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Paradigm shift in the European Union's space policy: institutional restructuring and its possible consequences for the CEE region

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Developing capabilities in outer space has become crucial as the space segment becomes an increasingly important pillar of the economy and defence capabilities of states. Despite the growing global competition in and for outer space, in recent decades the EU and the ESA have focused their strategy on the civil aspects of space exploration. However, the crises emerging from Russia's war on Ukraine has led the Member States to the conclusion that Europe must enhance its autonomous security and defence capabilities, especially in outer space. The main methods used in this study were the historical method and the legal analysis method. As a result of the crises, the EU has changed its politics recently adopted a space defence strategy, while it plans to propose an "EU Space Law Act" and is currently adapting its institutions to respond appropriately to the security challenges posed by the war on European territory and to the increasing competitiveness gap. First, the paper analyses the paradigm shift in the EU's space policy and its implementation at the level of the institutions. Second, it will scrutinize the potential of the CEE region in connection with this paradigm shift. As a result of the crises, the EU has changed its politics recently adopted a space defence strategy, while it plans to propose an "EU Space Law Act" and is currently adapting its institutions to respond appropriately to the security challenges posed by the war on European territory and to the increasing competitiveness gap.

KEYWORDS

European space Policy, politics of crises, war on Ukraine, security and defence policy, EU space law, competitiveness, CEE region

1 Introduction

The space industry is booming in several contexts, including both the civilian and military domains, both downstream, via increased demand for satellite data in various industries, and upstream, involving governmental conventional missions. The unprecedented intensity of space activities that has emerged is due to two main factors: the transformation of the space industry (New Space) and the militarisation of space activities due to geopolitical conflicts. The term "New Space" refers to the new wave of commercial space activities spearheaded by private companies, introducing innovative technologies with reduced costs and increased accessibility (Achilleas, 2024, pp. 9–13). Second, the increasing geopolitical tensions and crises around the world and the increasing exposure of societies to space systems have led to the militarisation of outer space, which in turn affects national and regional security policies.

These global tendencies are forcing Europe to make politics of crises and to engage fundamental changes to its space policy, including the institutional reforms necessary if it wishes to be a space power and an autonomous actor in geopolitics. The first of these challenges is related to the competitiveness of the European space industry in the New Space era. Whilst Europe has been a frontrunner in many aspects of space technology (e.g., the rocket propulsion

industry), the competitiveness gap is widening with its chief global competitors (mainly the United States and China). The second challenge is the militarisation of outer space, which has been accelerated by the war in Ukraine. The European Union (EU) and the European Space Agency (ESA) focused their strategy in previous decades on the civil aspects of space exploration. It is only lately, following the outbreak of Russia's war on Ukraine that the Member States of the EU decided to enhance the autonomous security and defence capabilities, especially in outer space. As a result, the EU has recently adopted a space defence strategy, with plans to propose an "EU Space Law Act" in 2025 and it is currently adapting its institutions to respond appropriately to the security challenges posed by the war on European territory.

The purpose of this study is to analyse the change in the EU's space policy following one of the major crises of the last decade, the war on Ukraine and to scrutinize the possible consequences of this paradigm shift for of the CEE region. Finally, it will make recommendations for the CEE region on how to foster competitiveness and autonomy through legal and other policy instruments. For the purposes of this study, the CEE region is defined as including Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. Although only some of these countries are analyzed in detail in this chapter, the conclusions drawn are applicable to the CEE region as a whole.

2 Materials and methods

In order to achieve the objectives of the study, the authors have analysed official documents of the EU, including primary and secondary sources of EU law, as well as other documents, on the policies and strategies of the EU in the field of space. With regard to international law, the materials referred to in this the study include international legal instruments as well as non-binding documents, including guidelines and recommendations adopted by the United Nations. At the national level, the authors studied national legislation in the field of space exploration, national space strategies and documents related to space programmes. In addition, recent literature in the area under study was reviewed. The main methods used in this study were the historical method and the legal analysis method. The historical method was mainly used to show the evolution of the European approach to space, the changes in its institutional structure and the space heritage of the Central and Eastern European Member States. The method of legal analysis was applied to the analysis of legal acts and their interpretation.

3 Discussion

3.1 Landscape of the European space Policy

The following section presents the current picture of the European space Policy, as well as the position of the Member States in the space domain.

3.1.1 Space programmes

The development of European space Policy has been shaped by the specific features of the history of the European continent and the EU. During the Cold War, the domain of space was for the most part within the reach only of the two superpowers, the US and the USSR whose national space agencies played a dominant role in pursuing space activities, while the rest of the world admired their achievements. However, in the 21st century, the concept of space activities has taken on a new meaning, and with the emergence of private actors in the field, leading to cost reductions and sustainable development, the role of the space domain has also changed. This is driven by the growing demand for space data and services in support of sustainability goals, where space programmes (including the EU's space programmes) can make a significant contribution to addressing challenges such as climate change, security, emergencies and mobility. It is also directly linked to the relevant need for an independent and resilient space infrastructure in response to an unstable geopolitical situation (EU Commission, n.d.). It is also worth mentioning that ESA puts also on emphasis on sustainable use of the space segment. For example, the Agency has published in 2022 its strategy to reduce space debris by 2030 (ESA Zero Debris Charter, n.d.). This development has also led to changes in the institutional landscape of the European space sector.

