INSTITUTE OF RESEARCH &TRAINING ON EUROPEAN AFFAIRS

EUROPA.S. 2023

Council of the EU (COMPET)

EUROPA.S.

PROMOTING EXCELLENCE, POLITICAL INNOVATION AND LEADERSHIP IN EUROPE

EUropa.S. 2023
7-10 April
University of Piraeus
Organized by:
Institute of Research & Training on European Affairs

STUDY GUIDE

Topic: Navigation into Space: The European Space Industry and Challenges outside the Earth

Table of Contents

Greeting of the Board

Distinguished Ministers,

*It is our utmost honour to welcome you to EUropa.S. 2023 and specifically to the committee of the Council of the European Union. This year's topic, "**Navigation into Space: The European Space Industry and Challenges outside the Earth**", is a new priority in the current EU agenda, a topic that requires an "out of the world" approach. In order to discuss the topic properly, we are going to base our committee of the CoEU to the COMPET Configuration (Fun Fact this is being simulated for the first time ever in EUropa.S. Conference!). As the Board of the CoEU we hope that this document will guide you throughout your studying and preparation for this year's EUropa.S., will prove to be a useful tool in your effort to deepen your knowledge on the topic under discussion and will motivate you to conduct your own further research. This April, we are waiting for each and every one of you to transform yourselves into Minister of Space and actively participate in our heated debates, collaborate, and reach productive conclusions. We wish that the committee proceedings will be full of excitement and with a careful navigation into space. Last but not least, should you have any inquiries feel free to contact us. We are really looking forward to meeting you all this April, in the 13th edition of EUropa.S. Get ready for an out-of-this-world experience!*

Kind Regards,

The Board of the Council of the European Union

Introduction to the Council of the European Union - The COMPET Configuration

The Council of the European Union is an EU institution that is composed of ministers of the 27 member-states. Depending on the issues under discussion the Council organizes its sessions in different configurations[1]. This practice is followed so that the ministers discussing and deciding upon the subject matter are relevant to it and have authority over it in their respective states. In this year's CoEU we will be simulating and hold our discussion under the COMPET configuration, meaning that all the participants will be Ministers of Space[2]. The Council is imbued with several responsibilities. Namely it co-decides with the European Parliament for the laws that will constitute the acquis Communautaire of the EU, it brings together state officials with a view to understanding what room for cooperation still exists and what could be more efficiently accomplished through a harmonization of policies. Moreover, the CoEU is a central player in the formation of the EU's Foreign and Security Policy, has an important role in the conclusion of international treaties and is also responsible for adopting the budget of the EU along with the European Parliament. From this assortment of responsibilities, the simulation will follow something more like an attempt at coordination of the policies of the 27 member states. The Ministers of Space will gather to discuss how they experience the innovative approach that the EU has adopted through the European Space Agency - ESA, and which opportunities and challenges are created. Following this discussion there will be an effort to create a resolution, including the common positions agreed upon by the 27 Ministers[3].

Insights into the Competitiveness Council (COMPET)[4]

The Competitiveness Council (COMPET) is tasked with strengthening competitiveness and growth in the EU. It deals with four main policy areas: the internal market, industry, research and innovation and space. Depending on the agenda, the Ministers of all Member States responsible for trade, economy, industry, research and innovation and space participate in the Competitiveness Council. The relevant European Commissioners also participate in the sessions, which take place annually, at least four times per year. As a policy maker, the

[1] Council of the European Union (2022). *What does the Council of the EU do?* [online] The Council of the EU. Available at: The Council of the European Union - Consilium (europa.eu) [Accessed 30 December 2022]
[2] Council of the European Union (2022). *Council Configurations.* [online] The Council of the EU. Available at: Council configurations - Consilium (europa.eu) [Accessed 30 December 2022]
[3] *Council of the European Union (2022). Competitiveness Council Configuration (COMPET). [online] Council Configurations. Available at: https://www.consilium.europa.eu/en/council-eu/configurations/compet/ [Accessed 30 December 2022]*
[4] *ibid*

Council seeks to promote the EU's competitiveness and growth. Apart from this, In the area of the internal market, the Council seeks, as a legislator, to remove obstacles to the cross-border movement of products, labour, capital and services. As far as industrial policy is concerned, the Council combines a horizontal approach that integrates industrial policy issues into all other relevant EU policies, with a sector-specific approach that takes into account the specificities of each sector. The Council works to improve the business environment, especially for small and medium-sized enterprises (SMEs). For this purpose, it co-legislates on special measures aimed at SMEs, such as: improving access to finance, reducing bureaucracy and promoting innovation. Lastly, In the field of research, innovation and space, the Council seeks to strengthen the scientific and technological base of European industry, promoting its international competitiveness and creating growth and employment. It also works with the European Space Agency (ESA) to develop European space policy[5].

Introduction to the Topic

Space[6] is the vast space where the celestial bodies move, or otherwise the relatively empty areas between the celestial bodies, beyond their atmospheres. Contrary to what is believed, space is not completely empty, i.e., completely empty, but it shows a minimal content of particles mainly of hydrogen plasma, while it still contains photons (a form of electromagnetic radiation) and neutrinos of infinitesimal mass. Also, in space there are galaxies and nebulae, which make up only 5% of the actual mass of the universe! The remaining 95% consists of dark matter and dark energy, the existence of which remains unconfirmed. Human activities are mainly related to the study of celestial bodies and the properties of space, at the level of our Solar System, such as sending manned or unmanned missions into space.

