PIONEER
ACADEMIC PUBLISHING LIMITED

Journal of Research in Social Science and Humanities
ISSN 2709-1910
www.pioneerpublisher.com/jrssh
Volume 4 Number 10 November 2025

Space Security, Economy and New Demanding Cybersecurity Challenges Through the EU Space Act

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doi:10.56397/JRSSH.2025.11.03

Abstract

The present paper focuses on the European Commission's proposal for the EU Space Act, which has a legal basis in Article 114 TFEU. The proposal's ultimate goal was to harmonize national legislation on security, resilience and sustainability in relation to space activities within a single market like the European one. The regulation proposes and highlights precise and uniform rules for economic and private operators, which fosters investment and respects sovereign prerogatives in connection with the protection of national security requirements. The analysis also focuses on the challenges that may arise in the coming years, both nationally and internationally, by examining the context of the Union's legal order, which is interconnected with provisions related to other Union-related matters.

Keywords: EU Space Act, space, security, defense, sustainability, resilience, cybersecurity, Art. 114 TFEU

1. Introduction

The proposal for a regulation by the European Parliament and the Council on the safety, sustainability and resilience of the Union's space activities, proposed on 25 June 2025, deserves investigation.[1] The EU Space Act regulation is yet another innovation of the European Union, designed to provide member states with a precise legal framework to foster and strengthen an internal market for space activities. The EU Space Act has highlighted a framework to ensure safety, environmental sustainability and resilience, while also seeking to facilitate the Union's competitiveness in the space sector. This harmonization allows for overcoming the differences in existing individual state legislation, helping the start-up of small and medium-sized enterprises and their growth beyond national borders within the unified market (Ünüvar, 2025). The proposal was launched at a historical moment that space demonstrates to be critical due to the potential it offers from an economic perspective for aspects related to its own safety.

The space economy, which has grown in recent years, is becoming a specific, critical component for various sectors, especially communications, financial transactions, agriculture, weather forecasting and space resources, which play a

[1] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the safety, resilience and sustainability of space activities in the Union, COM/2025/335 final: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52025PC0335. See also in argument: https://www.european-space-act.com/

key role in the opportunities and exploitation offered by new technologies. [1] The space economy involves the growth of both public and private actors. Non-spacefarer states are those that have integrated their space activities into a national space program. These states are protagonists in a struggle for time and space, considered special and important for the formation of customary norms for the sector. Spacefarer states, through various private entities, initiate activities in this sector. Obviously, the original structure and traditional actors are the United States and the Russian Federation, currently important groups for the states that have developed space programs. Furthermore, regional international organizations such as the European Union and the African Union have autonomous programs for space agencies (Wouters & Thiebaut, 2009; Von Der Dunk, 2017; Mahulena Hofman & Blount, 2018; Onwudiwe & Netwton, 2021). Alongside national space agencies, other actors are focusing on space and on interests associated with space resources and services. Private actors are thus significantly increasing the potential profits derived from space activities such as space tourism, satellites and the use of large constellations (Lacombe, 2019; Venkatesan, Lowenthal & Prem, 2020). Activities related to the development of space technology extend beyond the original space sector to the states and the objectives pursued, namely political and/or military ones.

Within this sector, support for the privatization of these activities is evident within a framework of exclusive prerogatives for states that assist their public and private actors, that is, within a framework of activities that do not appear to be fully regulated (Lockridge, 2006). Thus, a market for space activities is growing, driven by numerous private actors, with a regulatory impact that necessitates regulations based on the evolution of its context. The European Union, even at the regional level, is not excluded from this evolving procedural process, with a dual objective, this of European integration.

2. The Strategy Envisioned for the EU Space Act

The proposed Regulation Space Act was based on a European legal and political framework for the space sector that integrates and introduces an element of harmonization into this sector. Space also represents a cross-cutting area of interest for civilian activities linked to the defense and security sectors, thus entrusting a variety of space-related assets. Within this area, the work of the European Space Agency (ESA) (Krige, Russo, 2000) is noteworthy. This intergovernmental institution has been recognizing the failures of European space partnerships since 1975. Thus, the implementation of programs for space safety, space exploration and the development of European launchers for an emerging satellite industry positions the ESA to allow member states to invest in and support the development of the European space industry. In this spirit, the European Commission has supported space activities that consider horizontal tools for policies that have launched large-scale space programs in the fields of satellite navigation and Earth observation. Interest is thus growing progressively in relation to the development of a capacity for infrastructure, telecommunications, satellite navigation and Earth observation services with a decisive impact on society. The European Union has thus established its own link with the ESA, namely the Joint Space Strategy of 2000, which followed the Space Policy of 2003. The project was based on the 2004 agreement between the EU and ESA. Subsequently, key programs such as Galileo for satellite navigation and Copernicus for Earth observation, as well as other Space Surveillance and Tracking (SST) programs, were developed, i.e., objectives to protect European space infrastructure.