Based on the challenges outlined above, the European space Policy has dynamically evolved during the last few years. These developments are intrinsically bound up with the strategic autonomy of the EU and its Member States which has been considered in a number of documents adopted by the EU which culminated in the drafting of the European space Policy and its key milestones. Principal elements of this policy include the need to support the emergence of a highly competitive European space industry and its supply chains, which would enable Europe to participate in and contribute to the global growth of the space economy. The policy calls on all actors to work towards ensuring a global level playing field and to open their economies. Developed jointly by the European Commission and the ESA, the European space Policy sets out a basic vision and strategy for the space sector, addressing issues such as security and defence, access to space and space exploration. Particular attention is paid by the policy to space traffic management and space cybersecurity, which are essential elements for maintaining safe, autonomous, reliable, cost-effective and affordable access to space. A related and decisive step in strengthening the space sector was the Treaty on the Functioning of the EU (TFEU, Lisbon Treaty), which placed space on the political agenda at the highest level and explicitly mentioned cooperation between the EU and ESA. Article 189 of the Lisbon Treaty specifies the EU's competence in space, which operates alongside that of the EU Member States. It also provided the basis for establishing appropriate relations between the EU and the ESA.

All the major elements included in the European space Policy were subsequently included in the EU Space Programme for the years 2021–2027 (Regulation (EU) 2021/696, n.d.). The principal goal is to ensure high-quality, up-to-date and secure space-related data and services, increased growth and job creation in the EU due to use of such data and services, enhanced security and greater strategic autonomy of the EU. The programme stresses—inter alia—the importance of the EU's Galileo (EU Galileo, n.d.) and Copernicus (EU Copernicus, n.d.) and EGNOS (EUSPA EGNOS, n.d.) space programmes. In 2022, the European Commission proposed a regulation on the Union Secure Connectivity Programme for the period 2023–2027 (Regulation (EU) 2023/588) focusing on enhancing the robustness of EU communication services through the creation and management of a multi-orbital connectivity infrastructure, consisting of both space and ground segments, utilising a public-partnership approach called Satellite Communications for Air Traffic Management (IRIS). IRIS^2 will be a multi-orbital satellite constellation that will be able to provide secure communication services to

European governments (and commercial services at a later stage) (EU IRIS², n.d.).

One of the most recent milestones in shaping the EU approach to the space domain is the EU Space Strategy for Security and Defence (Joint Communication, 2023), which set the course for the development of the European space ecosystem to protect space systems and services in the EU, as well as to strengthen their resilience, as a response to increased counterspace capabilities and threats in the space domain (EU Space Strategy, n.d.). This shift in EU space policy in the direction of defence and security will be analysed in section 3.2.

Another important means of ensuring European autonomic access to space is the development of European launchers, which is the second largest area of space-manufacturing activity in Europe after commercial satellites. The issue is closely related to the services available at Europe's Spaceport in French Guiana and affects both the safety and competitiveness aspects of the European space domain. The first successful European space launch vehicle series, and for many years the only one, were the Ariane rockets. The various generations of Ariane launchers have served both the European governments as well as the commercial clients from all over the world. In addition, two other, smaller launchers were developed in French Guiana, i.e., Vega and Soyuz. In 2014, the ESA Council meeting at Ministerial level approved the development of the Ariane 6 and Vega-C launchers. Ariane 6 thus succeeded Ariane 5 to enable Europe to maintain its autonomy in launching services and the maiden flight of this system took place in 2024 (ESA Europe's launchers, n.d.).

3.1.2 Institutional framework

The implementation of the European space Policy and Programme depends to a large extent on properly functioning space governance. Space governance at European level has grown considerably in recent years and become more diverse, based on several institutions. It remains, however, highly fragmented for several reasons. First of all, this is related to the penetration of both supranational and national elements and the dynamic changes taking place in the European space Policy field. From the institutional perspective, EU has taken a collaborative approach to the space domain which may help it to fulfil the conditions of safety, sustainability, and resilience in space across the entire EU. These requirements have been envisaged in the EU Space Programme which sets out the principles of its governance through the distribution of tasks and responsibilities between the entities involved in the implementation of each of the EU Space Programme's components and measures, in particular between the Member States, the Commission, the EU Agency for the Space Programme (EUSPA), ESA and EUMETSAT.[1] From the institutional perspective, the European space sector is led by the European Commission and its operational agency in charge of the Space Programme—EUSPA. The increasingly important role of the European Defence Agency also cannot be ignored. This institutional landscape is also inhabited by the ESA, although it is not a part of the governance system of the EU, due to the independent legal position of ESA.

The European Commission (EC), as the executive body of the EU, plays a major role in governing the European space domain, as well as in proposing policies and strategies. Its dominant role was established in the EU Space Programme according to which "*[i]n the area of space, the Union exercises its competences in accordance with Article 4(3) TFEU.*[2] *The Commission should ensure the coherence of activities performed in the context of the Programme*" (Regulation (EU) 2021/696, n.d.). The Commission currently plays a dual role in the Space Programme, not only initiating the legislative process and preparing EU space programme proposals, but also being responsible for their implementation (Schuman Papers, Salini, 2021). The EC has also been assigned overall responsibility for the implementation of the space EU Space Programme, involving the determination of the long-term evaluation and priorities of the programme as well as the supervision of its implementation; management of its components and determining the technical and operational requirements needed for the implementation and evaluation of these components.

The EU's Space Programme introduced a number of new instruments to unify the governance system of the space sector at the EU level (EU Space Programme, n.d.). Accordingly, the EC is responsible for creating and promoting synergies with other related EU programs and financial instruments and should ensure consistency between the approaches developed under these programs.[3] This is why, through its executive agencies, the EC additionally coordinates and manages programmes such as Horizon Europe,[4] the CASSINI Space Entrepreneurship Initiative[5] and many others (European space sector, n.d.). Another milestone in the unification of space activities from the institutional point of view was the publication of the EU Space Strategy for Security and Defence. The role of the EC in this context is to synchronise and coordinate activities in critical space technologies, together with the European Defence Agency and ESA as well as EUSPA (Council Conclusions, 2023). Similarly to the tasks performed under the EU Space Programme "*the Commission promote joint programming through enhanced coordination between relevant EU programmes*" (Joint Communication, 2023). The EC's activities in the defence industry, as well as in the Space sector are led by the Directorate-General for Defence Industry and Space (Directorate-General DEFIS, n.d.).

