possible and should be sought, both for civil and military purposes.

### Recommendation 1: taking forward dual-use systems and civil-military synergies

In this respect the EP could reinforce the political consensus about a European dual-use policy and civil-military synergies, also contributing to their definition and improving coordination between civil and military space programmes. In fact, as of today, space programmes are characterized by fragmentation, divided in national and European initiatives based on civil, military and dual-use needs separately. It is indeed a direct lesson learned from the Galileo programme, but represents a very important issue for future technological development in Europe.

### Lesson learned 2: governance

The heterogeneity of the actors normally involved in European space activities – EU, ESA, their respective MS, industry – make of **governance** an important aspect not only for single space programmes, but also for the whole European space sector.

As showed, the initial governance structure established for Galileo was little conducive, characterized by weak accountability lines, and by concurrent and contrasting roles of single actors. The reorganization of the public governance in 2007 has definitely clarified who is the manager – the EC – and who is politically responsible for the programme – the EU with the political oversight of the EP and the Council –, along with the support of a procurement and design agent – ESA – and a specific EU Agency for commercial and security aspects – the GSA. In this framework, the EC, the EP and the Council tightly cooperate in the GIP. This governance set-up has allowed between 2008 and 2011 to bring some progresses in the management and development of the Galileo programme. Notwithstanding, a new governance scheme for the operations phase will be required and is currently debated among the Galileo institutional actors.

### Recommendation 2: shaping the governance of Galileo, GMES and of the European space sector

The new governance framework of Galileo will have to address the post-2013, when the deployment phase and the initial operations will proceed in parallel. For the time being no particular model or scheme has been favoured or clarified. Specifically, it must be defined which entity will operate the two systems, EGNOS and Galileo, with particular attention to the EGNOS SoL and the Galileo PRS, which will be the most critical services between 2014 and 2020, until Galileo FOC will be reached. The FOC will in turn need an adequate governance framework. At present, the options range from the selection of a private operator to the establishment of a new public entity. In alternative, it could be looked at existing structures. For instance, regarding both Galileo and EGNOS, the evolution of the GSA as an operator could be envisaged, as the EC, by statute, can expand the tasks of the Agency. If it is found that the GSA cannot evolve in this sense, then successful models adopted by other public and private organizations in the field of satellite services could be explored (i.e. EUMETSAT, EUTELSAT, etc.). For EGNOS, it could also be looked at Eurocontrol, which is one of the European Satellite Services Provider (ESSP) which delivers at present the EGNOS services, however this would contrast the integration of EGNOS and Galileo, as Eurocontrol is in charge of air navigation only. In addition, it is an intergovernmental organization including non-EU countries, external to the funding of Galileo. Though the array of options excluding existing entities might be wider, it is recommended to maintain a simple governance scheme and to reduce costs by maximizing available resources.

In this context, the cooperation among the EC, the EP and the Council is of paramount importance in order to shape a governance framework that responds to the fundamental criteria of transparency, financial sustainability, and accountability. Any legislative proposal of the EC will be object of the co-decision procedure in which the EP and the Council have equal rights.

The governance issue is of utmost importance also for the other major EU space programme, the Global Monitoring for Environment and Security (GMES). In line with the transfer of responsibility for Galileo and EGNOS to the EC, the latter proposed in 2009 to be the owner of the Sentinel infrastructure on behalf of the EU<sup>62</sup>. Such ownership would mark a clear responsibility of the EC with respect to the

---

62 Communication from the Commission to the European Parliament and the Council, Global Monitoring for Environment and security (GMES): Challenges and Next Steps for the Space Component, COM(2009) 589, 28 October 2009, pp. 4-5,

management of the programme. However, this possibility appears today at odds with the EC proposal for the new MFF which places GMES out of the EU budget (see further). As a result, the governance of GMES remains yet to be defined, casting doubts on the future sustainability of the programme and on the commitment of the private sector, in particular service providers, which in recent years have mostly based their investments on, and geared their services towards, GMES end users' requirements.

