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Satellite Communication as a New Dimension of Supranational Security

"Mankind is only partly aware of
the far-reaching consequences
of its entry into space..."[1]
Manfred Lachs

INTRODUCTION

The threats that have emerged over the past few years have increased the focus of the international community on security and defence matters, with the result that space assets are gradually being recognised as critical elements of defence strategies around the world. Although these domains remain mainly within national competences, it is clear that in the case of outer space, this is an area where international initiatives are vital, especially from the European perspective. The recent outbreaks of war and pandemic have highlighted the need to use satellite communications as a response to emerging hazards. However, supranational objectives are needed to make the use of space assets effective for safety as well as more accessible to those members that are less involved in space activities. With the European Space Programme implemented in 2021[2] and recently published Conclusions on the

[1] As Manfred Lachs further stated: "[A]nd in any case the importance of the step, though all may sense it, can so far be fully appreciated only by the initiated few. Some of the results of the space venture are conspicuous: they have placed the dominating issue of the security and defence of States in a new light." See Masson-Zwaan – Hobe 2010: 5.

[2] Regulation (EU) 2021/696.

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EU Space Strategy for Security and Defence,[3] work on defence and security using space infrastructure continues to move forward.

Considering the above, the author of this paper has identified several factors contributing to safety in and from space, namely: 1. governmental-focused space programmes such as the European Union Governmental Satellite Communication (Govsatcom) and the Infrastructure for Resilience, Interconnectivity and Security by Satellite (IRIS²) within the Union Secure Connectivity Programme;[4] 2. Space Situational Awareness (SSA); and 3. civil and commercial space endeavours. One of the pillars that includes a strong security dimension is the Govsatcom initiative which, together with the IRIS² programme, involves crisis management, surveillance and critical infrastructure such as water barriers, energy or transport. The first of these programmes aims to deploy the space services and capabilities used by EU and its Member States for safety critical missions, while the IRIS² satellite constellation, as the evolution of Govsatcom, is designed to provide value-added services such as flexibility and low latency.[5] The SSA is another important element as one of the capabilities that can enhance the resilience of both space systems and services. Therefore, the next part of the analysis will be an examination of the Space Domain Awareness concept that has been further developed with the first EU Space Strategy for Security and Defence. Finally, the author of this chapter examines the possible exchange of best practices on resilience measures among private entities. Their participation in ventures focused on space infrastructure will be analysed in the context of their involvement in international rivalry from the perspective of military and civilian space capabilities, the line between which currently tends to be blurred.

The objective of this paper is to investigate the activities taken at the regulatory and policy level to support all of the efforts aimed at improving safety in space identified above from both the national and international perspectives.

3 Council of the European Union 2023, preceded by the Joint Communication on an *EU Space Strategy for Security and Defence* presented by the Commission and High Representative to the European Parliament and the Council on 10 March 2023, 7315/23.

4 Regulation (EU) 2023/588.

5 European Commission s. a.

It will combine the analysis of recently adopted policies and regulations at national level and an examination of initiatives at the EU level, in response to space threats.

To achieve this, the paper will briefly characterise and compare the national space defence strategies of three selected States (Luxembourg, France and the U.K. as an example of a country outside the Union), in order to provide a sample of the type of activities being taken on the national level. Based on EU initiatives, such as the EU Space Programme with a focus on secured satellite communication i.e. Govsatcom and IRIS[2], the transnational defence and security objectives using space capacities will also be outlined. All of the above aspects demonstrate the transition from a national to a supranational approach in the field of space security and defence. In addition to factors contributing to the security of space infrastructure at the supranational level, the indicators that influenced this paradigm shift will then also be identified.