The EU space policy[7] aims to address some of today's most pressing challenges, such as combating climate change, uplifting technology advancement, and providing environmental and economic benefits to citizens. Space technology, data, and services have become crucial in Europeans' everyday lives. We rely on them when we use mobile phones and GPS systems, watch satellite TV, and withdraw money. Satellites also provide immediate access to information when

[5] *ibid*
[6] *Howell, E. (2022). What is space? [online] Space.com. Available at: https://www.space.com/24870-what-is-space.html [Accessed 30 December 2022]*
[7] *European Commission (2022). European Space Programme. [online] Europa.eu. Available at: https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/european-space-programme_el [Accessed 30 December 2022]*

disasters such as earthquakes, forest fires, or floods occur, allowing emergency and rescue teams to better coordinate their efforts.

Furthermore, the main objectives of the European space policy are the following[8]:

1. Improve agricultural and fisheries efficiency: satellite-enabled applications improve cropland mapping, harvest forecasting, and fisheries control.
2. Enhance the use of Satellites, which can help regions gain access to knowledge and information when terrestrial solutions are limited.
3. Improve crisis management plan: satellite services help to reduce emergency response times.
4. Safeguard the environment and contribute to the fight against climate change.
5. Boost security by utilizing satellite positioning, satellite communications, and Earth observation.
6. Improve citizens' health by providing remote medical assistance.
7. Transport optimization, including logistics operations, vessel track - and - trace, collision mitigation, motion control, and assistance with ship manoeuvres.

Image 1.1.: The main components of the European Space Programme

Key Terms and Definitions

Copernicus: Copernicus is the European Union's Earth observation program. Copernicus supports a broad range of applications, including protection of the environment, urban management, local and regional planning, agricultural production, forestry, fisheries, health, transportation, global warming, sustainable development, civil defense, and tourism, throughout its territory, maritime, surroundings, climate change, disaster response, and security services.

Galileo: Galileo is the European Union's Global Navigation Satellite System (GNSS) offers enhanced positioning and timing information, with significant benefits for

[8] *ibid*

many European services and users. It provides users with more precise location information than other available methods and aids in rapid response and search and rescue. Galileo also boosts European innovation, helping to create new products, services, and jobs.

EGNOS: EGNOS namely the "European Geostationary Navigation Overlay Service" is the European Union's local satellite-based augmentation system (SBAS). It is used to improve the efficiency of global positioning satellite systems like GPS and Galileo. It has been implemented to provide aviation, maritime, and land-based users with life-saving navigation services across Europe.

European Space Agency (ESA): The European Space Agency (ESA) serves as Europe's entry point into space. Its main objective is to shape Europe's space-related possibilities and ensure the continued incentive to invest in space to benefit European citizens. The ESA is a global organization with 22 member countries. By pooling its members' financial and intellectual resources, it can undergo programs and activities far beyond the capabilities of any single European country.

Governmental Satellite Communications (GOVSATCOM): It is a program whose goal is to provide secure and cost-effective communications capabilities to missions and operations critical to security and safety operated by the European Union and its Member States, which include homeland security actors and EU agencies and institutions. GOVSATCOM is one of the components of the European Union's June 2016 Global Strategy for Foreign and Security Policy. The Program will help the EU respond to specific threats, as well as support the EU Maritime Strategy and the EU Arctic Policy.

Space Situational Awareness (SSA): SSA is a holistic approach towards space hazards, split into three categories: a) *Space Surveillance and Tracking (SST) of man-made objects*, b) *Near-Earth Objects (NEO) monitoring (for natural space objects)*, and c) *Space Weather (SWE) monitoring of solar activity, and other natural phenomena*.

Space Traffic Management (STM): STM encompasses the methods and rules required in order to have access, conduct activities in, and return from outer space in a secure, sustainable, and safe manner. The importance of STM is crucial for future space missions, since more than 1 million debris larger than 1 cm orbit the Earth, a number that will keep growing as more and more satellites are launched into space. These "space junk" can seriously harm satellites, even destroy them, in case of a collision, making STM of great importance for Europe's next step into space.

Legal Framework

The European Space Agency (ESA) and the European Union (EU) work together to align the intellectual and financial resources of EU Member States in order to carry out space programs. As a result, both intergovernmental bodies have sway over Europe's industrial space policy. It is important to note, however, that ESA is a global intergovernmental organization that is not affiliated with the EU. ESA and the EU signed a framework agreement in 2004 providing operational arrangements based on the fundamentals of effectiveness and mutual benefit, to avoid unnecessary duplication of effort, and to accomplish a consistent and progressive growth of an as a whole European space policy[9].

Esa Governance - Procurement Input[10]

Article X of the ESA Convention establishes two governing bodies for ESA: the Council and the Director General. The Council is made up of representatives from the ESA Member States and meets as needed, either at the delegate level -at least two times a year- or at the government level -around every four years-. Each ESA Member State, regardless of its geographic size or financial contribution, has one vote and is represented by a limit of two representatives who may be associated by consultants.