In general, as of today, a clear governance of the whole European space sector has yet to be shaped and it is a urgent matter to be solved. Given the EU shared competence in space matters, a closer and effective cooperation based on a rational division of roles among the EU, ESA and their respective MS, the so called "institutional triangle", should be established. In particular, the EU will have to define its relationship with ESA beyond the Framework Agreement, which is still a matter of debate. In this respect the EC has expressed the opinion that 'ESA should continue to develop into an organisation with an intergovernmental and an EU dimension' and that it should be endowed with specific structures to exclusively deal with EU projects<sup>63</sup>. It is likely and desirable that when the EC will present the principal elements of a European space programme, as envisaged by the Treaty of Lisbon (art.189), the governance of the whole space domain will be specified. The EP can actively push and contribute to such a European Space Programme and the related governance.

### Lesson learned 3: funding

**Funding** is the most crucial factor not only for the Galileo programme, but also for any other space endeavour. The failure of the PPP model for financing the programme has confirmed that if no margin of profitability is possible and if high technical and liability risks exist, investments from the private sector cannot be expected. As of today, satellite communications remain the only commercially viable space-based applications, but these too have needed to evolve from public investments in the 1960s-1970s (i.e. INTELSAT, INMARSAT, EUTELSAT) to privatization at the end of the 1990s. Now that satellite communications have matured, reducing the technical risks related to system development, and have become a fruitful business, almost eliminating governments' interventions, the PPP model is increasingly looked at to limit public spending in civil and military satellite communications. This is a clear trend in a number of European countries, such as the UK (Skynet 5), Germany (SatcomBW), Italy (Sigma) and France (investigating the possibility to sell the two Syracuse 3 satellites and the Sicral 2 French payload to a private operator). As result, the PPP approach is considered as a successful model where realistic and clear business plans can be drawn from the outset.

On the contrary, in general Earth observation and navigation systems still need substantial public support for both their development and exploitation. Indeed, both applications are generally heavily subsidized and supported, for instance in the US, where Earth observation companies live off governmental purchases and navigation is publicly financed to guarantee services worldwide on a free basis. These applications might eventually become profitable as their maturation and utility consolidate over the years, opening the possibility for private actors to take over responsibility.

In Europe, the Galileo experience, which entailed the development of a new technology and implied high technical risks, taught that a European global navigation system needed public funding in the end, as it happened in the US, Russia and China. As for Earth observation, on the one side, Europe is at the forefront in the development of remote sensing systems funded by MS, mostly for military purposes.

---

[http://ec.europa.eu/governance/impact/ia\\_carried\\_out/docs/ia\\_2009/com\\_2009\\_0589\\_en.pdf](http://ec.europa.eu/governance/impact/ia_carried_out/docs/ia_2009/com_2009_0589_en.pdf)

63 Communication from the Commission to the European Parliament and the Council, Towards a space strategy for the European Union that benefits its citizens, COM(2011)152, 4 April 2011, cit. p. 11

[http://ec.europa.eu/enterprise/policies/space/files/policy/comm\\_pdf\\_com\\_2011\\_0152\\_f\\_communication\\_en.pdf](http://ec.europa.eu/enterprise/policies/space/files/policy/comm_pdf_com_2011_0152_f_communication_en.pdf)

Commercialization of military applications is improbable, considered state ownership of systems and the sensitivity of information produced, which raise national security interests both at the EU and national level. Nonetheless, some particular models could further evolve towards commercial imagery for security and defence. In fact, PPP for Earth observation systems models are slowly taking ground, like in Germany with the TerraSAR-X and TanDEM-X radar satellites financed by the German space agency (DLR) and EADS Astrium. These satellite systems are of civilian nature, but given their capabilities and technical features (1 meter resolution, confidentiality secured through anonymous and encrypted processes, data download directly to fixed or mobile ground stations) they are able to meet important security and defence needs<sup>64</sup>. On the other side, the market for civil applications remains very limited. Yet, if the necessary public support is provided to structure such market, there could be margins for commercialization. This way, for instance, the environmental component of GMES (the “E” of the programme) might turn commercially viable in the future, while the security component (the “S” of the programme) falls within the limits already highlighted.

As for other space activities, such as exploration and human spaceflights, space situational awareness (SSA), and space transportation, a major role of the private sector is hardly imaginable. To a limited extent, an exception could be represented by SSA, considered that commercial operators also need to protect their space infrastructure. In this sense they could provide a valuable contribution to SSA by sharing their space-derived information and data, so as to assure safe and responsible operations in space. However, given the degree of dependence on space systems for national security and economy, sovereign states still play the primary role in the field of SSA, where intergovernmental cooperation on global basis should be sought for increased effectiveness and maximization of existing SSA assets and mechanisms.