THE BACKGROUND OF CHANGES IN THE SPACE DISCOURSE

During the Space Race and at the height of the Cold War, space capabilities were mostly the preserve of two main spacefaring nations seeking to demonstrate their technological predominance and aspiring to begin the exploration of space. With the launch of the USSR's first artificial satellite, Sputnik 1, in 1957, which marked the beginning of the space age, the international community realised the significance of this event for the technological and military race on a global scale. One year after the USSR, in 1958, the U.S. placed its first satellite into orbit, Explorer 1 which clearly highlighted the huge capabilities in space technologies of both spacefaring nations, which indeed remained virtually the only space actors until the 2000s.

In the 21st century, the space discourse has changed and an increasing number of states across the globe are expanding their space capabilities and including space infrastructure among their key defence and security policy agendas. Not only satellite communications but the entire space infrastructure have become

key elements in ensuring security both at the national and supranational level. Space-based assets are essential for a range of services such as communication, navigation, imagery and early warning mechanisms, thus playing a key role in the global security and defence fields as well as helping to tackle emergencies and humanitarian challenges.[6] The proper and uninterrupted functioning of the entire range of space-based and ground systems depends on many factors such as the condition of the outer space environment and this in turn relies on various activities in this regard i.e. governmental, civil and commercial space endeavours, SSA as well as respective regulations and properly targeted policies.[7] Satellite communications play an indispensable role in government communications (Satcom), which provide an alternative when terrestrial means of communication are inaccessible or unreliable. Satellite communication represents the basis of the use of satellites and the data they generate and, by seamlessly connecting and extending, they complement terrestrial communication networks.[8]

There are several factors that have influenced the paradigm shift toward a supranational approach to ensuring the resilience of space capabilities. These include: intentional actions to disrupt or destroy space infrastructure; the implications of intensified space activities worldwide due to the increasing number of space stakeholders; disruption of the international order as a consequence of Russian aggression against Ukraine and the outbreak of multiple conflicts around the world. In view of these developments the vulnerability of space infrastructure to various types of hazards has increased in recent years. Multidimensional security threats can arise not only from intentional actions but also as a consequence of the increased levels of activity in space, by both public and private entities, contributing, for example, to the increase of space debris, the amount of which can render some orbits unusable. These phenomena are an indirect consequence of human activity in space and affect

6 Lueschow–Pelaez 2020: 779.

7 Papadimitriou et al. 2019: 184.

8 Working document of the EEAS(2017)359 on the subject of High Level Civil Military User Needs for Governmental Satellite Communications.

the space environment, the functioning of which has been significantly disrupted by human interference. As a consequence of these activities, the threat of explosions, collisions, satellite breakups or the risk of Kessler Syndrome[9] are just some of the factors that may influence the effectiveness of satellite operations. On the other hand, possibilities for taking deliberate action have also been developed by actors seeking to disrupt or destroy space infrastructure, such as by means of cyberattacks, kinetic weapons such as ASAT missiles[10] or electronic warfare in the form of spoofing or jamming.[11] Furthermore, the outbreak of war and pandemic have highlighted, as never before, the need to possess adequate and resilient communication systems in times of crisis. It is also particularly important to emphasise that satellites have become strategic targets as a consequence of the growing dependence of states on space infrastructure and space capabilities.[12]

SPACE SECURITY AS A NATIONAL DOMAIN

Defence and security issues have always been primarily a matter of national interest. The vast majority of countries in Europe identify the space domain as a strategic area and it is becoming an operational domain in itself alongside

[9] According to the OECD: "An experimental model has been developed to assess the economic effects of a collision event through global value chains. It estimates worldwide monetary losses in the case of Kessler Syndrome to USD 191.3 billion. This is a large sum in proportion to the resources currently committed to debris mitigation and remediation globally." See Net Zero Space 2022.

[10] Since 1959 there have been around 80 ASAT tests carried out by countries such as the United States, Russia/USSR, China and India. The majority of the tests were conducted by the Soviet Union and the United States during the first two decades of the Cold War. Until 2020, in total, ASAT testing has created nearly 5,000 pieces of catalogued orbital debris, more than 3,200 of which are still on orbit. In November 2021, by conducting a destructive direct ascent test, Russia added around 1,400 new pieces of tracked debris, along with hundreds of thousands of smaller fragments. See Secure World Foundation 2020.