Following the Treaty of Lisbon, the Union was granted competence in space matters, namely the Code of Conduct for Outer Space Activities.[2] This binding document offered guidelines for conduct aimed at ensuring the safety and sustainability of space, thus falling within the scope of soft law instruments, the law of space activities. It has thus assumed significant and growing importance in the evolution of international law, given the difficulties of reaching agreement on a legally binding text. This is why we are talking about a new Space Strategy for Europe, which was adopted by the

[1] OECD, Space economy at a glance, 2014, https://www.oecd.org/sti/the-space-economy-at-a-glance-2014-9789264217294-en.htm

[2] EU, Draft International Code of Conduct for Outer Space Activities, 31 March 2014, https://www.eeas.europa.eu/sites/default/files/space_code_conduct_draft_vers_31-march-2014_en.pdf

European Commission in 2016.[1] The Strategic Compass of 2022 and space identified as a strategic area, was put forward by the European Commission, [2] the High Representative for Foreign Affairs and Security Policy, who in practice issued the European Union Space Strategy for Security and Defence on 10 March 2023.[3] Space has played a key role in the Union's Common Security and Defense Policy, highlighting and drawing attention to the defense and security sector, which is shifting to an aspect involving the use of force in space. The related strategy thus proposed actions to strengthen the resilience and protection of the Union's space systems and services. This resulted in the issuance of the EU Space Law, which provides a common framework for the security and sustainability of space, strengthening the exchange of information on incidents and facilitating cross-border coordination for broad cooperation. In this way, the European Commission's proposal achieved a goal set for its strategy.

The proposed EU Space Act implements strategic objectives already identified for Europe through the Competitiveness Compass.[4] In this spirit, we recall the Approach for Space Traffic Management (STM) of 15 February 2022[5] and the Green Deal of the Union.[6] In this regard, the EU Approach for Space Traffic Management highlighted and addressed the connection between space traffic and the presence of an exponential number for satellites and earth orbits, according to the need to avoid debris. The European Green Deal (Campins Eritja & Fernández Pons, 2024) sought to influence the governance and regulation of space activities. This strategy aims for a green transition and the achievement of climate neutrality by 2050. It concerns various economic sectors such as transport, energy, agriculture, sustainable finance and aerospace activities, which contribute to the fight against climate change. In the 2024 Transition Pathway for the Aerospace Ecosystem document, the topic was dedicated to the air and space sectors.[7] Finally, of direct relevance, is the Vision for the European Space Economy, issued on the same day as the presentation of the legislative initiative, i.e., 25 June 2025.

The vision outlines a strategy to ensure Europe's significant share of the global space market, while strengthening its autonomy and technological advantage. It defines actions to strengthen the EU's space ecosystem. Among other things, it envisions a "Space Team Europe", an inclusive, high-level forum bringing together European space stakeholders, including the European Space Agency (ESA) and the European Union Agency for the Space Programme (EUSPA). This highlighted the unification of fragmented efforts to consolidate the Union's capacity. The ultimate goal is also to invest in the development of a unified regulatory framework for the Union's space market, especially in emerging sectors such as space mining and the use of space resources.

[1] EU, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Space Strategy for Europe, COM/2016/0705 final: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2016%3A705%3AFIN

[2] European Union, A Strategic Compass for Security and Defence, 24 March 2022, https://www.eeas.europa.eu/eeas/strategic-compass-security-and-defence-1_en

[3] European Commission and High Representative of the Union for Foreign Affairs and Security Policy, Joint Communication to the European Parliament and the Council, European Union Space Strategy for Security and Defence, Brussels, 10.3.2023, JOIN(2023) 9 final, https://ec.europa.eu/transparency/documents-register/detail?ref=JOIN(2023)9&lang=en

[4] European Commission, Competitiveness Compass, Brussels, 29.1.2025, COM(2025) 30 final, https://commission.europa.eu/topics/eu-competitiveness/competitiveness-compass_en

[5] European Commission High Representative of the Union For Foreign Affairs and Security Policy, Joint Communication to the European Parliament and the Council, An EU Approach for Space Traffic Management. An EU contribution addressing a global challenge, 15.2.2022 JOIN(2022) 4 final: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52022JC0004

[6] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions "The European Green Deal", COM(2019) 640 final of 11 December 2019: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019DC0640

[7] European Commission, Transition pathway for the aerospace ecosystem, 2024: https://img.spaceconomy360.it/wp-content/uploads/2024/06/07155258/Transition-Pathway-_-Aerospace-Ecosystem-_-EN.pdf?_gl=1*rezqup*_gcl_au*MTM5NTUzMjU1OC4xNzYwMTY5NjY1. European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A Vision for the European Space Economy, del 25.6.2025, COM (2025) 336 final: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52025DC0336

The building blocks are based on a single market framework for space, industrial preparedness and technological independence, along with a qualified working effort such as international cooperation, economic diplomacy and support for space-specific commercialization, in a continuous effort to accelerate research and innovation. This vision of the EU Space Act emphasizes competitiveness as a tool to enhance the space economy and establish a single market for space through data-driven space services. Thus, the new regulation provides common, predictable rules that contribute to making the European space industry highly competitive.