In general, public funding remains the only viable option to carry out ambitious space programmes as the costs of researching, developing, managing and exploit such systems is beyond the possibilities of any private actor, also considering the elevated risks of technical failures. Of course, in the case of the EU, it is worth using taxpayers’ money for space if a clear common European interest is defined and if the Union wishes to maintain its status of global and space actor. With these prospects and considerations in mind the EU will have to carefully evaluate the possibility of realizing new space programmes paid out of the EU budget, especially if these are geared to space exploration and SSA. Indeed, these activities are of growing interest at the European level, as it emerged from the Seventh Space Council and the recent EC Communication on space policy *Towards a space strategy for the European Union that benefits its citizens*.

As in other policy areas of the Union, funding programmes and activities through the EU budget offers a clear European added value (EAV), especially in a context of shrinking national budgets and fiscal adjustments. EU funded projects and programmes will play then a growing role to address European and global challenges that single MS cannot afford to confront with. In fact, the declining budget trend in MS will particularly affect space spending, which has never been particularly high in European countries (especially if compared to that in the US), with the exception of France. As a result, future space programmes like SSA, space exploration, early warning, electronic intelligence, and integrated systems (satellite communications, Earth observation and navigation) will require a bigger involvement of the EU in order to meet specific European needs and maintain an adequate level of capabilities. At the same time, they will contribute to reach the goals of the *Europe 2020 strategy for a smart, sustainable and inclusive growth*.

---

<sup>64</sup> See official web site of Astrium, <http://www.infoterra.de/geo-intelligence>

As the complexity and costs of these programmes are so elevated, new forms of financing should also be sought. The EC proposal on “project bonds”, aimed to foster the development of strategic infrastructure (like Galileo) with the EU guaranteeing bonds issued by companies to fund large scale projects, goes in this direction. However, for the time being, this remains a matter of heated debate within the EP, the Council and MS themselves, especially as doubts raise on the viability of a similar mechanism in times of critical economic and financial crisis.

The recent EC proposal on the next MFF casts doubts on the availability of European funds for future space programmes. Indeed, the EC has foreseen two different funding models for its two flagship programmes, Galileo and GMES. Both are considered “large scale programmes”<sup>65</sup>. As such, they are characterized by long-life cycles that exceed the MFF itself, technical risks that cause extra-costs, limited or no private investments, and uncertain economic revenues. These are indeed the features that have brought to the failure of the PPP for Galileo and consequently to its public funding. However, whereas the EC proposed that Galileo be totally funded by the EU budget with 7 billion euro over the period 2014-2020, GMES has been placed out of the EU budget and subject to the funds allocated by single governments. Such proposal is obviously incoherent not only with the declared priorities of European space policy – the completion of Galileo and GMES – just recently confirmed by the EC Communication on space policy, but also with the expectations of the Council and of the EP. Indeed, both institutions consider that the two programmes should continue to be adequately financed by the EU budget<sup>66</sup>. In addition, the EP, which has always supported space policy, will lose its say on GMES if it is placed outside the MFF. The EP had even urged in the past ‘that consideration be given to a possible new specific budget line for the ESP [European space policy]’<sup>67</sup> and, more recently, asked that ‘any future allocation of funds to EU space initiatives, such as Galileo, be under a separate heading and additional to research and innovation funds’<sup>68</sup>.

If no consensus is reached as to complete GMES financing under the EU budget, which is the preferable option, the possibility to fund at least the environmental component of the programme (the “E” of GMES) should be taken into consideration. Indeed, up to now, most investments at EU level have been channelled to environmental services which have considerably matured (land, marine, atmosphere and the contribution to the fight against climate change deriving from these three service areas), while security services are the least developed. It might be deemed that national assets for security and defence are sufficient. In fact, military Earth observation systems owned by MS are increasingly sophisticated, as most of these systems are now entering their second generations (i.e. Italian Cosmo-SkyMed, French Helios, German SarLupe) while also operating in cooperative frameworks (bilateral

---

65 Commission Staff Working Paper, A Budget for Europe 2020: the current system of funding, the challenges ahead, the results of stakeholders consultation and different options on the main horizontal and sectoral issues, SEC(2011)868, 29 June 2011, pp. 41-49