1 The European operational satellite agency for monitoring weather, climate and the environment from space on behalf of its Member States.

2 "In the areas of research, technological development and space, the Union shall have competence to carry out activities, in particular to define and implement programmes; however, the exercise of that competence shall not result in Member States being prevented from exercising theirs." (TFEU Art. 4).

3 "During the implementation of the programme, the commission should therefore promote synergies with other related union programmes and financial instruments, which would allow, where possible, use of access to risk finance, innovation partnerships, and cumulative or blended funding. The commission should also ensure synergies and coherence between the solutions developed under those programmes, particularly Horizon Europe, and the solutions developed under the programme." (Regulation (EU) 2021/696, n.d.).

4 The EU Framework Programme for Research and Innovation established by the European Innovation Council.

5 Under the umbrella of the European Commission, the European Investment Fund and European Investment Bank Competitive Space Start-ups for Innovation initiative (CASSINI) was officially launched in 2022.

The EU Agency for the Space Programme (EUSPA) was established to implement the EU Space Programme[6] as the EU decentralized agency in charge of the Space Programme. EUSPA acts as the operational manager of Copernicus, Galileo, EGNOS and all the other components of the space programme in terms of their security and coordinates the user-related aspects of Govsatcom in cooperation with the relevant Union agencies, the European External Action Service (EEAS), Member States and other entities. The responsibilities of EUSPA include the security accreditation of all the components of the EU Space Programme, as well as ensuring market development, communication and promotion of the services offered by Galileo, EGNOS, and Copernicus. Furthermore, according to the EU Space Programme, the EUSPA's competences also include implementation of activities related to the development of downstream applications as well as integration based on the data and services provided by EGNOS, Galileo and Copernicus (Regulation (EU) 2021/696, n.d.). The EUSPA provides security support to the EC in connection with other initiatives such as the Connectivity and Euro Quantum Communication Infrastructure (EuroQCI), and is a source of security expertise for components such as GOVSATCOM, Space Surveillance and Tracking (SST) and Space Situational Awareness (SSA) (EU Agency for the Space Programme, n.d.).

The institutional landscape in this area in the EU also encompasses the European Defence Agency (EDA). Due to the circumstances and threats that have emerged over the past few years, such as the Russian's aggression against Ukraine, increased development of counterspace capabilities and threats in the form of DA-ASAT[7] tests or cyberattacks on space infrastructure, the EDA has become increasingly important in the context of space activities. Programs coordinated by EDA are facing against these challenges by filling the relevant gaps in European defence capabilities. This includes efforts to build a more coherent European approach via programmes such as Space-Based Earth Observation (SBEO), SSA, Satellite Communications (SatCom) as well as Positioning, Navigation and Timing (PNT) (European Defence Agency, n.d.). In the context of the EU's broader space policy, with the aim of co-development, EDA is tasked with identifying the common requirements of defence users' military needs for space-based systems (EDA, Defence in Space, n.d.). Important changes in the roles of EDA have been envisaged in the European Space Strategy for Security and Defence. In line with this strategy, the EDA will be required to identify the needs expressed by Member States with regard to space domain, while also providing support for EDA's education activities in the field of space security and defence, as well as fostering the exchange of best practices in developing space-related skills.

A discussion of the institutional landscape of the EU would not be complete without outlining the role of the ESA. The relations between ESA and the EC were forged by a number of measures preparing the basis for future cooperation between the two organisations. On 16 November 2000, ESA and the EU Councils (at the time the European Communities) met for the first time to adopt parallel resolutions endorsing the jointly elaborated European Strategy for Space and to establish a structure for future cooperation (Council Resolution 2000/C 371/02). The next milestone in their cooperation was the drafting of the "Green Paper on European space Policy," prepared by the EC in cooperation with ESA. The Green Paper (European Commission, 2003) identified Europe's assets and weaknesses in the space sector in order to initiate a debate on Europe's space policy with all the involved players including national and international organisations, the European space industry and its users. The EU-ESA cooperation was formalized by the Framework Agreement signed by EU and ESA on 25 November 2003,[8] based on article 189 TFEU. The Framework Agreement recognises that both parties have specific complementary and mutually reinforcing strengths and commits them to work together to avoid the duplication of effort. However, it also stressed the continued independence of the ESA. The framework had two main aims: to establish a common basis for future activities and to put in place appropriate practical arrangements for efficient and mutually beneficial cooperation between the ESA and the EU, as well as to progressively develop a European space Policy to link the demand for services and applications in support of EU policies with the supply, through the ESA, of the space systems and infrastructure needed to meet that demand.

3.1.3 European states as independent actors of space policy and governance

In spite of the growing harmonization and unification of space-related laws within the EU, the Member States remain independent actors. Legally, that results from the provisions of the TFEU, which grants the EU only limited powers within the scope of regulating space activities. The current framework is derived from the TFEU, Article 189 of which empowers the EU draw up a European space Policy but excludes any harmonisation of the laws and regulations of the Member States. Thus, Member States—whether they are members of the ESA or not—are free to establish their own national space policies. The following section briefly outlines the currently highly fragmented regulatory landscape of space activities in the EU as regards the governance of space activities.

Most EU Member States regulate their national space activities through national legislation to keep pace with technological development (Sipos and Upadhyaya, 2024) while conforming with Art. VI. of the Outer Space Treaty which provides that States Parties to the Treaty shall authorize and supervise by the appropriate State Party to the Treaty (Outer Space Treaty, Art. VI, n.d.). The landscape of national space legislations of the Member States is very heterogenous due to the lack of legal competence of the EU in this field, as mentioned above, and to the lack of legally binding international legal instruments on the authorization and supervision of national space activities. In consequence, the EU's authority to act in relation to the national competences of the Member States is in parallel with them, which means that the Member States preserve their national authority to act within the space sector, even if the EU undertakes actions with the same subject and scope (Article 4.3. TFEU). In the present circumstances, the restriction on the harmonization of the European space laws has begun to be perceived as an obstacle to serving the interests of European societies in terms of safety and competitiveness in space. This has become all the more pressing since space was identified as a vital strategic domain.