"ESA's procurement framework[11] consists of:

a. *Article VII and Annex V of the ESA Convention, which set out ESA's industrial policy;*
b. *ESA Procurement Regulations and related Implementing Instructions; and*
c. *General clauses and conditions for ESA contracts."*

All procurement is managed via ESA's esa-star tender process system, which keeps track of all current and planned invitations to tender. The primary goal of ESA's advanced manufacturing policies is to ensure balanced Member State ability to participate based on financial contributions when trying to implement ESA space programs and associated space technological development. All ESA programs are also calculated using geographic location profit, which takes into

[9] *Wheeler, J. (2022). The Space Law Review: Europe [online] thelawreviews.co.uk. Available at: https://thelawreviews.co.uk/title/the-space-law-review/europe [Accessed 30 December 2022]*
[10] *ibid*
[11] *ibid*

consideration a country's share of the weighting factor of contracts as well as its share of the value added to ESA inside a given period[12].

Topic Analysis

I. ESA VS the non-EU Space Industries: competitors or partners?

The European Space Agency, commonly referred to as ESA, is an international organisation with 22 Member States: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom. It was established in 1975, describing itself as Europe's gateway to space. The mission of the ESA is to shape the development of Europe's space capability and to ensure that investment in the field of space will continue to be beneficial for Europeans and citizens of the world. The ESA is not an EU institution, however the majority of its Member States are also members of the EU. ESA's purpose, as defined in Article II of the Convention for the Establishment of a European Space Agency, is to provide for, and to promote, for exclusively peaceful purposes, cooperation among European States in space research and technology and their space applications, with a view to their being used for scientific purposes and for operational space applications systems. The ESA achieves its purpose by elaborating and implementing a long-term European space policy, by recommending space objectives to the Member States, by aligning the interests of Member States with those of other national and international organisations and institutions, by elaborating and implementing activities and programmes in the space field and coordinating European and national space programmes, in order to integrate national ones into the European Space Programme, in particular in the application of satellites, and by ensuring a coherent industrial policy is recommended to its Member States and implementing it in its space programmes. The ESA is funded from financial contributions made by its Member States to its mandatory activities, such as the general budget and space science programmes, by calculating their GNP. Member States can also participate in optional programmes by contributing the amount they wish. The ESA budget for 2021 was 6.49 billion euros, with, on average, every citizen of an ESA member state paying through taxes about as much as the price of a cinema ticket[13] .

[12] *ibid*
[13] *ESA facts* (n.d.). Available at: https://www.esa.int/About_Us/Corporate_news/ESA_facts (Accessed: 20 December 2022).

A successful partnership is the one currently held between the ESA and Canada. This all began in the 1970s, when Pierre Elliott Trudeau, first elected Canada's Prime Minister in 1968, wanted Canada to expand their space capabilities, since at the time didn't even have its own space agency. However, due to the challenging relations between Canada and the US, Canada could either keep the status quo, deepen relations with the US, which lacked public appeal, or pursue a cooperation with Europe, which came to be known as "the Third option". This began with Canada's participation in the European Space Research Organisation, a precursor to the ESA, at a time when a Canadian space agency didn't yet exist. Canada later began negotiations with the ESA for a potential membership into the organisation. A full membership for Canada was out of the question almost immediately, due to the small scale of the Canadian economy when it came to space programs, not having enough of a large space budget, the fear that deepening relations with the ESA would hurt the already stressed Canada- US relations, as well as objections from member-states of the ESA, primarily France, who strongly believed that the ESA is a European exclusive organisation and feared that Canada gaining full membership would motivate countries like Australia and New Zealand to also join, creating a strong Anglo-Saxon bloc inside the agency, as well as suspicion over how faithful and loyal Canada would be, considering its deep relation and cooperation with the United States. While other ideas were flown around, for example a proposed associated membership, something that didn't exist in the ESA at the time, Canada eventually became a cooperating member, better described as an observer plus, which gave Canada the ability to participate in optional programs of the ESA, at a much lower cost than the one that would be required even for the associated membership. This relationship still exists to this day and has been greatly beneficial for both sides, with Canada having participated in Satellite Telecommunications and Earth Observation projects, most notably the Galileo and Artemis projects[14]. Nowadays, associated membership does exist in the ESA, with Associate Member States being Slovakia, Slovenia, Latvia and Lithuania.

China has also invested greatly in the space industry. Beijing is following a path of self-reliance and independent innovation developing a 'Space Silk Road' in the context of the wider Belt and Road Initiative (BRI). The ESA has benefited from a relationship with China, whose involvement spans for over 20 years, with the Sino-European Galileo agreement being of great importance, with China having a stake of 5% in the project. The Sino-European cooperation has benefited China, whose relations with the United States has been troubling, placing restrictions on their trading capabilities due to embargos from the US to China on technologies

[14] Dotto, L. (n.d.) 'Canada and The European Space Agency Three Decades of Cooperation', p. 31.

necessary for the development of the space field, with Europe being able to utilise Chinese resources and production in order to develop its space programs. Europe and China cooperate on projects concerning space-based earth observation, as well as the launch of observation satellites, their participation in the Galileo program being a major example, as well as the presence of European space manufacturers in China, for example the French satellite manufacturer Alcatel, whereas American based manufacturers are prohibited from conducting business with China. There are however concerns that present dilemmas when discussing the Sino-European partnership. Europe has been pressuring China to join and ratify multiple international organisations and agreements, with some being the Missile Technology Control Regime (MTCR) and the United Nations Covenant on Civil and Political Rights, however especially after the new Taiwan policy of 2005, the government's support of anti-Japanese protest, as well as the well-known record of human rights violations and abuses of the Chinese regime, Europe has been facing a dilemma. It could either further evolve its relations with China, which would mean worsened relations with the United States and accepting the human rights violations of the regime, or abandon its relations with China and pursue an inherently difficult partnership with the US, which is such a Herculaneum task since its economically impossible for Europe and politically unacceptable to the United States[15].