[11] ESPI 2020a: 1.

[12] ESPI 2020a: 1.

the land, sea, air and cyberspace.[13] Moreover, space has also been identified as of strategic importance at European level through the proposal of European Union Strategy for Security and Defence. Nevertheless, individual countries still remain the main players in the field of space defence due to the fact that the exploitation and development of space military assets are coordinated by national organisations, while military strategies are defined at national level.[14] In order to enhance their defence capabilities in the space domain several countries have recently adopted their first space defence strategies. Below, selected strategic documents dedicated to space defence are highlighted. These brief descriptions identify the most important strategic assumptions at the national level (including the allocated budget), which will be further reviewed in terms of supranational objectives.

France

France identified outer space as a major factor in its strategic independence as early as the 1960s, and since the 1990s the national armed forces have actively used their space capabilities as an instrument to support military operations.[15] The French Space Defence Strategy (SDS) was published in 2019 by the Armed Forces Ministry and is intended to cover the period up to 2030. This strategy focuses on developing a comprehensive SSA capability, protecting France's indigenous capacities, strengthening the resilience of its armed forces (which should also be able to operate without space support) as well as "on reviewing the doctrine for military space operations based on four functions: space service support, operations support, active space defence and situational awareness".[16] The strategy sets out a vision for the future of France's space defence, while considering the need to define the country's rules of engagement in space.

[13] Ministry of Defence 2022.
[14] ESPI 2020a: 4.
[15] The French Ministry of the Armed Forces 2019: 17.
[16] The French Ministry of the Armed Forces 2019: 4, 10, 11.

This policy document also refers to the private space sector, emphasising the stimulation of innovation, thus representing a renewed vision of the French space industry model.[17] In general, the strategy identified two main aspects: 1. the protection of national satellites by enhancing the country's capacity to monitor the space environment in order to identify unfriendly activities in orbits of interest; and 2. in accordance with international law, the development of the ability to defend national interests in space against aggressive, hostile or unlawful actions.[18] Following the objectives set out in the strategy, another milestone was reached in July 2023, when the Parliament approved the French Military Programme Act 2024–2030, allocating €6 billion to strengthen the country's activities in space during this period.[19]

Luxembourg

Luxembourg's Defence Space Strategy was implemented in 2022 and is built around four major strategic objectives, namely: the consolidation of Luxembourg's current space capabilities, improving their resilience and development of new systems; supporting freedom of action in and from space; fostering international as well as national cooperation and finally working to secure and attract human resources in the domestic space ecosystem. The coordination and implementation of Luxembourg's defence policy falls within the competences of the Defence Directorate and the Luxembourg Armed Forces, under the authority of the Minister responsible for Defence.[20] These objectives are complemented by an emphasis on the development of specific segments such as satellite communications for ensuring the resilience of communications systems targeting multi-orbit access, investing in strategic systems in GEO, MEO, LEO participating in the multinational Wideband

[17] Pasco–Wohrer 2023: 2.
[18] The French Ministry of the Armed Forces 2019: 25.
[19] De Selding 2023.
[20] Luxembourg's Defence Space Strategy: 7.

Global Satcom system (WGS) programme and the national GovSat-1 satellite, as well as investing in various programmes, giving preference to dual use of the commercial and military bands.[21] In 2018, Luxembourg launched the first dual-use Satcom (GovSat-1) based on a public–private joint venture between the Luxembourg Government and a Luxembourgish satellite telecommunications network provider (SES).[22]

The United Kingdom

The U.K.'s first Space Defence Strategy was published in 2022 and is based on three "strategic themes". These relate firstly to the development of space capabilities for protection and defence, identification of threats to space systems and appropriate responses to hostile action. A further element of the strategy is to strengthen military operations by integrating space with other defence activities, providing resilient space services that are of fundamental importance to military operations and strengthening the architecture and integration of the various domains. The last component is related to the improvement of skills through the development of coherent space plans and policies as well as by recruiting and retaining qualified space personnel, including the retention of human potential in the country.[23] An allocation of £1.4 billion is planned for the development of technology to protect the country's interests in space (of which £968 million will be allocated to the ISTARI[24] programme and £61 million will be invested in laser communication technologies).[25] Under the strategy, to secure domestic satellite communication capability, the U.K.