6 It replaced and succeeded the European GNSS Agency established by Regulation (EU) No 912/2010, n.d..

7 Direct-Ascent Anti-Satellite Missile.

8 Entered into force on 28 May 2004.

To date, 12 Member States have enacted national space legislation in the EU (UN National space law database, n.d.). This paper only deals with countries which have enacted rules on the authorisation and supervision of space activities. Therefore, it does not consider Member States which only regulate the competences of their national space agency [e.g., Poland (Polish Space Agency, n.d.) and Italy (Italian Space Agency, n.d.)] or the registry of national space objects [e.g., Czech Republic (2014)]. Member States which have passed national space legislation can be divided into two broad groups. The first group includes those countries which do not regulate the rules for space activities in their entirety, but which have codified only certain aspects of them [e.g., Germany (SatDSiG, 2007)]. The second group includes those States that have established rules for the performance, control and registration of space activities in a comprehensive piece of legislation [Sweden (UNOOSA Sweden, n.d.), Spain (UNOOSA Spain, n.d.), Belgium (Belgian Space Law, 2005), France (French Space Law, n.d.), Netherlands (Dutch Space Law, n.d.), Austria (Austrian Space Law, n.d.), Denmark (Danish Space Law, n.d.), Luxemburg (Luxembourg Space Law, 2020), Greece (Greek Space Law, n.d.), Finland (Finnish Space Law, n.d.; Decree (74/2018), n.d.), Portugal (Portuguese Space Law, n.d.), Slovenia (Slovenian Space Law, n.d.)]. Most of the latter States supplement the law by implementing regulations, in order to codify the detailed, often technical rules contained in them (see Figure 1).

3.1.4 Space policy and governance specifics in the states of Central Eastern Europe

Faced with the legal landscape depicted in section 3.1.2., Member States are implementing both their own space strategies and national space laws, that involve science, research and development and international cooperation, and which increasingly possess elements of a defensive and security nature. The complexity of the processes involved in space activities requires both the adoption of appropriate strategies and taking suitable governance measures. It is possible to characterize different European regions in terms of their level of engagement with the space domain, depending on various indicators such as historical heritage, relatively low level of public and private investment in the space sector, the lack of awareness among local authorities of the potential of the space domain, the continued lack of prioritisation of the space sector as well as a low level of cooperation between institutions and industry (Malinowska et al., 2024).

In the current New Space Era, in addition to security and defence aspects, the increasing presence of private entities in the space

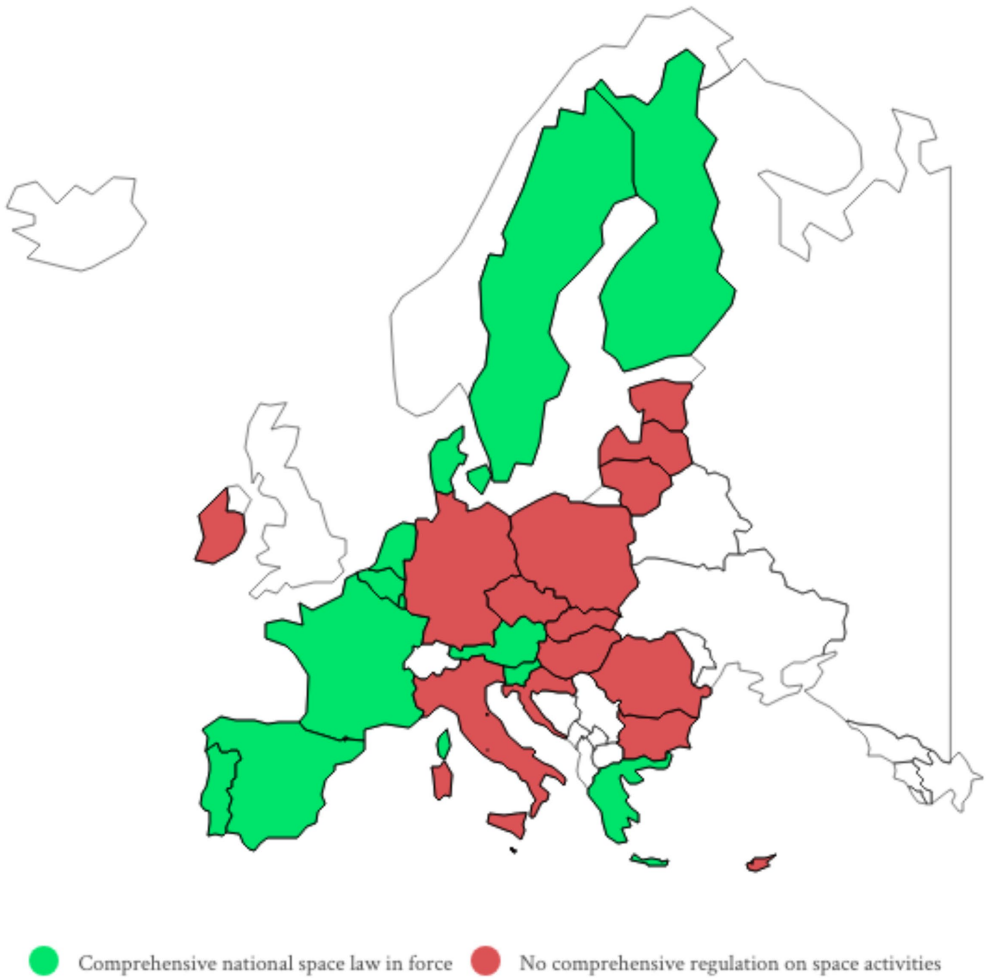

FIGURE 1
Comprehensive national space laws in the European Union. Based on the research of the authors of this paper, prepared by the authors.

ecosystem and the high risks associated with their activities make space governance increasingly difficult. The proper governance of the domestic space sector involves addressing several legal challenges, such as the issue of licensing, supervision and the registration of space objects. The countries of Central and Eastern Europe (CEE) are in a special position, having developed their space capabilities for decades behind the Iron Curtain. The consequences of such a legacy still affect their position and are evident in the lack of developed tools for governing national space activities, both from an institutional and regulatory perspective. The situation is not helped by the lack of space legislation in the vast majority of countries in the region. Along with the paucity of national space legislation, there is also a lack of relevant national space agencies with the authority to coordinate the national space sectors. Such a situation also exists in Hungary, where the governance of space activities is the responsibility of a department of a ministry, without the existence of a specialized agency.