[http://ec.europa.eu/budget/library/biblio/documents/fin\\_fw1420/SEC-868\\_en.pdf](http://ec.europa.eu/budget/library/biblio/documents/fin_fw1420/SEC-868_en.pdf)

66 See Council Conclusions 3094<sup>th</sup> Competitiveness, 31 May 2011, par. 5

[http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/intm/122342.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/intm/122342.pdf);

Special committee on the policy challenges and budgetary resources for a sustainable European Union after 2013, Report on Investing in the future: a new Multiannual Financial Framework (MFF) for a competitive, sustainable and inclusive Europe, 26 May 2011, p. 15

<http://www.europarl.europa.eu/oeil/FindByProcnum.do?lang=en&procnum=INI/2010/2211>

67 European Parliament resolution on the European space policy: how to bring space down to earth, 20 November 2008, cit. par. 17

<http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P6-TA-2008-0564&language=EN>

68 Special committee on the policy challenges and budgetary resources for a sustainable European Union after 2013, Report on Investing in the future: a new Multiannual Financial Framework (MFF) for a competitive, sustainable and inclusive Europe, cit. p. 55

agreements such as Cosmo-SkyMed/Helios and SarLupe/Helios or multilateral agreements like MUSIS). However, it is particularly complex to put cooperation into practice when it comes to sharing strategic capabilities and sensitive information in the defence field and when individual systems are characterized by different ownerships, data policies and standards. As a result, the security component of GMES (the "S"), organized at the EU level in terms of governance and data policy, would nonetheless represent an important common asset for EU external action and in particular for CSDP, on which they could rely.

On their part, ESA and the private sector have already expressed their deep concerns with respect to the proposal and to the future of the programme<sup>69</sup>. Cautious voices from the GMES community have advanced the view that this unexpected proposal on the part of the EC is a provocation to prompt more political backing from MS to allocate additional funds for GMES in the MFF. As a matter of fact, a group of MS has officially criticized the EC proposal on the creation of a separated fund for GMES out of the budget, in a wider complaint for the MFF which is considered too high<sup>70</sup>.

### Recommendation 3: supporting adequate funding for GMES, Galileo, and future space programmes and systems

Based on its budgetary power, the EP will have a strong say on the whole MFF during the delicate negotiation procedures with the Council necessary to adopt the budget. In this respect, it is recommended to maintain the spirit and commitment proved during the 2008 budgetary procedure to secure the financing of Galileo, so as to provide funds also for GMES and securing Galileo's proposed budget. Such eventual result would show the EU's coherence with previous investments and engagements, as well as its political will to pursue an effective European space policy. This could in turn establish a stronger precedent, first set by Galileo, for space systems funded by the EU budget. These, it should be borne in mind, need both long-term political and financial commitments.

As for financial instruments supporting the space sector, along with new initiatives (see project bonds above), existing ones, such as the EC Framework Programmes for R&D or the European Investments Bank's financing mechanisms (i.e. Risk Sharing Finance Facility) should be maximized. As the space sector needs adequate resources, and even limited additional ones can make a difference, there is room for improvement in the context of the future Horizon2020.

### Lesson learned 4: specificity of the aerospace sector

The European aerospace industry will be the protagonist of future space systems, therefore it will need a suitable **regulatory framework** and a competitive environment to effectively operate. As showed, the initial industrial organization designed for both the development and deployment phases of Galileo resulted little efficient due to its limited competitiveness, to different rules applied by ESA and the EC, and to industrial disputes over the share work to be awarded. This caused delays and costs overruns, as well as further divides among MS siding their national companies.

---

69 See EARSC Position Paper, The threat to GMES, July 2011

<http://www.earsc.eu/eonotes/earsc-activities-news>

See P.B. De Selding, ESA protests Earth observation programme's removal from Multiyear budget proposal, Space News, 22 July 2011

<http://www.spacenews.com/civil/110722-esa-protests-gmes-removal-budget.html>

<sup>70</sup> *8 pays jugent trop élevée la proposition sur le cadre 2014-2020*, Bulletin Quotidien Europe, Agence Europe, 13 September 2011

The space sector has been recognized by the EU as an important component of an integrated European industrial policy. In the Communication *An Integrated Industrial Policy for the Globalisation Era - Putting Competitiveness and Sustainability at Centre Stage* (October 2010), within the flagship initiative Europe 2020, the EC has referred to space as a “driver for innovation and competitiveness at citizens’ service”, thus highlighting the need to pursue a specific space industrial policy developed in collaboration with ESA and MS<sup>71</sup>. This is also in line with the Treaty of Lisbon, which provides in art. 189(1) (TFEU) that a European space policy shall be established to promote, among other things, industrial competitiveness.