The ESA has also had partnerships with India, specifically the Indian Space Research Organisation (ISRO), founded in 1969. The first venture between India and Europe took place in the 1980s, when the European rocket Ariane 3 launched into space the first ever Indian geostationary satellite Apple. On 17th March 2005 the ESA approved a co-operation agreement between the ESA and the ISRO for then India's first Moon mission, Chandrayaan-1. Under that agreement Europe coordinated and supported several important instruments required for the mission, as well as supplying India with the necessary hardware, and direct in-kind contributions from the ESA. In return, India made available to all ESA Member States data from the mission[16]. After the war in Ukraine, the relations between the ESA and Roscomos broke down, which has made the ESA consider India in order to launch its missions after losing access to Russian Soyuz launch vehicles[17].

[15] Johnson-Freese, J. and Erickson, A.S. (2006) 'The emerging China–EU space partnership: A geotechnological balancer', *Space Policy*, 22(1), pp. 12–22. Available at: https://doi.org/10.1016/j.spacepol.2005.11.001.
[16] *ESA Council give go-ahead to Europe's co-operation with India in Moon mission* (n.d.). Available at: https://www.esa.int/Enabling_Support/Operations/ESA_Council_give_go-ahead_to_Europe_s_co-operation_with_India_in_Moon_mission (Accessed: 21 December 2022).
[17] *'India an option': Europe on hunt for new partners to launch space missions as Russia exits* (n.d.) *India Today*. Available at: https://www.indiatoday.in/science/story/isro-european-space-agency-roscosmos-nasa-pslv-gslv-sslv-spacex-1987246-2022-08-12 (Accessed: 21 December 2022).

One of the longest running co-operations of the ESA has been its more than 40-year cooperation with JAXA, the Japanese space agency. The two agencies have been close partners for decades, having launched together multiple space programmes, with recent ones being the ESA-led Hera mission, the first ever asteroid deflection system ever used, and the JAXA-led MMX mission, which plans to collect and bring back a sample from the Martian moon Phobos[18]. In a 2019 visit made by the president of JAXA at the 282nd meeting of the ESA council, the two agencies created a joint satellite programme called EarthCARE, whose mission will be to observe and gather crucial data for understanding and tackling climate change. A recent collaboration between the two resulted in establishing a space-enabled next generation 5G telecommunication link between Japan and Europe, which will greatly aid business between the two, a major step forward towards a more interconnected future[19].

II. Is the aerospace industry falling behind in Europe or is it moving forward?

The European commercial space industry includes a wide variety of industries that are impacted thanks to its services. In the first ever EUSPA and EC Earth Observation and GNSS market report, 17 market segments were included in the report, which were the following:

- Agriculture
- Aviation and Drones
- Biodiversity, Ecosystems and Natural Capital
- Climate Services
- Consumer Solutions, Tourism and Health
- Emergency Management and Humanitarian Aid
- Energy and Raw Materials
- Environmental Monitoring
- Fisheries and Aquaculture
- Forestry
- Infrastructure
- Insurance and Finance
- Maritime and Inland Waterways

[18] *JAXA | Global Activity* (n.d.) *JAXA | Japan Aerospace Exploration Agency*. Available at: https://global.jaxa.jp/projects/activity/topics.html (Accessed: 22 December 2022).

[19] *Space-enabled 5G links Japan and Europe* (n.d.). Available at: https://www.esa.int/Applications/Telecommunications_Integrated_Applications/Space-enabled_5G_links_Japan_and_Europe (Accessed: 22 December 2022).

- Rail
- Road and Automotive
- Space
- Urban Development and Cultural Heritage

The diversity of the report shows how important and how influential the commercial space industry can be, affecting every single facet of everyday life. The report states that the annual shipments of GNSS receivers will grow from 1.8 billion units in 2021 to 2.5 billion units in 2031 annually, and for the global GNSS downstream market revenues to grow at a Compound Annual Growth Rate (CAGR) of 9.2% in the next decade, reaching a total of €492 billion by 2031, with the main contributors being the professional markets of Agriculture, Urban Development and Cultural Heritage, and Infrastructure. In the market for Earth Observations, revenues are set to double roughly from €2.8 billion to €5.5 billion, 85% of which will be made by value-added services. And even though EO might have a relatively small markets right now in markets like the Insurance and Finance sector, thanks to the growing use of parametric insurance products, the Insurance and Finance sector is expected to grow to €1 billion EO-enabled revenues by 2031, with a market share of 18%.