[21] Luxembourg's Defence Space Strategy: 12.
[22] ESPI 2020b: 80.
[23] Ministry of Defence 2022: 19, 22.
[24] Ministry of Defence – Defence Science and Technology Laboratory 2022.
[25] Ministry of Defence – Defence Science and Technology Laboratory 2022.

pledges to exploit and enhance the Skynet 6 programme[26] in order to support government operations and better fulfil its military objectives. The programme has been allocated £5 billion over the next 10 years and additional funding of almost £60 million will be invested in the development of Skynet 6 and other Satcom capabilities.[27]

Despite the clear focus of these documents on national aspects by emphasising the resilience of national space infrastructure as well as capacity building for domestic space activities, strengthening international cooperation is an integral part of all of the space defence strategies described above. According to Luxemburg's Space Defence Strategy:

> "Through the development of space capabilities at national level or in cooperation with NATO/EU partners, and by strengthening the resilience of these capabilities, Defence will not only meet its national needs but also contribute these capabilities to international organisations and allied countries."[28]

In line with the French strategy, a common vision of strategic space challenges should be oriented towards building a European space industry based on mutually agreed dependencies (i.e. tasks that need to be completed).[29] Deepening and broadening international as well as intergovernmental cooperation is also an important aspect of the U.K.'s strategy.[30] It is worth noting that despite the growing demand for space infrastructure for defence and security purposes, to date only a few European countries have decided to allocate a separate budget for space defence.

[26] Skynet 6 is the Ministry of Defence's satellite communications (Satcom) capability which is based on military communications satellites.
[27] Ministry of Defence 2022: 7.
[28] Luxembourg's Defence Space Strategy 2022: 9.
[29] The French Ministry of the Armed Forces 2019: 32.
[30] Ministry of Defence 2022: 16.

A NEW DIMENSION OF SUPRANATIONAL SPACE SECURITY

Space Security is defined in the Space Security Index[31] as "the secure and sustainable access to, and use of, space and freedom from space-based threats".[32] According to the Index:

> "This broad definition encompasses the sustainability of the unique outer space environment, the physical and operational integrity of manmade objects in space and their ground stations, as well as security on Earth from threats and natural hazards originating in space."[33]

Space security, according to this definition, is affected by the threats posed by space debris, a problem which is currently reaching a critical level.[34] Pollution of the space environment is a global concern, which affects, among other things, the proper functioning of satellite communications. Activities at the international level such as SSA are essential to ensure equal and unhindered access to space for both present and future generations.[35] At the same time, other hazards are rapidly emerging and will pose critical challenges for space safety, such as the ability to neutralise other countries' space systems which are designed for military purposes.[36]

[31] The Space Security Index is a research partnership between the Project Ploughshares and the University of Adelaide which "aims to improve trust and transparency related to space activities, and to provide a common, comprehensive, objective knowledge base to enhance capacity for dialogue and policies that contribute to the governance of outer space as a shared global commons".

[32] Polkowska 2018: 330.

[33] Grego 2017: 5.

[34] NASA 2021.

[35] According to the Definition of Long Term Sustainability in Outer Space Activities: "The ability to maintain the conduct of space activities indefinitely into the future in a manner that realizes the objectives of equitable access to the benefits of the exploration and use of outer space for peaceful purposes, in order to meet the needs of the present generations while preserving the outer space environment for future generations." See LTS Guidelines 2018: 2.