A European space industrial policy should pursue objectives such as the consolidation of the European space industrial base that include SMEs, expansion of the space-based applications and services market to the benefit of a variety of sectors (agriculture, transports, tourism, etc.), stronger penetration of the global market through the development of innovative technologies and applications, increased independence in cutting-edge technologies and specific space-subsectors, consistent R&D policies and programmes. These goals will be made easier to accomplish if a well defined regulatory framework is in place and if financial instruments, as underlined, are available.

#### Recommendation 4: supporting the improvement of the regulatory framework of the aerospace sector

Along 2011 the EC will draw up a space industrial policy and the EP should make sure that these goals are pursued in an efficient way, with the adequate financial support and certainty on regulatory frameworks. It is recommended that such policy takes into consideration the specificities of the sector, namely, the high-technology nature, the industrial reality described, the modest size of the market, and the role of public funding (also outside the EU). Regarding regulatory matters for the space industry, as in other specific, “non-traditional”, and strategic industrial sectors, like defence, there’s room for EU action, provided that harmonization of the laws and regulations in the field of space is explicitly excluded by the Lisbon Treaty (art. 189(2) TFEU). In any case, some EU directives already touch the aerospace sector, in particular its “military dimension”. This is the case of the directives on the simplification of intra-EU transfers of defence-related products (2009/43/EC) and on defence and security procurement (2009/81/EC), currently being transposed and implemented in all MS. These directives are aimed at stimulating further integration of the European defence market based on common rules, so as to strengthen the industrial and technological base. This is a worthy and ambitious goal which should be pursued also for the “civil dimension” of the aerospace sector. In fact, it would be important to investigate at the EU level opportunities for a specific regulatory framework for the purchase of civil space-based services and products. Otherwise, this would either fall under the directive on the coordination of procedures for public procurement in the EU (2004/18/EC) which does not address the specificity of the aerospace sector or left to the discretion of EU MS, which could create further fragmentation of the aerospace market with negative effects. Thus, it is recommended that the EU launch initiatives in terms of best practices or model laws or specific arrangements. MS could also play a concerted role, for instance drawing on the experience of the Code of Conduct on defence procurement (CoC), a voluntary and non-legally binding regime implemented in the framework of the European Defence Agency (EDA) and aimed at fostering an internationally competitive European

---

71 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *An Integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Centre Stage*, COM (2010)614, October 2010, pp- 24-25, cit. p 24

[http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/files/communication\\_on\\_industrial\\_policy\\_en.pdf](http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/files/communication_on_industrial_policy_en.pdf)

Defence Equipment Market (EDEM). Indeed, procurement rules are crucial elements because today the diverse sets of norms in place (competition vs. geographic return) cause inefficiencies and distortions in the sector, though having both advantages. The options to solve these incoherencies are either a gradual convergence of the sets of rules into a common approach or the abandonment of the geographic return, though through a clearly planned path and defined time framework, along with more financial commitments by the MS to the EU space programmes.