What is important to note is that this progress has been mostly driven thanks to the EU's flagship space programmes, by Galileo and EGNOS on one side and Copernicus on the other, making the EU space programme a major factor in the development of the downstream space application market. Earth Observation services have major influence over 16 out of the 17 markets mentioned in the EUSPA report. In the agriculture industry, EO provides data and information concerning sustainable nutrient management, restoration of soil health and the preservation of biodiversity. Data is also used as an input for smart analytics for the optimisation of agri-tech solutions. In aviation, EO traditionally has been used to help identify hazardous weather and volcanic ash clouds, as well as identify preventative maintenance from particulate matter. Combined with GNSS technology, it can help scientists comprehend the impact of the aviation industry on the environment. EO is also utilised in the observation of ecosystems, allowing scientists to discover stressors and innovative ways to protect biodiversity. EO is heavily utilised in climate services, specifically in the collection of data for climate models, with its application set to further expand in the near future. EO is also providing services in the health apps market focusing on air quality and UV monitoring, as well as enabling sustainable and safer tourism. EO is extremely important in humanitarian aid and emergency management, providing first responders with a full picture of a crisis, but by also providing early warning signs of disasters and allowing for post-event analysis. EO is contributing to the EUs pledge to a greener future, by allowing for a more environmentally friendly

extraction of raw materials, the better monitoring of our environment, affecting local to international policies, monitoring fish populations and improving aquaculture outputs, optimising ship routes in order to minimise emissions, and assist officials and developers in the preparation of urban planning, creating the green cities of the future. EO can be used in order to track the carbon footprint of infrastructure and to monitor infrastructure health post-construction, thus preventing future disasters. The EUSPA report proves that, although there is a belief amongst many Europeans that the EU space market cannot compete with the US and Chinese space markets, in reality the EU space market is not only competing with them but is going to keep growing substantially in the near future[20].

Another development in the European space market has been the shifts in the commercial industry during the past twenty years. The commercial space industry grew considerably after the 1990s, with Europe shifting its focus to developing its telecommunications infrastructure, as well as to developing navigational and earth observation projects. This development led to an opening for start-up companies to enter this new market and compete side by side with large industry players. This is helped by the fact that the ESA in its 2025 agenda[21] vowed to make access to space services more accessible for companies, giving the ability to start-up companies to utilise the already existing infrastructure of the ESA to develop and launch their own satellites. Another evolution of the European space market is the decrease in companies relying on governmental funding for their projects, instead choosing to target equity funding, as well as promote affordable access to space, which has led to novel space applications and services. A great example is the European EO market, of which Europe controls 41% market share, jointly led by the United States of America with 42%, where the European Association of Remote Sensing Companies (EARSC) Industry survey showed that more than 93% of European EO companies were start-ups and SMEs, highlighting the importance of small companies for the European EO economy.

III. Territorial cohesion and competitiveness in space

The European Union has always had close ties and has been the main benefactor to the European Space Agency ever since its creation, with the goal of making Europe self-sufficient and capable of developing its own space industry, without being dependent on the United States. However, it is important to point out that

[20] European Union Agency for the Space Programme. (2022) *EUSPA EO and GNSS Market Report.2022 / Issue 1* LU: Publications Office. Available at: https://data.europa.eu/doi/10.2878/94903 (Accessed: 23 December 2022).
[21] *Agenda 2025* (no date). Available at: https://www.esa.int/About_Us/ESA_Publications/Agenda_2025 (Accessed: 14 December 2022).

the ESA is not an institution of the EU but is an independent organisation that includes countries that aren't members of the EU, examples being Norway, Switzerland, the United Kingdom and Canada. This close relationship between the ESA and the EU is highlighted in the agency's 2025 agenda, where one of the main priorities set was the strengthening of EU-ESA relations.

This unfortunately meant that the EU lacked for a long time its own space agency, with EU member states being responsible for setting their priorities and interests, with no EU policy to steer them towards a collective approach to the development of their space industries. The lack of an EU space agency was solved with the EU Space Programme Regulation of 2021, in which the European Union Agency for the Space Programme (EUSPA) was created in order to implement and execute the programme detailed in the regulation[22]. The lack of an EU space agency has greatly affected the EUs ability to represent itself in international organisations, for example the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS), with member states having individual representation.

The European Union has for a long time recognised the need for an EU space policy, as we can see from the 2004 ESA-EU framework agreement[23], as well as from the 2009 Lisbon Treaty, in which the EU recognised space as a specific competence of the Union[24].

An EU space policy has been one of great importance for the Union, since it has a great variety of usage in many aspect of everyday life, with benefits stemming from access to high-quality space related data and services for EU citizens, promotion of EU autonomy and security from future threats, socio-economic benefits as the space industry becomes more involved in multiple market sectors, to a stronger presence for the EU in the space sector as a leaving actor. With the EU focusing on how to effectively utilise space data, it can better guide first responder and rescue teams in areas hit by natural disasters, improve agriculture practices, and allow for the construction of safer transport and energy infrastructure. The combination of space data and digital technologies will open new paths for business opportunities in all EU member states.

---

[22] *EUR-Lex - 4526706 - EN - EUR-Lex* (n.d.). Available at: https://eur-lex.europa.eu/EN/legal-content/summary/eu-space-programme-2021-2027-european-union-agency-for-the-space-programme.html (Accessed: 8 December 2022).

[23] *Framework Agreement between the European Community and the European Space Agency* (2003) *OJ L*. Available at: http://data.europa.eu/eli/agree_internation/2004/578/oj/eng (Accessed: 13 December 2022).

[24] *Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007* (2007) *OJ C*. Available at: http://data.europa.eu/eli/treaty/lis/sign/eng (Accessed: 13 December 2022).

An example of how territorial cohesion can affect the priorities, vision and scope of Europe's space programmes, is the Galileo project. The **Galileo project** is a Global Navigational Satellite System (GNSS), competing with the US Navstar GPS, the Chinese Beidou 2 or Compass and the Russian GLONASS. Apart from technological differences between Galileo and the other systems, the main difference between them is Galileo's development. Unlike the other GNSSs, Galileo was developed by the EU, which meant that all 27 member states had to agree, not only on the technological aspects of the project, but also how it would be managed, how it would be funded, who would be responsible for managing the project, etc. As a result, Galileo's existence is a result of the complexity of the relations between the ESA, the EU and its member states, and how the EU has to balance the different expectations and priorities of each member state, as well as creating a unified EU approach, which will benefit the Union as a whole[25].