[36] Grego 2017: 6.

While space has become a significant national security issue, this domain is also undergoing significant and rapid change worldwide. The development of space technology is based both on international cooperation and on the achievement of technological goals, without which the effective use of space infrastructure would not be possible. In this domain, international relations require mutually agreed objectives. Due to the increasing demand for the protection of common space assets as well as the need to address collective security challenges and objectives, appropriate measures are taken at European level to ensure the resilience of the common space infrastructure and to enhance Europe's common defence capabilities. For the purposes of this study, the work on defence and security in this field will be illustrated using the example of the European Union. The rationale for this focus is the recent adoption of a key strategic document, namely the European Space Strategy for Security and Defence and the development of secure satellite communications programmes such as Govsatcom and IRIS², through the implementation of initiatives such as the European Space Programme, with a dedicated budget for this purpose.

EU Space Strategy

The need to set common goals for securing and improving space infrastructure at the European level has grown in importance recently as the outer space environment has been threatened by irresponsible and hostile behaviour. Addressing these challenges, the EU Council approved the *Council Conclusions on the EU Space Strategy for Security and Defence* on 13 November 2023. In response to threats of intimidation, destabilisation and economic disruption from hostile space activities, the common EU resilience framework was established. This represents that for the first time such a framework has been focused solely on space infrastructure, and space itself is considered strategic, as demonstrated by the statement that "space is key for the EU's freedom of action and autonomous decision-making in security and defence". The need for a common resilience framework (based on the sector's specifications and

industrial base), in order to enhance the global competitiveness of the EU space sector also stems from the need to avoid the fragmentation of the single market for space services and products. The strategy also refers to the exploration of the potential development of services within the IRIS² Program (including for defence and security purposes) by the Commission in close coordination with the Member States.[37]

European Union Space Programme

The European Union Space Programme, as well as the European Union Agency for the Space Programme were established by Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021. Under this regulation, an EU Space Programme has been developed based on a multi-annual funding framework for 2021–2027. The programme includes space activities in the fields of Satellite Navigation, Connectivity, Space Research and Innovation, as well as Earth Observation. Among the overall goals of the programme, in addition to strengthening European space services and assets and maximising their socio-economic benefits by fostering the development of innovations in both the downstream and upstream sectors, the objectives of the programme include enhancing the security of the Union and its Member States, by reinforcing the safety and "sustainability of all outer space activities pertaining to space objects and debris proliferation, as well as space environment".[38] The budget allocated for the implementation of the programme, and for covering the associated risks is €14.880 billion and it will run from 1 January 2021 to 31 December 2027. Out of the total budget €0.442 billion has been allocated to the Govsatcom and Space Situational Awareness Components.

[37] Council of the European Union 2023: 5, 6, 10, 22.
[38] Regulation (EU) 2021/696.

SUPRANATIONAL NATURE OF SPACE COMPONENTS

Govsatcom

Created in order to carry out security-critical missions and operations managed by the European Union and its Member States, the European Union Governmental Satellite Communication (Govsatcom) Programme is designed to guarantee cost-effective and secure communications capabilities.[39] The services provided by Govsatcom are intended to be used for security and safety operations and it includes crisis management[40] surveillance[41] as well as safeguarding critical infrastructure[42] such as water barriers, energy transport and space infrastructure. The capacity and services of Govsatcom shall be used by European Union and Member States Actors.[43] The programme seeks to create synergy between the civilian and military domains by overcoming the fragmentation of Govsatcom users. In addition, it aims to guarantee EU and national government users' access to satellite communications and to ensure European independence in terms of resources, technology and operations as well as services.[44]

Although Govsatcom is one of the flagship projects of the EU Space Programme, work on secure and resilient satellite communications for government purposes, involving the participation of Member States, began much earlier.

[39] EUSPA 2023.