## BIBLIOGRAPHY

### Articles, proceedings, reports and studies

- Bertran, X. and Vidal, A., *The implementation of a public-private partnership for Galileo. Comparison of Galileo and Skynet 5 with other projects*, Proceedings of the 18th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS 2005), Long Beach Convention Center, Long Beach, CA, 13-16 September 2005  
[http://spacejournal.ohio.edu/issue9/pdf/Implement\\_Public-Private.pdf](http://spacejournal.ohio.edu/issue9/pdf/Implement_Public-Private.pdf)
- Casarini, N., *Stars and Dragons: the EU and China*, Memorandum for the European Union Committee, UK House of Lords, April 2009  
<http://www.publications.parliament.uk/pa/ld200910/ldselect/lddeucom/76/76we03.htm>
- B. De Selding, P., *Europe, China at impasse on satellite navigation*, Space News, 20 January 2011  
<http://www.spacenews.com/civil/110120-europe-china-impasse.html>
- \_\_\_\_\_, *ESA protests Earth observation programme's removal from Multiyear budget proposal*, Space News, 22 July 2011  
<http://www.spacenews.com/civil/110722-esa-protests-gmes-removal-budget.html>
- \_\_\_\_\_, *European governments trim Galileo system cost overruns*, 22 June 2011  
<http://www.spacenews.com/civil/110622-euro-goverts-trim-galileo-overruns.html>
- *The threat to GMES*, EARSC Position Paper, July 2011  
<http://www.earsc.eu/eonotes/earsc-activities-news>
- European Commission, *Galileo: financial aspects*, Air & Space Europe, 1:2, 1999
- \_\_\_\_\_, *Galileo: organizational framework*, Air & Space Europe, 1:2, 1999
- Froelich, A., *Space and the complexity of European rules and policies: the common projects Galileo and GMES – precedence for a new European legal approach?*, Acta Astronautica, 66 (2010), pp. 1262-1265
- Giegerich, B., *Navigating differences: transatlantic negotiations over Galileo*, Cambridge Review of International Affairs, 20:3, September 2007, pp. 491-508
- Lembke, J., *The politics of Galileo*, European Policy Paper No. 7, April 2001, European Union Center for West European Studies, University of Pittsburg  
[http://www.ucis.pitt.edu/euce/pub/policypapers/2001-Politics\\_of\\_Galileo.pdf](http://www.ucis.pitt.edu/euce/pub/policypapers/2001-Politics_of_Galileo.pdf)
- A. Lewis, J., *Galileo and GPS: from competition to cooperation*, Centre for Strategic and International Studies (CSIS), Washington DC. June 2004  
[http://csis.org/files/media/csis/pubs/040601\\_galileo\\_gps\\_competition\\_coop.pdf](http://csis.org/files/media/csis/pubs/040601_galileo_gps_competition_coop.pdf)
- Lindström, G. with Gasparini, G., *The Galileo satellite system and its security implications*, Occasional Paper no. 44, April 2003, European Union Institute For Security Studies, Paris  
<http://ftp.infoeuropa.euroid.pt/database/000037001-000038000/000037511.pdf>
- Mörth, U., *Public and private partnership as dilemmas between efficiency and democratic accountability: the case of Galileo*, Journal of European Integration, 29:5, pp. 601-617, 2007
- Nardon, L., *Galileo and the profit motive*, Note de l'IFRI, March 2007

[www.ifri.org/downloads/NardonGalileo.pdf](http://www.ifri.org/downloads/NardonGalileo.pdf)