3. The Basis of the New Regulation

The work carried out by the European Commission before adopting a new regulation was focused on the functioning of the national space market, also highlighting the institution's political orientations regarding European competitiveness in space qualified as a strategic, fundamental sector of the Union.[1] The basis of the EU Space Act is understood as a preliminary reference to the Union's competences for space activities. Following the Treaty of Lisbon, competence for space was conferred upon the Union, positioning it as a potential key player in this sector. Article 4, paragraph 3 TFEU (Kellerbauer, Klamert & Tomkin, 2024) is recalled for the sectors of research and technological development, space for the Union. The Union has the competence to conduct actions aimed at defining the implementation of certain programs without the related competitive exercise, which has the effect of preventing Member States from exercising these rights among themselves.

The TFEU grants a qualified, sui generis, parallel, competitive competence in this area, shared with the Union and the Member States on a general basis, based on the exclusion principle. Its exercise does not impede Member States but highlights the regulatory provision that concerns the conduct of actions defined as the implementation of programs in this sector. This provision was inserted through the TFEU to allow the Union to issue regulations in this sector, leading to the process of integration in relation to the security sector and its own defense. Its limited and specified competence is granted by Article 189 TFEU (Kellerbauer, Klamert & Tomkin, 2024) with reference to European space policy. This policy is based on the former Article 189 TFEU, which provides the foundations and support for research, technological development and the coordination of efforts necessary for the exploitation of space, exclusively through the harmonization of national regulations in the space sector.

The harmonization limit and competence of the Union's space policy are limited by the adoption of national legislation within new and emerging sectors regulating space, such as the exploitation of space resources and space traffic management. Space competences and capabilities at the European level and at different levels of governance are subject to the risk of misalignment as they achieve various regulatory levels. This criticality, for the European Commission, lays the foundation for security, resilience, environmental sustainability and renewable energy for the Union's space activities, avoiding fragmentation and providing the basis for a single regulatory framework for all Member States (Liakopoulos, 2024).

The EU Space Act, based on Article 114 TFEU (Kellerbauer, Klamert & Tomkin, 2024), on the adoption of space measures within the Union, has promoted space activities that promote the competitiveness of the space industry, facing thus the risks of an exponential growth of space activities that safeguard the use of space.[2]

Article 114 TFEU justifies and addresses the divergent approaches of Member States that create difficulties for operators and the conduct of space activities in cases requiring authorization from different space authorities, such as the launching state and the territorial state. Article 114 TFEU achieves the objectives of an internal market based on Article 26 TFEU (Kellerbauer, Klamert & Tomkin, 2024) through the harmonization and approximation of legislation for the Member States of the Union. It also ensures the original, primary objective of the free movement of persons, services and capital within an area of internal borders. Additionally, the case law of the CJEU has highlighted a broad interpretation of Article 114 TFEU in relation to the areas of competence

[1] CJEU, 5 October 2000, C-376/98, Germany v. Parliament and Council, ECLI:EU:C:2000:544, I-08419. 12 December 2006, C-380/03, Germany v. Parliament and Council, ECLI:EU:C:2006:772, I-11573.

[2] CJEU, 5 October 2000, C-376/98, Germany v. Parliament and Council, ECLI:EU:C:2000:544, I-08419. 12 December 2006, C-380/03, Germany v. Parliament and Council, ECLI:EU:C:2006:772, I-11573.

excluded from the treaty (Weatherill, 2017).[1]

Obviously, the use of general internal market rules is intended to pursue instrumental sectoral policy objectives that circumvent the Treaty's stated limitations. Space activities, as referred to in Article 114 TFEU, have enabled the European need to harmonize uniform disciplines regarding aspects of the activities of private commercial operators within an internal market, such as states that maintain control over services and data related to dual-use space activities of strategic importance for national security. The ability to regulate aspects such as launch authorization regimes for private operators, liability and insurance profiles, the registration of launched objects and the enactment of national legislation refer to common rules that smooth out frictions arising from the application of conflicting state regulations (Linden, 2016).

The sector operator that acquires authorization from states to have a basic activity link and the various criteria connecting it, such as territory, nationality, registration, etc., lay the foundation for European regulation capable of establishing preferential criteria that avoid other procedures, also facilitating the entry and operation of the European market. The actions of Article 189 TFEU are suitable for achieving this effect. The regulation is based on harmonization with reference to key aspects of safety, resilience and environmental sustainability. It takes into account authorizations that are related to space activities. Independently coordinating activities for individual states means offering the corresponding recognition for authorizations that are linked to another member state as a connecting factor to the activity and the competence that issues the basis of the national regulation. This solves the problem and the need for a private operator facilitating commercial activities to request their own authorizations, while preserving the possibility for each state to impose restrictive criteria deemed objectively and necessary for its own territory.

The relevant provisions for operators operating in areas under the jurisdiction of multiple states lack legal status as they are not based on a precise and uniform regulatory framework. Simplification of the final instance makes the space industry competitive through new space startup avenues that encourage investment in the space sector. The technical requirements proposed by the regulation and debris mitigation, along with sustainability that stimulates innovative research and technological development, activate a virtuous cycle capable of improving the Union's economic environment in the long term. The European Commission, in an explanatory appendix to the proposal, identifies the relevant aspects relating to subsidiarity and proportionality, linked to legislative initiative. This highlights the establishment of a single European framework, which also represents added value compared to the action of high-level member states. This Union level has created equal conditions regarding safety, resilience and environmental sustainability requirements. This avoids overlaps, duplications and conflicts between legislation in force in various countries, thus improving the functioning of the internal market.