[40] "Crisis management, which may include civilian and military Common Security and Defence missions and operations, natural and man-made disasters, humanitarian crises, and maritime emergencies." See Regulation (EU) 2021/696.

[41] "Surveillance, which may include border surveillance, pre-frontier surveillance, sea-border surveillance, maritime surveillance and surveillance of illegal trafficking." See Regulation (EU) 2021/696.

[42] "Key infrastructures, which may include diplomatic network, police communications, digital infrastructure, such as data centres and servers, critical infrastructures, such as energy, transport and water barriers, such as dams, and space infrastructures." See Regulation (EU) 2021/696.

[43] Regulation (EU) 2021/696.

[44] European Commission 2016.

Calling for close cooperation between the Commission, the ESA and the EU Member States, the EC conclusions of December 2013[45] began the preparations for the next generation of Govsatcom.[46] The European Defence Agency (EDA) in 2014 approved the initial satellite communications needs for European military entities dealing with the operation of Common Security and Defence Policy (CSDP) as well as national operations[47] and in June 2016 Govsatcom was identified as one of the elements of the Global Strategy for the European Union's Foreign and Security Policy.[48] A demonstration project called Govsatcom Demo began to be developed in March 2017 by the European Defence Agency.[49] A step towards demonstrating European capabilities to support the initiative was the creation of the Govsatcom Precursor programme which, in the form of public–private partnership projects (known as PACIS), enabled the participation of satellite operators and service providers in preparatory work related to this project.[50]

In addition to the supranational nature of the European Union's activities, some other space initiatives can also be characterised as intergovernmental. The Govsatcom Programme is an example of a project that takes the approach of pooling and sharing national assets.[51] According to Article 68 of the EU Space Programme:

[45] "Remains committed to delivering key capabilities and addressing critical shortfalls through concrete projects by Member States, supported by the European Defence Agency, it welcomes [...] in the area of Satellite Communication: preparations for the next generation of Governmental Satellite Communication (Govsatcom) through close cooperation between the Member States, the Commission and the European Space Agency." See European Council 2013.

[46] Regulation (EU) 2021/696.

[47] Borek et al. 2020: 46.

[48] Regulation (EU) 2021/696.

[49] Borek et al. 2020: 46.

[50] ESA s. a.

[51] ESPI 2020b: 38.

> "Member States, the Council, the Commission and the EEAS shall be Govsatcom participants insofar as they authorise Govsatcom users, or provide satellite communication capacities, ground segment sites or part of the ground segment facilities. Where the Council, the Commission or the EEAS authorise Govsatcom users, or provide satellite communication capacities, ground segment sites or part of the ground segment facilities, on the territory of a Member State, such authorisation or provision shall not contravene neutrality or non-alignment provisions stipulated in the constitutional law of that Member State."

This programme, dedicated to ensuring secure satellite communications, is an example of the type of activities taken at the European level to achieve supranational, technological and operational independence with the close cooperation of Member States. It is implemented through the involvement of institutions such as ESA, EUSPA and the European External Action Service (EEAS).[52]

IRIS²

The IRIS² infrastructure contributes to implementing the Govsatcom programme, and is designed as a system of systems, incorporating the necessary ground and space components to provide the necessary government and commercial services for ensuring "resilience, interconnectivity and security by satellite".[53] It consists of Government Infrastructure including both self-standing Commercial Infrastructure and Shared Infrastructure. According to Article 3 of the IRIS² Regulation,[54] the general objectives of the programme are based on providing autonomous, secure, high-quality, cost-effective and reliable satellite communication services to users authorised by government. The second dimension of the programme seeks to "enable the provision of commercial services, or services offered to government-authorised users based on commercial infrastructure at market conditions, by the private sector".

[52] European Commission 2024.
[53] European Commission 2023.
[54] Regulation (EU) 2023/588.