- \_\_\_\_\_, *Galileo and the issue of public funding*, Schrogge Kai-Uwe (ed.) et al., Yearbook on Space Policy 2007/2008, ESPI, Springer, Wien, 2009, pp.125-137
- Nardon, L. and Venet, C., *Galileo: the long road to European autonomy*, The Europe & Space series, No. 2, December 2010  
[http://ifri.org/index.php?page=contribution\\_detail&id=6510&id\\_provenance=103&provenance\\_context\\_id=7](http://ifri.org/index.php?page=contribution_detail&id=6510&id_provenance=103&provenance_context_id=7)
- Pasco, X., *Galileo: the cornerstone of the European space effort*, 2003  
<http://www.frstrategie.org/barreCompetences/espace/doc/GALILEO.pdf>
- Plattard, S., *What's the problem with Europe's flagships Galileo and GMES?*, Schrogge Kai-Uwe (ed.) et al., Yearbook on Space Policy 2006/2007, ESPI, Springer, Wien, 2010, pp.153-165
- T. Salvemini, M., *Financing long-term strategic investment in Europe: which options?*, Draft Paper for the Workshop "The post 2013 financial perspectives: Re-thinking EU finances in times of crisis" promoted by Centro Studi sul Federalismo, European Policy Centre, Istituto Affari Internazionali, Notre Europe, Turin, 7-8 July 2011
- T. Salvemini, M., *Una garanzia europea per rilanciare la crescita*, AffariInternazionali, 10 August 2011  
<http://www.affarinternazionali.it/articolo.asp?ID=1830>
- Wouters, J., *Space in the Treaty of Lisbon*, Schrogge Kai-Uwe (ed.) et al., Yearbook on Space Policy 2007/2008, ESPI, Springer, Wien, 2009, pp.116-124
- *Inception Study to Support the Development of a Business Plan for the GALILEO Programme*, PricewaterhouseCoopers, November 2001,  
[http://ec.europa.eu/dgs/energy\\_transport/galileo/doc/gal\\_exec\\_summ\\_final\\_report\\_v1\\_7.pdf](http://ec.europa.eu/dgs/energy_transport/galileo/doc/gal_exec_summ_final_report_v1_7.pdf)
- *Looking Forward to interoperability, cooperation and market development, Proceedings of the Third Annual CFE Workshop on GPS and Galileo*, IFRI, Paris, 14 December 2004  
<http://www.ifri.org/files/CFE/GPSGalileo2004.pdf>
- *MPs urge action on Galileo costs*, BBC News, 12 November 2008  
<http://news.bbc.co.uk/2/hi/science/nature/7087941.stm>
- *Pros and Cons of Europe's "GPS"*, BBC News, 30 November 2007  
<http://news.bbc.co.uk/2/hi/science/nature/7119176.stm>
- *EU divided over Galileo funding*, BBC News, 2 October 2007,  
<http://news.bbc.co.uk/2/hi/sci/tech/7023457.stm>
- *UK presses private Galileo role*, BBC News, 3 July 2007,  
<http://news.bbc.co.uk/2/hi/sci/tech/7023457.stm>
- *Satellite decisions draws near*, BBC News, 15 March 2002  
<http://news.bbc.co.uk/2/hi/europe/1875177.stm>
- *Funding doubts for Galileo project*, BBC News, 4 December 2001

<http://news.bbc.co.uk/2/hi/business/1691208.stm>

### Official documents

- Communication from the Commission to the European Parliament and the Council, *A European approach to Satellite navigation services*, COM(94) 248, 16 June 1994  
<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/94/577&format=HTML&aged=1&language=EN&guiLanguage=en>
- Communication from the Commission to the European Parliament and the Council on Galileo, COM(2000) 750, 22 November 2000  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2000:0750:FIN:EN:PDF>
- Communication from the Commission to the European Parliament and the Council, *Taking stock of the Galileo Programme*, COM(2006) 272, 7 June 2006  
[http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006\\_0272en01.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0272en01.pdf)
- Communication from the Commission to the European Parliament and the Council, *Global Monitoring for Environment and security (GMES): Challenges and Next Steps for the Space Component*, COM(2009) 589, 28 October 2009  
[http://ec.europa.eu/governance/impact/ia\\_carried\\_out/docs/ia\\_2009/com\\_2009\\_0589\\_en.pdf](http://ec.europa.eu/governance/impact/ia_carried_out/docs/ia_2009/com_2009_0589_en.pdf)
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *An Integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Centre Stage*, COM(2010)614, October 2010  
[http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/files/communication\\_on\\_industrial\\_policy\\_en.pdf](http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/files/communication_on_industrial_policy_en.pdf)
- Communication from the Commission to the European Parliament and the Council, *Towards a space strategy for the European Union that benefits its citizens*, COM (2011) 152, 4 April 2011  
[http://ec.europa.eu/enterprise/policies/space/files/policy/comm\\_pdf\\_com\\_2011\\_0152\\_f\\_communication\\_en.pdf](http://ec.europa.eu/enterprise/policies/space/files/policy/comm_pdf_com_2011_0152_f_communication_en.pdf)
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *A Budget for Europe 2020*, Part I, 29 June 2011  
[http://ec.europa.eu/budget/library/biblio/documents/fin\\_fwk1420/MFF\\_COM-2011-500\\_Part\\_I\\_en.pdf](http://ec.europa.eu/budget/library/biblio/documents/fin_fwk1420/MFF_COM-2011-500_Part_I_en.pdf)
- Regulation (EU) No 912/2010 of the European Parliament and of the Council setting up the European GNSS Agency, repealing Council Regulation (EC) No 1321/2004 on the establishment of structures for the management of the European satellite radio navigation programmes and amending Regulation (EC) No 683/2008 of the European Parliament and of the Council, 22 September 2010  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:276:0011:0021:EN:PDF>
- Regulation (EC) No 683/2008 of the European Parliament and of the Council on *the further implementation of the European satellite navigation programmes (EGNOS and Galileo)*, 9 July 2008  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:196:0001:0011:EN:PDF>