Responsibility for coordinating space activities is often scattered among a dozen different entities. It is also often the case that these responsibilities are shared between the relevant ministry and the national space agency, which can lead to an unclear division of responsibilities and thus to many ambiguities or unnecessary procedural complications that may have a negative impact on the development of the domestic sector. Furthermore, a space agency (such as in Poland), although formally an independent legal entity, may at the same time report to the relevant ministry. Such a governance structure can significantly hamper the decision-making process and the implementation of space policies or programmes. In most countries in the CEE region, these activities are coordinated within one main ministry, but it is clear that these competences are also delegated within the various ministries which are responsible for individual space components. A small number of the countries analysed have a dedicated national space agency established either by a separate act or as part of national space legislation.[9]

The space governance model in most CEE countries is based on joint coordination between several ministries and the various related public agencies. Considering the concept of space governance in Western European countries, it seems that the new space countries of CEE are taking a similar path. A question that deserves more attention is whether the increasing dependence on space technologies and applications in the civil and military fields requires a rethinking of the role of space agencies. In this day and age, it is increasingly suggested that they should be given more independence and coordination powers, rather than being subordinated to various ministries.

Although the CEE countries share a common history of the beginnings of their steps into space exploration and had a similar start in the world of democratic space conquest, each of them is currently at a slightly different stage. This undoubtedly makes it difficult to compare them under uniform criteria. They differ in terms of the implementation of their space strategies and national space programmes, the level of institutional help available to local space industries and the establishment of the national space agency. Due to the differences in the size of their economies, differences in space sector numbers cannot be a reliable indicator for comparisons. There are also, however, some similarities, such as in the pattern of relations with the ESA (although of different nature) as well as the lack of national space laws (the only exceptions in this respect are Austria and, more recently, Slovenia).

3.2 Drivers of paradigm shift in the EU's space policy

3.2.1 Lack of competitiveness

The European space industry is considered highly competitive in some areas. The European navigation system (Galileo satellite network) has, since 2024, provided the most accurate and secure positioning and timing information, including for military applications. Galileo's High Accuracy Service is much more precise than any other Global Navigation Satellite Systems (GNSS), including the US GPS, China's Beidou and Russia's Glonass. The Copernicus satellite system offers the world's most comprehensive Earth Observation data, including for environmental monitoring, disaster management, climate change monitoring and security (Draghi-report, 2024, pp. 173–174).

Nevertheless, despite all these successes, there is a wide consensus that the EU has lost ground in recent years and is starting to lag behind its main competitors on the global market, the United States and China, with a widening capability gap (ESPI, 2022). In recent years Europe has lost its leading position not only in the market of geostationary satellites[10] but also on the launchers market, while its dependency on semiconductors and the American megaconstellations (such as Starlink) which have a huge competitive advantage over European projects.

It is also worth highlighting Europe's lag in autonomously accessing outer space. In the area of launchers, the problem is not only the delay in the development of the Ariane 6 launcher or the technical problems troubling the Vega-C launcher, but also the fact that Europe's competitors have technological advantages (Boston Consulting Group-ESPI, 2023). For example, the reusability of Space X's launchers significantly decrease the costs of its launches. On the topic of space transportation, where Europe does not have autonomous capabilities, the ESA will present its program proposal in 2025 (ESA Resolution, 2023). Finally, unlike the US, China, Russia and India, Europe has no plan to develop own space station in Earth orbit.

Because one of the focuses of the new European Commission will be competitiveness, Mario Draghi—former European Central Bank President—was tasked by the European Commission to prepare a report on the future of European competitiveness. The report, presented in September 2024, analyses 10 sectors, including the space sector, and articulates recommendations to foster competitiveness.

9 Of example, Polish Space Agency was established under the Act of 26 September 2014 on the Polish Space Agency, later amend by Act of 13 June 2019 amending the act on the Polish Space Agency and the act on government administration departments (Journals of Laws 2019 item 1248).

10 Geostationary orbits of 36,000 km from the Earth's equator are best known for the many satellites used for various forms of telecommunication, including television. Signals from these satellites can be sent all over the world. Telecommunication devices on the Earth's surface need to be able "see" the satellite all time and hence it must remain stationary in the same positions relative to the Earth's surface (ESA. The geostationary orbit, n.d.).

Draghi has identified the following root causes of the EU's competitive gap in the space domain:

a) The public funding for space policy in the EU is lower than in other regions, as it lacks large civil and military space programmes.
b) The lack of coordination among Members States' investment in space hinders the growth of the demand side.
c) Public investment in R&D in the EU does not have the required level of ambition.
d) EU space companies' ability to scale up is hindered by their limited access to finance and public contracts.
e) The governance model is fragmented. The co-existence of multiple institutional actors at national and European levels amplifies the fragmentation of the EU's space industrial base.
f) Coordination and synergies between space and military activities are not fully exploited in the EU.
g) European space activities and programmes face trade barriers and strategic dependency of foreign producers (Draghi-report, 2024, pp. 176–181).