The need for various authorizations is eliminated through the mutual recognition mechanism that guarantees that the Union's space infrastructures provide services in a safe and secure manner. This ensures consistent, uniform environmental impact assessments. The proportionality of regulatory intervention ensured by the European Commission does not introduce rules that go beyond the objectives pursued and create disproportionate costs that harm the European space industry. The specific measures are applied to the different types of orbits that conduct space activities and do not influence the choice of technologies that safeguard state prerogatives and national security.

The proposed regulation introduces a simplified authorization process for constellations and less restrictive rules for activities carried out in low earth orbit, given the proximity to the atmosphere and the relative brevity of space missions in that area. These factors take into account the proportional rules of actual needs and the space dimension at a critical level for the mission and the propulsion system used. This use takes into account the European Commission's choice of a legal instrument for the regulation. In this spirit, Article 114 TFEU allows for the adoption of regulations and decisions that are appropriate and uniform, so

[1] 14 October 2004, C-36/02, Omega, ECLI:EU:C:2004:614, I-09609. 8 June 2010, C-58/08, Vodafone and others, ECLI:EU:C:2010:321, I-04999. 22 January 2014, C-270/12, United Kingdom v. Parliament and Council, ECLI:EU:C:2014:18, published in the electronic Reports of the cases.

as to avoid even the slightest discrepancies in an application profile resulting from discretionary choices related to the implementation of a directive. The explanatory document and the reasoning behind this choice ensure transparency and uniform guarantees of rights and obligations as service providers operating in an internal space market between the Union and third countries.

Another consideration concerns the measure, as an initiative that refers to European Space Law,[1] a content and object of aspects that respect full harmonization. In such a way, the legal basis, which refers to Article 189 TFEU, is assessed, i.e., a space policy consistent with the choice of name for the EU Space Act, as a measure based on Article 114 TFEU.

4. Structure and Content of the EU Space Act

When speaking of the structure of the new regulation, we refer to the variety of topics systematically addressed through a number of titles totaling 119 articles, introduced by detailed rules for an authorization regime for space activities and the governance of the technical requirements required for this type of procedure. The provisions aim to achieve an important and forward-looking objective for the EU Space Act, which is to ensure the safety, resilience and environmental sustainability of the Union's space activities. The rules focus on research and balancing state needs related to the security and defense of the Union, enhancing the internal market through regulatory harmonization.

The definitions of the material areas are included in Title I of the EU Space Act, which seeks to regulate, authorize and register the Union's space activities, including management rules for orbital traffic to avoid future collisions. This therefore involves governance and the implementation of its decisions, such as the establishment of the Union space label, as well as the introduction of capacity-building measures. In this spirit, Article 109 of Title VI, relating to the proposed regulation, includes development activities and capabilities in the space sector, as well as technical support for space operators and competent state authorities. The development of guidelines and the identification of best practices, as well as in-orbit services, facilitation of information exchange, funding of research projects and technological innovation, are also included. Already within the scope of the UN, the main capacity-building activities were the result of the work of the United Nations Office of Outer Space Affairs (UNOOSA), which consisted of training, education, technical advisory services and the management of programs promoting space science and applications.[2]

Title II includes provisions relevant to authorizations. The European-level agency already relies on information from the competent state authorities for authorizations, as well as on basic information on authorized operators under national law. The Union Register of Space Objects (URSO) has been created to include operators from third countries. This simplified description of small operators conducts activities in orbits close to the earth's atmosphere and within constellations. An authorization for space objects is thus provided, which comprises authorizations for individual objects. Space objects within the Union, as well as the competent authorization authority, are linked to the European Commission. Other international organizations, as well as operators from third countries, can register to URSO by demonstrating compliance with the required technical requirements. The agency issues the relevant certificate of conformity in electronic format for these activities.

Title III concerns the governance and responsibilities of national authorities and related technical bodies with supervisory, sanctioning and inspection powers, such as those of the Agency. They play a coordinating role with similar state authorities and the activities of operators managing assets for the Union, providing support to states that lack adequate capacity at the national level.

Technical requirements are included in Title IV in strict compliance with the principle of proportionality, which differentiates the requirements relating to the safety, resilience and sustainability of the various categories of operators and the activities conducted. The rules on safety and the reduction of collision risks,

[1] Legislative Train Schedule of the European Parliament, https://www.europarl.europa.eu/legislative-train/theme-a-new-plan-for-europe-s-sustainable-prosperity-and-competitiveness/file-eu-space-law

[2] https://www.unoosa.org/oosa/de/ourwork/topics/capacity-building.html

mitigation and the production of debris in orbit[1] are safety procedures for both orbit and deorbit. Within this spirit, the measures and devices use objectives set for debris mitigation plans and the reduction of radio and light pollution for specific aspects, including those relating to mega-constellations. Security primarily considers the security dimension.[2] The same title includes the main management links for space risks and infrastructures, including cyber risks. The connection and reference to cybersecurity rules protects critical infrastructures relating to safety profiles and the security dimension. The protection measures include the space mission cycle, launch design and the operational phase of potential physical and cyber risks. The regulations also include the Space Act, which is considered a lex specialis, as well as the NIS2 Directive on information security. This facilitates cooperation between the actors involving the Commission and the Agency at the European level, as well as the competent authorities of individual states, as envisaged in the establishment of the Union Space Resilience Network (EUSRN), which seeks to monitor the management of significant cyber incidents for the alignment of resilience measures.