Other major space programmes run by the EU are EGNOS, Copernicus, EUSST, and GOVSATCOM.

EGNOS is a regional augmentation system that is used in order to augment the accuracy and reliability of GNSS signals, improving GNSS performance. EGNOS was developed for the ESA, EU Commission and the European Organisation for the Safety of Air Navigation, and just like with the Galileo project, the Commission delegated responsibility of the project to the EUSPA.

Copernicus is an Earth Observation programme, also known as the Global Monitoring for Earth and Security Programme. Its main goal is the collection of accurate and reliable data, as well as the free and open access to data concerning the effects of climate change, and data related to the atmosphere, emergency management, land, marine, and security. Copernicus is managed by the Commission and is implemented in partnership with EU member states, the ESA, the Eumetsat, the European Centre for Medium-Range Weather Forecasts, Mercator Ocean, and EU agencies.

The **EUSST** programme, developed in 2014, was set up in order to protect EU space infrastructure at an EU level, by creating a ground- based and space based network of sensors, in order to survey and track orbital objects for EU member states. France, Germany, Italy, Poland, Portugal, Romania, and Spain form the EUSST consortium, and by working in tandem with the EU satellite Centre, they provide to all EU Member States space surveillance and tracking services.

[25] Nurmi, J. *et al.* (eds) (2015) *GALILEO Positioning Technology*. Dordrecht: Springer Netherlands (Signals and Communication Technology). Available at: https://doi.org/10.1007/978-94-007-1830-2.

GOVSATCOM was a programme that consisted of one of the elements of the 2016 Global Strategy for the EU's foreign and Security Policy. The programme aimed to provide reliable, secure and cost-effective communications to the EU and its Member States, for the purpose of managing security and safety critical missions and operations. Its main three use cases were in crisis management, surveillance, and key infrastructure. GOVSATCOM is now part of the EU Space Programme 2021-2027.

The European Union has been promoting the competitiveness of its space industries through its new industrial strategy, presented by the Commission in March 2020, in order to safeguard its autonomous access to space, and to incentivise the usage of space applications and data. EU space industries have a significant percentage of market share in launchers and satellite manufacturing, the two main sub sectors of the upstream space sector. In 2018, EU exports in space represented more than half the value of G7 exports, reaching almost €2 billion, double the amount BRICS exported the same year. The EU has also partnered with the European space industries, under Horizon Europe, which is expected to allow EU actors to have access to technological advances in the domain, dedicated to bolstering the European new space, by focusing on providing low-cost launchers, which is an emerging market. The EU commission has also continued its support for EU space programmes, with the recent launch of the second stage of Galileo back in 2021, which had an estimated cost of €1.47 billion, as part of maintaining the EUs competitive edge in the downstream sector.

The EU is also investing in the downstream space sector through initiatives like the CASSINI project of the European Innovation Council, which provide financial support together with the European Investment Bank (EIB). Another aspect the Commission has focused on is the synergy between the civil and defence industries, a combination expected to raise the EUs competitiveness, as it's mentioned in the Commission's synergies action plan. A prime example is the semiconductor shortage that global markets have been facing, which heavily affected the space industries and infrastructures, which the EU has been combatting through the European Chips Act, allowing the European space industry to contribute in developing an autonomous European semiconductor industry. In the long term, the EU needs to find a way to train and attract young people in space sciences, technology and business. One of the efforts made is the network UNIVERSEH, established by five universities in five Member States (Germany, France, Luxembourg, Sweden, Poland), aiming to create opportunities for more than 130.000 students to train, research and innovate around a sustainable space. Another important goal that must be achieved in order for the EU space market to reach its full competitiveness capabilities is its progress

towards gender equality. A UN report found that there hasn't been any substantial improvement in the gender balance of the space industries in over three decades, especially when it comes to scientific and management positions, according to the OECD.

IV. Strategic development for expanding EU's navigation into space

We have already analysed the EU and ESA relationships with other countries and space agencies, so it's important to analyse the European Union's plans for its expansion to the space industry and market. The EU has a very compelling reason to continue its work towards complete European autonomy, since an incapacitation of Europe's space systems, would cost the EU €50 billion of gross revenue per year, as well as it would place more than 1 million jobs in risk, a figure which is predicted to rise with Europe's expansion in space. It's for this reason that the EU must carefully consider how it will approach its future space programmes and missions[26].