The report lists five short-term and five med-term proposals to address these problems. It is worth highlighting two of these which the report deems as priorities and which might radically affect not only the governance of European space activities but also might significantly affect the position of central and eastern European countries. The first proposal is to abolish the ESA's geographical return principle to reduce the fragmentation of the EU's industrial base and modernise EU procurement rules. The second recommendation of the report is to establish a functioning Single Market for space, through a common EU legislative framework (Draghi-report, 2024).

3.2.2 War on Ukraine

Since its inception, space has been a subject of interest to States from a defence point of view. This was due to the unique capabilities created by orbital and observation mechanisms.[11] The military use of space was a major factor in space exploration during the Cold War, when the ASM-135 anti-satellite missile was developed and tested by the US Air Force in 1985. In the 1980s other countries also started to think about military uses of space.[12] The evolving space technologies demonstrated their military potential for the first time during the first Gulf War in the years 1990–1991, during which military forces relied heavily on remote sensing (ESPI, 2020). While the commercial use of space has evolved over the years, with the public image shifting from defence to civilian use of space, the military aspect has always been there, albeit behind the scenes. With each new conflict, the space industry becomes more important in the chain of command, especially in interstate wars.

Space defence has recently returned to the forefront with the increase in geopolitical tensions and this seems to be one of the main drivers of the change in EU space policy. In particular, the war in Ukraine clearly had a decisive influence on this shift. Examining this policy shift reveals the main trends in the space domain and, in fact, it is already shaping the future of space, especially in the military domain. The explicit symptoms of this shift can be seen in the example of the ASAT tests carried out in recent years by China, Russia, the US and India.[13]

Space applications are multiplying and are increasingly being used in the conduct of military operations, serving reconnaissance, meteorology, communication and navigation purposes, including such space assets as ballistic missile defence and ASAT weapons.[14] The capabilities offered by satellites involve two main aspects in relation to the defence. One concerns the ability to assist earth-based military operations while the second is the accelerating rise of in-space military capabilities which have been recently shown by some countries in the form of ASAT tests. This has led some experts to suggest that "Space for Defence" is being transformed into the "Defence of Space' (ESPI, 2020). As regards the first aspect, i.e., the application of space techniques for assisting military operations on Earth, remote sensing seems to be the most pertinent issue as it enables "intelligence, surveillance and reconnaissance".[15] This can be characterised as "space support for earth defence." Military operations in space, on the other hand, include kinetic contacts between space objects and proximity operations. It thus deals with defence and military actions in space. Both of these aspects have a common denominator which is the protection of space-based assets (ESPI, 2020).

The use of satellites has had several impacts on the course and conduct of the war. An explicit example of this is the mega-constellation of Starlink satellites launched from the USA by SpaceX, and Maxar (Deggert, 2023, p. 1). The main outcomes of these are improved communication, intelligence gathering abilities and battlefield awareness that may lead to a faster-paced and potentially more destructive conflict. This influences and supports not only specific military actions and decisions, but also military strategy through algorithms made available to commanders. For all these reasons Starlink has been called "a transformative tool for modern warfare." According to one report, military insiders "are in awe of Starlink," since it provides more resilience than some military specific communications systems, specifically against jamming (Starlink, 2023). Starlink has been vital to Ukraine since the early days of the war. Communications and speculatively limited PNT (Positioning Navigation and Timing) capabilities are used by Ukraine through Starlink. The Russian invasion of Ukraine in February 2022 put the latter in a difficult position in terms of remaining connected to the outside world. The use of the Starlink service in Ukraine has become indispensable for both the Ukrainian military and civilians (Palmer, 2024). No less important are the commercial images of enemy troops provided by Maxar and Icye, which have helped to draw international attention to the reality of war. More broadly, the experience with Starlink in Ukraine has shown the growing reliance of governments

11 For example, the US Corona satellites, and USSR Zenith satellites launched in 50s served military-recognizing purposes.

12 For example, Israel and South Africa (Ferreira-Snyman, 2015).

13 China 2007, Russia 2021, India 2019, USA 2008.

14 It is noteworthy that the space imagery component is considered the weakest part of the Russian space sector. According to some data, as of 2018, the U.S. military uses over 170 satellites while Russia operates 97 military satellites, and China's military has 100 (Kehrer, 2019).

15 "A capability for gathering data and information on an object or in an area of interest (AOI) on a persistent, event-driven, or scheduled basis using imagery, signals and other collection methods" (ESPI, 2020).

on private space operators in the absence of government equipment. This is an important indication of the autonomy of Europe and its Member States' governments and an important driver of the development of the space domain.

In response to the existing security challenges outlined above, Europe has been undergoing a rapid transformation in its approach to defence, and specifically to space defence, over the last few years. This involves a fundamental change within the EU, which is itself becoming an independent actor in this field, alongside the Member States. Taking into account global trends, including in particular the stance and actions of the United States, the EU started at the end of 2008 to develop its own Space Situational Awareness (SSA) system consisting of three separate segments: (1) Space Surveillance and Tracking (SST), (2) Space Weather (SWE), (3) Near-Earth Object (NEO) monitoring. The SSA system is a dual-use system, with its military components being built on the basis of military requirements defined by the EDA. The accelerating development of European space capabilities is also evident in the rapid development of EU space programmes such as Galileo and Copernicus which, although essentially civilian in nature, also have obvious defence and security potential (Kozioł, 2022).[16]

The shift in paradigm over the last 2 years has been demonstrated by the adoption of the Common Security and Defence Policy, and the creation of the Directorate-General for Defence, Industry and Space within the European Commission (ESPI, 2020). The Space and Defence Strategy was announced in 2022, in the Strategic Compass (EU Strategic Compass, n.d.). which called for a dedicated strategy to address the threats faced by European space assets. In parallel, the security and defence activities of the EU, such as the European Defence Fund and the Permanent Structured Cooperation (PESCO), have increasingly integrated space-based components in recent years. It seems that the evolution of the EU approach to space security and defence is in line with the EU's generally increased scope of engagement in the field of security and defence, as well as with developments in the international environment. The Space and Defence Strategy is intended to be a stepping stone towards an action-oriented roadmap, in three dimensions, by fostering the use of space systems and services for terrestrial security and defence activities, addressing the security of European assets in space and aligning Europe's political, operational, diplomatic and governance dimensions.