The EU Space Act introduces provisions on environmental sustainability, which include an environmental impact statement. The indications on the requirements for space objects required to achieve environmental sustainability objectives also provide for the possibility for the Commission to issue standard rules for technical characteristics. In this spirit, Title V defines the activities of operators for third countries and international organizations of the Union. It also outlines an equivalent system for licenses issued to international organizations managing assets for the Union based on Article 218 TFEU (Kellerbauer, Klamert & Tomkin, 2024). Support measures are provided for in Title VI, which includes technical assistance and capacity-building, such as digital solutions for any functional means convenient for the implementation of the regulation. Title VII also includes final and conclusive provisions, which are of particular interest for interim measures, given that the regulation is applicable to space activities starting from the 2030 regulation and its connection with the legal system of the Union.

The European Commission's proposal is based on existing regulations covering diverse areas such as cybersecurity and the impact on space activities. In this regard, Regulation (EU) 2021/696 [3] established the European Union Agency for the Space Programme (EUSPA) together with the Union Space Programme, enabling the Union to operate autonomously and competitively in the space sector (Davis Cross, 2021). Regulation 696/2021, unlike the EU Space Act, has found legal space in Article 189, paragraph 2 TFEU, allowing for space, which is a key sector for the services provided to everyday society and on earth for the protection of strategic interests such as security and technological resilience. The objective of harmonizing Union rules in the space sector makes the regulation the basis for progress towards simplifying the Union's governance system.

Article 3 of Regulation 696/2021 includes the Galileo programme as a civil global satellite navigation system; EGNOS as a civil regional satellite navigation system; Copernicus, as well as a satellite observation system for the entire Earth; and Space Situational Awareness (SSA), which includes a surveillance system for space tracking, as well as the observation of space weather events monitoring in proximity to earth. These are essential elements for the detection of potential threats and for the adoption of related countermeasures. GOVSATCOM, as a civil and governmental satellite communications service, is also included in this spirit.[4] The European Commission was identified as responsible for implementing a space programme capable of

[1] Committee on the Peaceful Uses of Outer Space (COPUOS), Scientific and Technical Subcommittee, Inter-Agency Space Debris Coordination Committee (IADC) Space Debris Mitigation Guidelines, 3 February 2025, A/AC.105/C.1/2025/CRP.9, par. 3.1, p. 8: https://www.unoosa.org/res/oosadoc/data/documents/2025/aac_105c_12025crp/aac_105c_12025crp_9_0_htmlAC105_C1_2025_CRP09E.pdf

[2] UNIDIR, What's in a word? Notions of 'security' and 'safety' in the space context, 12.5.2023, https://unidir.org/whats-in-a-word-notions-of-security-and-safety-in-the-space-context/.

[3] Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021 establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013 and (EU) No 377/2014 and Decision No 541/2014/EU, OJ L 170, 12.5.2021: https://eur-lex.europa.eu/eli/reg/2021/696/oj/eng

[4] https://defence-industry-space.ec.europa.eu/eu-space/govsatcom-satellite-communications_en

defining the relevant priorities for long-term development according to Article 28 of Regulation 696/2021. EUSPA, as a new agency of the Union, has been given legal personality, replacing the Galileo Global Navigation Satellite System (GNSS) agency, which in practice works in close cooperation with all other external and internal Union actors such as the European Space Agency, the Member States and the relevant EU agencies relating to the European External Action Service.

This is a sphere of old and new issues introduced by Regulation 588/2023 of 15 March 2023, which highlighted the Union's program for secure connectivity, [1] focused on secure and stable communications services for both civilian and government sectors, enabling infrastructure protection, surveillance, and, above all, crisis management. Within this framework, the IRIS2 constellation is expected to be in orbit for a period of time until 2027 to ensure very fast communications, thanks to cryptographic and quantitative technologies. The EU Space Act harmoniously integrates Regulation 696/21, clarifying the interconnection between the provisions of its provisions. The EU Space Act itself proposed linking other provisions addressing issues of interest to the Union with space-related aspects. Thus, the communications sector also addresses cybersecurity and the protection of strategic infrastructures.

We continue with Title IV, which deals with technical rules in the resilience sector, also addressing the topic of coordination with the Information Security Directive and infrastructure with essential services according to NIS2, i.e., the Resilience Directive on critical infrastructure[2] and physical, anthropogenic and natural threats, including terrorist threats.[3] The related NIS2 Directive takes into account the Union's level of cybersecurity, taking into account the protection of terrestrial infrastructure[4] and the protection of terrestrial infrastructure for use by Member States and by private entities for space activities that exclude the scope of application for infrastructure managed, used by the Union on behalf of, and within the scope of its own space program. The Directive does not provide a comprehensive framework for the management and risks for segments of space infrastructure and for all space operators, given the limited scope for activities that take place on their own planet. Therefore, the EU Space Act includes and integrates the regulatory framework that fills the gaps in this regard.