According to the Regulation, the programme objectives include the integration and complementation of existing and future capabilities of the Govsatcom component. Another goal is to improve satellite connectivity over geographic areas of strategic importance such as the Baltic, the Black Sea, Mediterranean regions and the Atlantic, as well as the Arctic and Africa. In addition to the support provided to governments and the elimination of the so-called "dead zones" in Europe, Africa and the Arctic, this programme involves New Space ecosystem stakeholders by stimulating innovations.[55] A further objective of the Regulation is to

> "encourage innovation, efficiency, as well as the development and use of disruptive technologies and innovative business models throughout the European space ecosystem, including New Space actors, new entrants, start-ups and SMEs, in order to strengthen the competitiveness of the Union space sector".[56]

Space Domain Awareness

Space Situational Awareness (SSA) is based on detecting, identifying and tracking space objects as well as predicting their future locations.[57] The Space Foundation defines SSA as "the ability to view, understand and predict the physical location of natural and manmade objects in orbits around the Earth, with the objective of avoiding collisions".[58] According to the U.S. Space Policy Directive 3: "Space Situational Awareness shall mean the knowledge and characterization of space objects and their operational environment to support safe, stable, and sustainable space activities".[59] The European Space Agency completes the definition by identifying three elements of SSA knowledge,

[55] Copernicus 2023.
[56] Regulation (EU) 2023/588.
[57] Erwin 2019.
[58] Space Foundation s. a.
[59] Executive Office of the President 2018.

namely Space surveillance and tracking (SST), Space weather events (SWE) and Near Earth Orbit (NEO) observation. The European Space Situational Awareness system has dual-use military and civilian applications.[60] Outer space is becoming increasingly congested and the international order has been challenged in recent years.[61] In order to respond effectively to the development of counter-space activities by hostile states, the approach to SSA has changed towards ensuring safety by the urgent improvement of SSA capabilities.[62] According to the Strategy, Space Domain Awareness remains within the scope of national responsibility and "SDA is a sovereign prerogative and capacity of Member States stemming from a variety of sources and that sharing this information is a sovereign and voluntary decision by each Member State".[63]

As part of the SSA component, based on the Space Surveillance and Tracking (SST) Support Framework, the SST Consortium was established in 2015. The new EU SST Partnership Agreement which includes 15 EU Member States[64] entered into force in 2022, with the aim of connecting national assets to improve the EU's SST autonomy and performance in the SSA domain.[65]

COMMERCIAL SPACE ENDEAVOURS

Due to the intensified commercialisation of space activities and the growing demand for technology developed by private entities, cooperation between the private and public sectors is more visible and is becoming necessary and, indeed, crucial for security purposes. The line between the commercial space

[60] Polkowska 2018: 342.
[61] Council of the European Union 2023.
[62] Polkowska 2018: 333.
[63] Council of the European Union 2023: 14.
[64] I.e. France, Germany, Italy, Poland, Portugal, Romania, Spain, Austria, the Czech Republic, Denmark, Finland, Greece, Latvia, the Netherlands, Sweden.
[65] The EU Space Surveillance and Tracking (EU SST) Partnership Agreement has officially entered into force on 11 November 2022.

domain and that of military satellites tends to be blurred. Military forces rely on commercial space services and dual-use assets have become widespread throughout the world.[66] To promote best practices and responsible behaviour, space stakeholders in both the public and the private sector need to actively participate in interstate and non-governmental forums in order to contribute to the development of international standards and best practices,[67] especially in the context of ensuring common security. Mutually agreed goals, and the identification of related dependencies play a crucial role when it comes to international cooperation but they can also have a huge impact on public–private partnership, particularly in the upcoming projects dedicated to secure satellite communication. More and more countries are developing their own SSA capabilities, while commercial companies are also working to provide the necessary information to satellite operators. Currently, specialised services related to SSA are increasingly being offered by commercial entities, due to the development of space technologies related to this domain. However, a threat has emerged which is associated with the fragmentation of SSA data, which complicates the efforts being made to standardise and validate information derived from SSA.[68] The evolution of space sector is significantly influenced by governments, which play a range of roles in interacting with the private space sector from regulator to customer to supplier to competitor.[69] Within the IRIS^2 regulations, which enable commercial services, or services offered to government-authorised users based on commercial infrastructure, appropriate market conditions are essential. Furthermore, as indicated in the analysis of both the national and European strategies, the development of innovative and competitive national as well as European upstream and downstream sectors, including SMEs and startups are of particular importance.