The strategy proposes actions to strengthen the resilience and protection of space systems and services in the EU and to meet this objective several actions were proposed such as (1) proposing an EU Space Law to provide a common framework for security, safety, and sustainability in Space, that would ensure a consistent and EU-wide approach, (2) setting up an Information Sharing and Analysis Centre (ISAC) to raise awareness and facilitate exchange of best practices among commercial and relevant public entities on resilience measures for space capabilities, (3) launching preparatory work to ensure long-term EU autonomous access to space, addressing in particular the security and defence needs of the union, as well as (4) enhancing the technological sovereignty of the EU by reducing its strategic dependencies and ensuring the security of supply for space and defence, in close coordination with the European Defence Agency and the ESA (Joint Communication, 2023; EU Space Strategy, n.d.).

3.3 Possible consequences of the paradigm shift for the CEE region

The increasing gap in competitiveness between the EU and its global peers and the growing international security risks led the Commission to announce in its 2024 work plan that the EC will propose in 2024 a "*European space law that will set rules, for example for space traffic management, but also on how we will keep our critical space infrastructure safe. It will be complemented by a strategy on the space data economy to increase the use of space data across economic sectors*" (European Commission, 2023). Although the proposal was due to be presented in April 2024, the project has been suspended due to the EP elections. However, it seems clear that the intention remains: a new portfolio has been created within the new EC for space and defence with the task to "*introduce common EU standards and rules for space activities and harmonise licensing requirements, as proposed the Draghi Report*" (von der Leyen, 2014). It thus seems clear that the future space policy of the European Commission will be founded on the recommendations of the Draghi report. Therefore, the following section will examine how a possible reform of the ESA's geographical return principle and the introduction of harmonized regulation on space activities—as proposed by Mario Draghi—might affect the Central and Eastern European Region's countries policies.

3.3.1 Reform of the geographical return principle

The geographical return principle is one of the key pillars of the cooperation between the 22 Member States of the European Space Agency, established in 1970. Its Convention stipulates that the industrial policy elaborated by ESA shall be designed—inter alia—to "*ensure that all Member States participate in an equitable manner, having regard to their financial contribution (…) in particular the Agency shall (…) grant preference to the fullest extent possible to industry in all Member States (…)*" (ESA Convention Art. VII. (1) c, n.d.). The main rule adopted by the Agency since at its Council at Ministerial level in March 1997 is that the ratio between the share of a country in the weighted value of contracts given to its industry and its share in the contribution paid to the Agency, must be of a pre-defined per cent by the end of a given period (ESA Industrial policy, n.d.). In other words, the ESA invests in each member countries through contracts for its space programmes an amount which is more or less equivalent to the country's financial contribution to the Agency.

According to Draghi, this policy has become increasingly outdated because it amplifies the fragmentation of the EU's space industry base, which has proved ineffective and even counterproductive because it creates a mismatch between the most competitive industrial actors and the actual allocation of resources based on geographical repartition (Draghi-report, 2024, p. 179). The Draghi report therefore recommends removing the geographical return principle from the ESA's industrial policy and aligning the Agency's governance framework with the EU's procurement, financial and security rules (Draghi-report, 2024, p. 185).

16 See also the statement of Thierry Breton, which said that: "although it has been a taboo at the European level up to now, the time has come to break this taboo and to recognise that space is an enabler of security and defence, with a defence dimension for Galileo and a security element for Copernicus" (Messina, 2021; ESUPA, Breton, n.d.).

This reform would certainly have a major effect on the space industry of the Member States of the ESA, especially on countries with less developed space technologies (such as in the CEE region). In practice, such a reform would mean that the contracts for ESA projects would most likely be obtained by western member states with a mature space industry. It might lead to smaller states, including those in the CEE Region, questioning whether it is at all worthwhile remaining members of the ESA and paying financial contributions to it. Although it is difficult to deny that overall European competitiveness might well increase in the short term, this would cut off the smaller states with immature space industry, which in the long term, in our opinion, does not serve the interests of Europe. The issue is complex and indicates one of the EU's structural problems. As Moeller notes, Draghi falls short in leveraging Europe's multi-stakeholder environment and appears rather simplistic in calling for the removal of this intergovernmental mechanism through which more than 50% of European space industrial activity is implemented, without a plan for creating a significant new source of EU funding (Moeller, 2024).

As for the likelihood of such a reform, it is first of all important to note that the ESA is not subordinated to the EU, but is an independent international organization whose Member States must agree unanimously to amend the Convention, so such a reform could not be implemented against the will of the smaller member states of the ESA (ESA Convention, Art. XVI, n.d.). Even if such a drastic change in the ESA's governance policy seem unlikely, it appears probable that the ESA itself will consider some minor adjustments in the hope of reaching a compromise. Jean-Philippe Baptiste, president of the French Space Agency (CNES) called the principle a poison stating that "*either ESA is able to change, or if it does not change…the European Commission at some point will do without (it)*" (Baptiste Interview, 2023). The ESA itself made a first step towards the reform of the geographic return principle in May 2024. Although the implementation of the new process remains to be seen, the goal is to enhance "*fair and transparent public procurement processes which support the development of a diversified and innovative European space industry*" (ESA Resolution, 2024).

As for the interests of the CEE region, it is important to find a compromise where developing space industries also have a chance to grow and participate in ESA projects, without hampering the overall competitiveness of European projects.