On the other hand, the interest between the various sectors emerges above all in relation to cybersecurity, which is lacking in this sector given that the security of satellite traffic is not guaranteed to reduce the risk of collisions due to damage caused by marked debris.

This increases resilience, which aims to protect the Union's and member states' infrastructure from threats, especially cyberattacks. It ensures the long-term sustainability of space activities through common standards and lifecycle assessments for space objects. The link with cybersecurity is relevant to the activity under investigation.

The EU Space Act explicitly establishes and proposes the application of cybersecurity regulations to all space operators for space infrastructure, thus creating a basis for measuring resilience in the space sector. Private and public actors in this sector acquire specific legal obligations necessary to ensure the resilience associated with space missions. The regulation's direct applicability thus overcomes criticisms related to the delayed and timely implementation of the NIS2 Directive. The proposed regulation provides a general information security framework for the Union establishing specific requirements in the space sector, thus becoming a lex specialis for information security measures. According to the NIS2 Directive, Union space operators are included in the category of entities implementing the directive with objectives that comply with the cybersecurity risk management

[1] Regulation (EU) 2023/588 of the European Parliament and of the Council of 15 March 2023 establishing the Union Programme for Secure Connectivity for the period 2023-2027, PE/65/2022/REV/1, OJ L 79, 17.3.2023, pp. 1-39: https://eur-lex.europa.eu/eli/reg/2023/588/oj/eng

[2] Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972 and repealing Directive (EU) 2016/1148 (NIS 2 Directive), OJ L 333, 27.12.2022, pp. 80–152: https://eur-lex.europa.eu/eli/dir/2022/2555/oj/eng

[3] Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC of 14 December 2022, in OJ L 333/164, 27.12.2022: https://eur-lex.europa.eu/eli/dir/2022/2557/oj/eng

[4] Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, cit., Annex I, p. 67.

measures. It also reports obligations among those that are important for the functioning of the sector and the type of services they provide. The accuracy criterion complies with the requirements set out in the EU Space Act, which also comply with the content of the NIS2 Directive.

The Union's policies in the area of safety, coordination and air traffic management encompass various sectors, such as air transport, movement of people, and so on. They also include space activities that affect multiple Member States, according to Regulation (EU) No. 2019/123,[1] which highlights the functions of the European network. Thus, the mandatory reporting system for the Union, pursuant to Regulation No. 376/2014, [2] is systematically implemented within the scope of aerospace activities. The provisions of the proposed regulation seek to integrate existing legislation. Also details in this regard specifically related to space operations. In environmental matters, the regulation precisely addresses the Green Deal and the Union's related sustainability objectives, using methodologies that assess the impact of space activities, such as life cycle assessments (LCA) and environmental products, taking into account specific, yet complex, environmental impacts of space activities. The relevant directive includes critical infrastructure, including the space sector, which falls within the scope of the directive concerning the provision of services that depend on ground infrastructure operated for use by Member States and/or private entities. The regulation thus functions and complements the provisions regarding an orbit infrastructure that qualify as critical. The effort is to coordinate new legislation with a legal framework that applies within the space sector, which is only at a collateral level. The EU Space Act presents and establishes a guarantee of primary coordination in the sector, primarily to ensure the specific criteria of the related specific requirements in the space sector.

In this spirit, relations with international law, which requires the Union to recognize the Outer Space Treaty and the principles developed within the UN framework, represent a fundamental point for the legal regulation of space activities within strategic documents such as the Space Strategy. Adhering to the principles of the Outer Space Treaties, the Astronaut Rescue Agreement,[3] the Liability Convention,[4] and the Registration Convention [5] are also referred to in the Space Traffic Management document (Bennett, 2023).

5. The Security and Defense Framework

The EU Space Act highlights several security issues for the Area of Freedom, Security and Justice that are worth analyzing at this point. First, we refer to Article 2, paragraph 3, which excludes the applicability of the regulation and related objects used exclusively for defense and national security objectives, regardless of the provider of space services. Military command and control posts for defense objectives do not apply to space objects for the entire duration of the space mission. Thus, it is up to each Member State to determine its own circumstances as a space object falling under this type of exclusion. The regulation under investigation does not affect authorization provisions regarding the radio spectrum regulated under Decision 676/2002/EU, Directive (EU) 2018/1972 and Decision 243/2012/EU. There are also interrelations with the space sector that continue

[1] Commission Implementing Regulation (EU) 2019/123 of 24 January 2019 laying down detailed rules for the implementation of the functions of the air traffic management (ATM) network and repealing Commission Regulation (EU) No 677/2011 Text with EEA relevance, C/2019/293, OJ L 28, 31.1.2019: https://eur-lex.europa.eu/eli/reg_impl/2019/123/oj/eng

[2] Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007, OJ L 122, 24.4.2024, pp. 18–43: https://www.easa.europa.eu/en/document-library/regulations/regulation-eu-no-3762014

[3] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Space Objects Launched into Outer Space (ARRA), adopted by the General Assembly by General Resolution 2345 (XXII), opened for signature on 22 April 1968, entered into force on 3 December 1968, 672 U.N.T.S.119, https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introrescueagreement.html

[4] Convention on International Liability for Damage Caused by Space Objects (LIAB), adopted by the General Assembly by resolution 2777 (XXVI), opened for signature on 29 March 1972, entered into force on 1 September 1972, 961 U.N.T.S. 187, https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliability-convention.html

[5] Convention on Registration of Objects Launched into Outer Space (REG), adopted by the General Assembly with resolution 3235 (XXIX), opened for signature on 14 January 1975, entered into force on 15 September 1976, 1023 U.N.T.S. 15: https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introregistration-convention.html

to be applied to specific standards such as the European Electronic Communications Code.