66 ESPI 2020a: 1.
67 The French Ministry of the Armed Forces 2019: 27.
68 Satsearch 2023.
69 Polkowska 2018: 336.

IMPLICATIONS OF THE PARADIGM SHIFT TOWARD SUPRANATIONAL OBJECTIVES

The implications of the paradigm shift from a national to supranational scope for security and defence space activities are manifold. There are several reasons for favouring a cooperative approach. One is the development of international cooperation in information sharing, through the involvement of various agencies as well as public and private entities. This contributes to the improvement of common standards and norms of behaviour in space that benefit space stakeholders in terms of security objectives. Due to the increasing demand for the protection of common space assets, addressing common security challenges as well as setting common objectives are essential. In addition, public–private partnerships in the security and defence domain provide opportunities for exploiting commercial technological advances.[70] Components such as SSA involve space activities conducted by private entities due to the level of technological advancement they can provide. The economic aspects of such initiatives should not be overlooked either, as the dual nature of space technology and space activities foster the industrial ecosystem and lead to an expansion of Research and Development cooperation. In the context of initiatives taken at the European level, the autonomy and resilience of space systems is crucial, as is the avoidance of fragmentation in space infrastructures' operations and strategic decision-making capabilities.[71] However, it should also be borne in mind that this approach creates more dependencies, while becoming a challenge for intergovernmental coordination, management and operational capabilities.

[70] Department of Defense 2020.
[71] Mölling et al. 2021.

CONCLUSIONS

The fundaments of global space governance are based on the UN treaties on the use of space, which provide a crucial framework for the peaceful exploration and use of outer space "carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind".[72] It could be argued that these fundamental principles are being disrupted by developing military and defence capabilities in space. In response, it is worth pointing out that the freedom of space exploration and research as well as equal access to outer space is certainly being undermined by the development of counter-space activities.

A key measure for building trust and transparency is the sharing of doctrines as well as public security strategies and policies.[73] Such activities are undertaken both nationally and supranationally. European space capabilities on the technological level have been developed primarily through the establishment of the European Space Agency. The role of the EU in the European space ecosystem is increasing, however.[74] At the same time, it is important to recognise that this ecosystem consists of 22 ESA and 27 EU Member States, most of which have their own national space agencies and dedicated space programmes as well as strategies. A common goal for each indigenous sector is to preserve the space infrastructure in order to use it effectively, for security and defence purposes. To achieve this goal in such a fragmented institutional and regulatory environment, it is necessary to establish supranational mechanisms. European collaboration in space initiatives plays a vital role through strengthening legal

[72] Article I of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies Adopted by the General Assembly in its resolution 2222 (XXI), opened for signature on 27 January 1967, entered into force on 10 October 1967.

[73] Council of the European Union 2023.

[74] As Laurence Nardon noted in 2007: "European military space developments are limited. Acquisition of independent space surveillance means would change the situation. However, all European countries do not share the same motivation for space or indeed for military independence." See Nardon 2007.

frameworks, fostering collaboration in space initiatives and investing in the development of components dedicated to security and defence capabilities. Given the implications presented in this article, special attention should be paid to the evolution of the legal framework and the normative environment along with the development of unified standards for data management as well as ensuring interoperability at supranational level.[75] At the technological level, these instruments are fulfilling their role, but it is necessary to set up support mechanisms of both a strategic and unified nature in order for all the players involved to share a common vision of the strategic challenges of space.

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