3.3.2 Harmonization of national space legislations

As mentioned above, one of the measures which is intended to realise the EU Space and Defence Strategy is promoting the idea of EU space law. The concept of an EU space regulatory framework was announced for the first time in late 2022 in the form of a Communication of the Social Economic Committee (Joint Communication, 2022; European Economic and Social Committee, n.d.). Soon after it was presented as an inherent part of the Strategy (March 2023), where the reasons behind the idea were explained in the following way:

> "*To enhance the level of security and resilience of space operations and services in the EU, as well as their safety and sustainability, the Commission will consider proposing an EU Space Law. It will encourage the development of resilience measures in the EU, foster information-exchange on incidents as well as cross-border coordination and cooperation.*" (Joint Communication, 2023, p. 7).

Therefore, it seems that one of the main objectives of the law is to establish an information exchange network and provide a first level of analysis and reporting of these weak signals through the EUSPA. It has also been noted that the EU Space Law would ensure a consistent EU-wide approach and build on the Joint Communication on an EU Approach for Space Traffic Management (Joint Communication, 2023, pp. 172–184). In addition, the Strategy proposed that the EU Space Law would complement the implementation of the NIS 2 Directive (Directive (EU) 2022/2555; Directive (EU) 2018/1972, n.d.), the upcoming Cyber Resilience Act (Regulation (EU) 2019/1020, n.d.), as well as other existing cybersecurity frameworks. EU Space Law (EUSL) would set specific cybersecurity standards and procedures in the space domain.

As it explained in the mission letter of Commissioner-designate Kubulius, the Act would also aim to harmonize licensing requirements, "as proposed the Draghi Report." While that report does not specify any plans for harmonizing licensing conditions, it is important to note that Art. 189 of the TFEU explicitly excludes the harmonization of the laws and regulations of the Members States. It is also worth remembering that there was a strong unwillingness among the Member States at the time of the adoption of the Lisbon Treaty to give up their sovereignty in the era of space (Potter, 2023, p. 6; Linden, 2016, p. 7). Hence, it will be interesting to see the legal base of the awaited proposal.

Also, it is important to note that—regarding the level of harmonization—the expectations lean towards a regulation rather than a directive which will leave much less margin for Member States to act at the national level. Based on historical experience, the 13 Member States that have already adopted a comprehensive national space law may resist modifying their legal system. As for the CEE Region, where only Slovenia has adopted a detailed regulation, countries willing to a adopt national space law—such as Hungary—will have two options. The first is to wait for the adoption of the EUSL to see in what questions they can complement the regulation at the national level, if needed. However, the European legislative procedure might take a long time, resulting in damage to the competitiveness of these countries. Their other option is to act now. However, doing so might harm the principle of predictability that is so important for industry players, as these countries might then have to modify their national legislation as soon as the EUSL enters into force.

4 Conclusion

At the dawn of a new space age, Europe has come to a crossroads. Europe must simultaneously catch up with its main competitors in terms of competitiveness, while, as a result of the crises and the new geopolitical environment, it must expand the scope of its previously civil-focused space policy. The challenges and problems were precisely identified by the European Union in the recently presented Draghi report, although implementing the proposals it made may have several negative effects on the CEE region.

While the further strengthening of the Europe's military defence capabilities in space is clearly in the interest of the CEE region, the proposals made regarding the governance of the ESA could even result in the disintegration of the Agency. If the so-called georeturn principle were no longer to apply in the ESA tenders, the developing companies of smaller member states would probably not be able to participate in

many projects that are important for their operation and development. At the same time, the reform seems inevitable, which is clearly proven by the problems of the competitiveness of the European space industry. A compromise must therefore be found so that all European states can contribute to the development of Europe's space capabilities in the long term.

If the European Union harmonizes the law of the member states regarding space activities it would also lead to significant change. Although there is a delay in the publication of the proposal, and the details of its content remain unknown for the public, the intention of the European Commission is clear. However, many obstacles to the success of the project can be foreseen. First of all, the legal basis of such a harmonization is questionable, as it is not clear how it can be reconciled with Article 189 of the TFEU. Secondly, it is not clear whether the 12 EU member states that have already passed legislation on their national space activities will support the amendment of their existing national legal systems, especially since they vary significantly. The vast majority of states in the CEE region have not yet adopted national space legislation. These states may now be facing an even more difficult decision. Either they wait for EU legislation, which may take years, and their competitiveness may be damaged, or they adopt national legislation in the interim, in which case there is a risk that they will have to amend it within a short period of time in the event of the possible adoption of the regulation.

To conclude, European states and the European Union must act if they do not want to fall behind with an increasing speed their main rivals, which would also threaten Europe's strategic autonomy. The European space industry must be strengthened, which does not mean that the state's role and participation should be diminished. Ambitious plans and committed states might be the basis of this paradigm shift. Of course, an EU-level regulation can be an element of this, but care must be taken to ensure that this does not further impair the competitiveness of European industry, and that the development of the CEE region's space industry does not come to a halt.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

BB-G: Visualization, Writing – original draft, Writing – review & editing. KM: Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Glossary

CEE - Central and Eastern Europe

CNES - French Space Agency

DA-ASAT - Direct-Ascent Anti-Satellite Missile

DG DEFIS - Directorate-General for Defence Industry and Space

EC - European Commission

EDA - European Defence Agency

ESA - European Space Agency

EU - European Union

EUMETSAT - European Organisation for the Exploitation of Meteorological Satellites

EuroQCI - Connectivity and Euro Quantum Communication Infrastructure

EUSL - EU Space Law

EUSPA - EU Agency for the Space Programme

GOVSATCOM - EU Governmental Satellite Communications

NEO - Near-Earth Object

PESCO - Permanent Structured Cooperation

PNT - Positioning, Navigation and Timing

SatCom - Satellite Communications

SBAS - Satellite-Based Augmentation Systems

SBEO - Space-Based Earth Observation

SSA - Space Situational Awareness

SST - Space Surveillance and Tracking

SWE - Space Weather

TFEU - Treaty on the Functioning of the European Union