The ESA took major steps towards amending its relations with the EU as it's analysed in its 2025 Agenda. Inside the agenda, the ESA sets as one of its 5 priorities the strengthening of ESA-EU relations, as well as making the commercialisation of space environmentally friendly and to invest in digitalisation, ensure the security and safety of the European region with the utilisation of space technology, address current programme challenges and, most importantly, complete the agency's reorganisation. The agenda highlights the agency's future partnership with the EU for more flagship programmes, as well as considerably increasing its budget on the development of innovative technology, development processes and activities concerning safety and security with EU member states. The ESA has also been negotiating over the past years with NASA, in order to place a European on the moon's surface by 2030. The astronaut will be part of the final stage of the Artemis programme, rumoured to be NASAs last manned mission to the moon. Although French President Emmanuel Macron has tried to push for a French ESA astronaut to fill the seat, the ESA hasn't selected which astronaut will fill the seat[27]. The ESA has also vowed to complete its digitalisation and to emphasise in a business-led strategy, with the goal of creating a friendlier environment for companies to invest in space programmes, as well as to allow the commercialisation of the space industry. Projected

[26] Tortora, J.-J. and Moranta, S. (2020) 'European Space Security Policy: A Cooperation Challenge for Europe', in *Handbook of Space Security*. Cham: Springer International Publishing, pp. 1–17. Available at: https://doi.org/10.1007/978-3-030-22786-9_127-1.
[27] 'Macron to Kamala Harris: Take my man to the moon' (2022) *POLITICO*, 30 November. Available at: https://www.politico.eu/article/emmanuel-macron-kamala-harris-space-nasa-esa-moon-artemis-thomas-pesquet/ (Accessed: 8 December 2022).

estimates show that the global space industry could generate revenue of US$1 trillion and more by 2040, from the US $350 billion it generated in 2021[28].

The 2025 ESA Agenda showed the importance of a close relationship between the ESA and the EU, something that will affect the way legislation is drafted and will shift Europe's priorities, in order to be able to capitalise on the growing importance of the space industry in not only the commercial markets, but also from a security and defence perspective.

Before however we discuss how the European Space Sector is achieving strategic autonomy, we must understand what it really means for Europe to have strategic autonomy. The term "strategic" is used whenever it relates to the core interests of a political community, while the term "autonomy" refers not to a choice of having or not autonomy, but instead to a spectrum of autonomy. This spectrum can be explained by three simple questions: autonomy for, autonomy to, and autonomy from. These questions form the fundamental basis for discussing the concept of strategic autonomy. It is safe to assume that when talking about the European Union, space is a strategic domain and there is a political ambition to enhance the Union's autonomy in space, in order to ensure the defence and economic prosperity of the region (autonomy for). The EU is striving to ensure that it has the political, diplomatic, financial, and material resources needed to secure its strategic autonomy in space (autonomy to). On its decision-making capabilities, the EU Commission's DG DEFIS has been tasked with taking care of industrial policy and innovation through the EUSP. The European External Action Services' (EEAS) Space Task Force has been taking care of the EU's diplomatic and multilateral efforts, while the EU SatCen, an autonomous CFSP/CSDP capacity for geospatial intelligence, and the European Defence Agency (EDA) focus on space capabilities development.

A base of strategic autonomy is the creation of a technological and industrial base. A major hurdle in achieving the goal of becoming a technological leader in space is the EU's dependence on types of electronic, electrical, and electromechanical components, as well as advanced materials, required for the development of space products, making up roughly 40-70% of modern procurement costs for space equipment. Strategic autonomy in the space sector is measured in terms of the technology used and the political community's capability of mastering it and the critical supply it relies upon.

[28] *Agenda 2025* (n.d.). Available at: https://www.esa.int/About_Us/ESA_Publications/Agenda_2025 (Accessed: 14 December 2022).

Finally, in order for the EU to reach strategic autonomy in space, it must hold the capability to shape the corpus of international law in its favour, rather than being a "rule taker". For this reason, space diplomacy holds an integral part in the Union's strategy for autonomy in space. However, the Union has failed to become a "rule maker" when it comes to space technologies and capability development in relation to extra-territorial mechanisms such as the International Traffic in Arms Regulation (ITAR). In order to achieve autonomy from mechanisms such as ITAR, the EU must be willing to develop technologies, components, and software that are far from the reach of ITAR and other similar mechanisms.

Although many have seen space as a space for the usage of innovative military technology, commonly found in sci-fi novels, the militarisation of space will have a political cost for those who attempt it. In fact, space is referred to as an extra-terrestrial coastline of the Earth, with many theories and studies concerning the usage of space in terrestrial politics being maritime inspired. It is for this reason that space has been dominated by defensive strategies like SSA rather than offensive ones.

Now that we have analysed extensively the definition of strategic autonomy, we will focus on the ways the EU has already achieved its strategic autonomy in the space sector. It should be mentioned that for the EU, the European Space Sector is an essential feature to the economy and its strategic autonomy. Europe is already a leader in space exploration, with the Rosetta and BepiColombo programmes, as well as a leader in the development of next generation launch capabilities, with prime examples being Ariane 6 and Vega C77, which should reduce the cost of space launches while offering shorter lead times for production.

An important distinction must be made between "Europe's" space efforts and the "EU's" specific capabilities and programmes when talking about strategic autonomy. The Eu's core space programmes Galileo, EGNOS, and Copernicus are European programmes, because they don't solely rely on EU and Member State funding, but also on the technical expertise of non-EU bodies such as the ESA, and the EUMETSAT. This creates a question of what it truly means to have "strategic autonomy" and who is part of "Europe" when talking about space. An example that highlights this is issue is the fact that although the EU is one of the largest sources of public funding institutions financing the space sector, its depended on the technical expertise of bodies such as national space agencies, the ESA, and the EUMETSAT in order to develop launch and satellite technologies, and these bodies work in turn with industrial and research partners across Europe. As a result, space cooperation in Europe is a mix of supranational and intergovernmental actors and structures.