- European Commission Proposal for a decision of the European Parliament and the Council on *the detailed rules for access to the public regulated service offered by the global navigation satellite system established under the Galileo programme*, COM(2010)550, 8 October 2010  
[http://ec.europa.eu/enterprise/policies/satnav/galileo/files/prs-proposal-com-2010-550-final\\_en.pdf](http://ec.europa.eu/enterprise/policies/satnav/galileo/files/prs-proposal-com-2010-550-final_en.pdf)
- Report from the Commission to the European Parliament and the Council, *Mid-term review of the European satellite radio navigation programmes*  
[http://ec.europa.eu/enterprise/newsroom/cf/getdocument.cfm?doc\\_id=6321](http://ec.europa.eu/enterprise/newsroom/cf/getdocument.cfm?doc_id=6321)
- European Parliament resolution on Space and security, 10 July 2008  
<http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P6-TA-2008-0365&language=EN>
- European Parliament resolution on *the European space policy: how to bring space down to earth*, 20 November 2008  
<http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P6-TA-2008-0564&language=EN>
- European Parliament Draft Report on the proposal for a decision of the European Parliament and of the Council on *the detailed rules for access to the public regulated service provided by the global navigation satellite system established under the Galileo programme*, 10 January 2011  
<http://www.europarl.europa.eu/oeil/file.jsp?id=5878432>
- Special committee on the policy challenges and budgetary resources for a sustainable European Union after 2013, *Report on Investing in the future: a new Multiannual Financial Framework (MFF) for a competitive, sustainable and inclusive Europe*, 26 May 2011  
<http://www.europarl.europa.eu/oeil/FindByProcnum.do?lang=en&procnum=INI/2010/2211>
- Resolution of the Council of the EU on *the European contribution to the development of a Global Navigation Satellite System (GNSS)* 19 December 1994.  
<http://eur-lex.europa.eu/Notice.do?mode=dbl&lang=en&ihtmlang=en&lng1=en,it&lng2=da,de,el,en,es,fr,it,nl,pt,&val=303622:cs&page=>
- Presidency Conclusions, Barcelona European Council, 15 and 16 March 2002,  
[http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/ec/71025.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/71025.pdf)
- Council of the European Union, Interinstitutional file 2010/ 0282, Report from COREPER to the Council, 24 March 2011  
<http://register.consilium.europa.eu/pdf/en/11/st07/st07725.en11.pdf>
- Press Release, 3080th Council meeting Transport, Telecommunications and Energy Brussels, 31 March 2011  
<http://europa.eu/rapid/pressReleasesAction.do?reference=PRES/11/84&format=HTML&aged=0&lg=en&guiLanguage=en>
- Council Conclusions 3094<sup>th</sup> Competitiveness, 31 May 2011, par. 5  
[http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/intm/122342.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/intm/122342.pdf)

- European Court of Auditors, *The management of the Galileo programme's development and validation phase*, Special Report No. 7, 2009  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SRCA:2009:07:FIN:EN:PDF>
- GSA, GNSS Market Report, Issue No.1, October 2010,  
<http://www.gsa.europa.eu/files/dmfile/GSAGNSSMarketreportIssue1.pdf>
- Transport Committee, UK House of Commons, *Galileo recent developments, First Report of Session 2007-08*, Annex C, cit. p. 61  
<http://www.publications.parliament.uk/pa/cm200708/cmselect/cmtran/53/53.pdf>
- Transport Committee, UK House of Commons, *Galileo, Eighteenth Report of Session 2003-2004*, 17 November 2004  
<http://www.publications.parliament.uk/pa/cm200304/cmselect/cmtran/1210/1210.pdf>

## DIRECTORATE-GENERAL FOR EXTERNAL POLICIES

# POLICY DEPARTMENT

## Role

Policy departments are research units that provide specialised advice to committees, inter-parliamentary delegations and other parliamentary bodies.

## Policy Areas

- Foreign Affairs
- Human Rights
- Security and Defence
- Development
- International Trade

## Documents

Visit the European Parliament website: <http://www.europarl.europa.eu/studies>