The regulation includes safeguard clauses for state sovereignty, recognizing the Member States' prerogatives in the area of national security. In this spirit, Article 4 of the Regulation includes the national security clause. This is intended to reassure Member States against any interference by the Union and related matters, which falls within its exclusive jurisdiction. The European Commission considers the adoption of functional measures that serve the European interest and respect the principles of subsidiarity, proportionality and full respect for state competences. The preamble already specifies the scope of the clause, which refers to cases where a state needs to establish specific space measures by taking control of an object under its jurisdiction for the purpose of exercising its national security competence. The security issue includes objects, dual-use infrastructures and especially resilience measures, as well as infrastructures that are operational for the control and assessment of space threats for the development of the EU Space Threat Response Architecture.

The Union Space Resilience Network (EUSRN), pursuant to Article 94, paragraph 1 of the Regulation, supports and identifies events related to space systems that pose a threat to the Union and its Member States. It therefore presents itself as an effective response to threats that complement the provisions of Council Decision (CFSP) 2021/698 on the security, systems and services used within the Union's space program, related to Union's security.[1] The EU Space Act proposes the European Union Space Strategy for Security and Defence, taking into account a geopolitical context that sets strategic objectives to protect space assets, defend the Union's interests, deter hostile activities in space and strengthen its strategic autonomy. The strategy identifies threats that put space systems and related infrastructures on one's planet at risk, thus identifying counterspace capabilities. These are the activities that demonstrate capabilities and deterrence against competitors, preventing the use of space systems to achieve information superiority. Space assets orbit their supporting infrastructures, which are present on earth via interconnected links. The desired effect of employing a space countermeasure reversibly includes these types of activities, which are directed against specific targets in a space sector that affects the radio frequency spectrum. Use by space objects does not immediately include the classification of space assets as military or civilian.

In this spirit, the 2021 Council Decision (CFSP) on the security of systems and services in connection with space programmes is a binding legal document that, unlike the EU Space Strategy, includes enforceable provisions that allow the Union to identify and attribute related threats in order to respond and put the security of the Union and of its member states at risk. The High Representative launched the Space Threat Response Architecture to implement the Council Decision. This decision clearly highlights the EU Space Strategy laying the foundation for an effective countering of threats, thus broadening the scope of the mechanism and the response employed to defend Galileo and all the Union's space systems and services. This mechanism is based on the availability of an information framework (Space Domain Awareness) and the immediate identification of in-orbit threats (Early Warning) based on the capabilities of the member states, as is the new service that connects with the EU Satellite Centre and the European Union Agency for the Space Programme (EUSPA). An interconnection to this system is presented through the regulation, which proposes resilience as a response to threats. Specifically, Articles 74-95 of the provision address its own resilience and space infrastructure.

The general principles applicable to risk management for space infrastructure are also established. The obligation to perform and assess risks is based on the legislation in force regarding the cybersecurity and physical resilience of the relevant entities. Space operators conduct risk assessments, identifying vulnerabilities and corrective measures that are adapted to the specific risk scenarios of each space mission. The Union's space operators have passed on major incidents involving Union-owned assets to the Agency. As a Union space resilience network, the EUSRN seeks to facilitate cooperation between the European

[1] Council Decision (CFSP) 2021/698 of 30 April 2021 on the security of systems and services deployed, operated and used in the Union space programme which may affect the security of the Union, and repealing Decision 2014/496/CFSP, OJ L 170/178 of 12.5.2021: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32021D0698

Commission and the Agency for national authorities. It is responsible for monitoring and managing major incidents to align and implement resilience measures with other relevant Union frameworks. The vision for the European Space Economy strategically highlights the space sector's overall economy and its related military, technological and security objectives.

Space investments are geared toward government and military demand, resulting in the distinction between commercial, civil and military space programs, as well as dual-use assets in orbit. The ongoing tensions and crises surrounding government and military satellite constellations supporting communications, missile tracking and real-time situational awareness for military operations enable the commercial space sector to play a key role in providing these capabilities to sectors such as intelligence and defense services. This allows for a strategic autonomy that outlines the Union Strategic Compass for Security and Defense. Thus, the space industry plays a fundamental role in contributing to the achievement of this objective.

The relative involvement of commercial players in the space sector in armed conflicts is a reality that highlights the vulnerability of space infrastructure to kinetic and cyber attacks and the devastating effects on the economy and civilians. The increase in cyberattacks as a form of attack also includes hybrid, missile and cyber attacks. The European Commission calls for the adoption of precise cybersecurity standards for satellites in space. Radio frequency interference jeopardizes the security of European transport services, especially air and sea transport, ultimately compromising the safe operation of Europe's critical infrastructure. The Union considers countermeasures and investments that protect the infrastructure of numerous economic players to be necessary. The development of resilience systems and the increased security and protection of the Union's existing space systems provide space services for all civilian sectors, such as energy, thus offering a fundamental response to such emergencies. Space capabilities exist at the national level to indirectly provide the Space Act, which enables and establishes a unified framework that fosters the development of precise rules through the internal market.