Conclusion

EU Space contributes significantly to Europe's security, which is set to grow with the launch of the GOVSATCOM encrypted communications program. It also sets up the European Union as a global space power, ensuring that Europeans assist from the social and economic benefits of space. Moreover, EU Space has become essential in the lives of Europeans due to the services and implementations it enables, ranging from earth 's atmosphere monitoring and high accuracy agribusiness to safe and secure aerospace and automated driving, as well as its donation to the EU societal and economic well-being. However, today we observe many challenges threatening the position of the European Union in space from the rest of the foreign space agencies. At the same time, the intensity of the activities that Europe itself is trying to promote raise questions. So, which is the position of the space ministers on these out-of-earth issues?

Questions Raised

1. Is the ESA-rest of the foreign space agencies-partnership beneficial for the development of the EU space market?
2. Does CoEU encourage the EU to continue its partnership with China, or should it abandon it?
3. How can ESA improve the status of its relationship with NATO in order for it be more beneficial for both parties?
4. Should the EU prioritize developing its military space market, or its commercial one?
5. In which ways can the EU prevent the monopolization of the commercial space market?
6. How does CoEU evaluates the potential practice of the EU to help private companies and start-ups enter the aerospace market?
7. Does the CoEU salute the EU related bodies to develop an EU legal framework concerning space related activities? If so, which principles should be highlighted?
8. Does the European Space Programme balance the Union's interests amongst all Member States? What could be improved?
9. In which ways can the EU and its member states utilize the ESA's safety and security programmes?
10. How can we use the tools offered in the framework of the European Space Policy for the benefit of the members of the European Union?

Bibliography

Abi-Fadel, M. and Peeters, W.A.R. (2019) 'The Role of Incubators in the European New Space Economy', *New Space*, 7(4), pp. 201–207. Available at: https://doi.org/10.1089/space.2019.0035.

Dotto, L. (no date) 'Canada and The European Space Agency Three Decades of Cooperation', p. 31.

EUR-Lex - 32021R0695 - EN - EUR-Lex (n.d.). Available at: https://eur-lex.europa.eu/eli/reg/2021/695/oj (Accessed: 8 December 2022).

EUR-Lex - 4526706 - EN - EUR-Lex (n.d.). Available at: https://eur-lex.europa.eu/EN/legal-content/summary/eu-space-programme-2021-2027-european-union-agency-for-the-space-programme.html (Accessed: 8 December 2022).

Framework Agreement between the European Community and the European Space Agency (2003) *OJ L*. Available at: http://data.europa.eu/eli/agree_internation/2004/578/oj/eng (Accessed: 13 December 2022).

Johnson-Freese, J. and Erickson, A.S. (2006) 'The emerging China–EU space partnership: A geotechnological balancer', *Space Policy*, 22(1), pp. 12–22. Available at: https://doi.org/10.1016/j.spacepol.2005.11.001.

'Macron to Kamala Harris: Take my man to the moon' (2022) *POLITICO*, 30 November. Available at: https://www.politico.eu/article/emmanuel-macron-kamala-harris-space-nasa-esa-moon-artemis-thomas-pesquet/ (Accessed: 8 December 2022).

Nurmi, J. *et al.* (eds) (2015) *GALILEO Positioning Technology*. Dordrecht: Springer Netherlands (Signals and Communication Technology). Available at: https://doi.org/10.1007/978-94-007-1830-2.

Samuel Reich, E. (2011) 'Europe makes do without NASA', *Nature* [Preprint]. Available at: https://doi.org/10.1038/471421a.

Further Reading

Zervos, V. (1998) 'The Economics of the European Space Industry: The Impact of the European Military Space Market on Structure, Conduct and Performance', in G. Haskell and M. Rycroft (eds) *New Space Markets*. Dordrecht: Springer Netherlands (Space Studies), pp. 117–124. Available at: https://doi.org/10.1007/978-94-011-5030-9_15.

Το Διάστημα ως Κεντρικό Πεδίο Ανταγωνισμού των Μεγάλων Δυνάμεων | Ινστιτούτο Διεθνών, Ευρωπαϊκών & Αμυντικών Αναλύσεων (n.d.). Available at: https://idea.uom.gr/%CF%84%CE%BF-%CE%B4%CE%B9%CE%AC%CF%83%CF%84%CE%B7%CE%BC%CE%B1-%CF%89%CF%82-%CE%BA%CE%B5%CE%BD%CF%84%CF%81%CE%B9%CE%BA%CF%8C-%CF%80%CE%B5%CE%B4%CE%AF%CE%BF-%CE%B1%CE%BD%CF%84%CE%B1%CE%B3%CF%89%CE%BD/ (Accessed: 14 December 2022).

Tortora, J.-J. and Moranta, S. (2020) 'European Space Security Policy: A Cooperation Challenge for Europe', in *Handbook of Space Security*. Cham: Springer International Publishing, pp. 1–17. Available at: https://doi.org/10.1007/978-3-030-22786-9_127-1.

Useful Links

Agenda 2025 (n.d.). Available at: https://www.esa.int/About_Us/ESA_Publications/Agenda_2025 (Accessed: 14 December 2022).

European Union Agency for the Space Programme. (2022) *EUSPA EO and GNSS Market Report.2022 / Issue 1* . LU: Publications Office. Available at: https://data.europa.eu/doi/10.2878/94903 (Accessed: 23 December 2022).

Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007 (2007) *OJ C*. Available at: http://data.europa.eu/eli/treaty/lis/sign/eng (Accessed: 13 December 2022).