6. Connection with Cybersecurity Rules

The regulation has established traffic management for the protection of critical infrastructures that takes into account cybersecurity aspects. This regulation covers space objects that damage, and compromise equipment related to the total or partial disabling and decommissioning of space systems due to defects that are accidentally caused in control and management systems, such as IT. The risks, already outlined in the preamble, include collisions and increased orbital congestion, resulting in debris production, as well as geopolitical threats related to the cybersecurity of space infrastructures. Critical situations are related to physical contact and disruptive activities within their systems, as well as the safety of space operators and the associated compromises. The guarantee of protection and the compromise of the functioning of space systems is addressed in two ways. The security, space activities and earth orbits of economic operators in the sector put in the foreground human activities on earth that depend on space-based systems such as satellite systems, telecommunications, remote sensing, weather forecasting, the acquisition of their own images and information that meet needs within the scope of their own security.

The cybersecurity of the Union, through the regulation of Directive NIS2 2022/2555, refers to this matter only incidentally, placing the envisaged regime in a system that does not include all possible actors, private, government and services relevant to the space system. However, no reference is made to communications network providers, non-public services, research institutions and education institutions. Also missing is the regime for European assets, which is based on a Union space program. The EU Space Act seeks to standardize resilience by increasing standards for state assets, bringing them closer to those of the European space program. Cybersecurity requirements, unlike those adopted by all Member States through national legislation, unbalance and compromise the functioning of the internal market, which they must address. The European-level provision and the related minimum infrastructure requirements specify the needs of a typology that contributes to and eliminates the inequalities that create solid, identical basic conditions for the entire Union internal market. This objective is established by the EU Space Act as an appropriate system for

managing risks and design phases of space missions. This ensures cybersecurity for space infrastructure and all resources and data systems that are essential for all phases, from design and manufacturing to launch and operation throughout the entire life cycle. This puts in place robust risk management measures through a life cycle for space missions that adequately address all evolving phases.

In this spirit, Title VI is considered, which contributes to state capabilities related to achieving this objective. The related infrastructures at all levels, as well as the actions managed for each type of risk, enable the regulation to harmonize requirements appropriately with the diverse needs associated with the space environment. The provisions also include Directive 2022/2555 as a lex specialis that complies with Article 21. This directive applies across sectors of interest to the Union. It continues to represent a useful reference basis for the space sector, introducing requirements that tighten risk management and the need for a harmonized framework for the entire market.[1]

The related harmonization with the NIS2 and CER directives regarding risk management and procedures for managing incidents, threats and information exchange refers to Chapter II of Title IV of the new regulation. Space activities thus have an impact that determines the security of the earth, relying on space capabilities and especially on the area of freedom, justice and security. The Copernicus Earth observation program is already used in border control and indirectly in migration issues. The judicial police also uses satellite control systems for geolocation, shadowing, communications and image collection.[2] Examples can be seen in space activities that become integrated with terrestrial activities. Ensuring the safety and functioning of space assets, the protection of space activities, has a direct impact on the guarantee and security of the planet. The measures referred to in the EU Space Act are based on producing their effects in this area.

[1] Regulation (EU) 2019/881 of the European Parliament and of the Council of 17 April 2019 on ENISA (the European Union Agency for Cybersecurity) and on information and communications technology cybersecurity certification, and repealing Regulation (EU) No 526/2013 ('Cybersecurity Act'), PE/86/2018/REV/1, in OJ L 151, 7.6.2019, pp. 15-69: https://eur-lex.europa.eu/eli/reg/2019/881/oj

[2] https://www.esa.int/Enabling_Support/Preparing_for_the_Future/Space_for_EarthSatellite_technology_to_help_fight_crime

7. Concluding Remarks

From the previous paragraphs, we have sought to explore the European Commission's proposed regulation, seen as an important step for the Union's role in the space sector, governed by legal aspects. The related strategies, which are linked to the EU Space Strategy for Security and Defense and the Strategic Compass, as space represents a key interest, increase activities and foster the proliferation of actors engaging with economic potential. The related European-level provision aims to harmonize national legislation in this sector. It is not linked to state competences but provides a single framework with uniform rules to facilitate the activities of commercial operators and related investments. Legal protection guarantees the safety, resilience and sustainability of space activities, aligned with the will of the European legislator as an effect that ensures the protection of space assets. The national security clause is inserted into a provision that excludes the applicability of detailed rules, while effectively retaining dual-use assets within the scope of the regulation. The EU Space Act has proposed other relevant measures that are relevant to the space sector, such as the related directives on cybersecurity (NIS2) and critical infrastructure (CER). The regulation is intended to be a lex specialis for space activities. The regulation is ultimately based on the legal basis of Article 114 TFEU on the harmonization of rules for the functioning of an internal market, which proposes, in a complementary manner, compliance with national legislation. The EU member states have thus sought to enact space legislation through the use of relevant space-related legislation that has a uniform regulatory effect for in-orbit activities, including the terms of their own governance for the relevant actors in their respective sectors.

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