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DEVELOPMENT OF NATIONAL SPACE LEGISLATIONS OF CEE COUNTRIES AND THEIR IMPLICATIONS ON SPACE SECTORS

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Programme: Further Development of the Hungarian State and Legal System and Legal Scholarship, with Special Regard to European Legal Trends

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Recommendation for the final defence of the Dissertation Authored by mgr Kaja Hopej and Entitled: *Development Of National Space Legislations Of CEE Countries And Their Implications On Space Sectors*

Hereby, I submit my recommendation of the PhD dissertation entitled: "Development Of National Space Legislations Of CEE Countries And Their Implications On Space Sectors" prepared by mgr Kaja Hopej under the framework of the Further Development of the Hungarian State and Legal System and Legal Scholarship, with Special Regard to European Legal Trends Programme of the University of Miskolc.

The dissertation addresses a particularly dynamic and timely topic situated at the intersection of international law, business law, and space law: the development of national space legislations in Central and Eastern European (CEE) countries and their implications on the space sector. While international treaties provide a foundational legal framework for space activities, the dissertation explores how their implementation and development within domestic space regulations necessitate careful consideration. The growing presence of diverse space stakeholders and the increasing congestion of outer space underscore the need for relevant legal environments at the national level.

The dissertation is structured into five main chapters. The first chapter provides an overview of the interaction between business law and the economy, outlining the general functions of law in the economy, with particular emphasis on steering and stabilizing functions. This part also characterizes the space industry and its function in the economy from global, regional, and national perspectives, comparing the *Old Space* and *New Space* approaches. The second chapter presents the international legal landscape of the space sector, from *Corpus Iuris Spatialis* to soft law mechanisms at the international level. It describes the concept, formation, and historical background of international space law, identifying elements from the "Old Space Era" and comparing them with the current necessities of *New Space* stakeholders. The third chapter is devoted to national space legislations, presented from a comparative perspective. Its purpose is to identify common elements and differences in the regulation of various national space sectors, especially by analyzing the legislations of the UK, France, and Luxembourg, to identify support clauses for specific national space markets. The fourth chapter analyzes the evolution of the space sector in the CEE Region and the impact of these developments on the growing demand for national space legislation, paying particular attention to space programs from the Iron Curtain period and the ESA enlargement process. Finally, the fifth chapter includes conclusions drawn from the preceding parts, focusing on identifying clauses that impact the space economy and examining the implications of national space legislation on space sectors.

The dissertation effectively integrates international legal analysis with a focus on domestic legal frameworks in Central Europe, offering a significant contribution to the understanding of space law development. The analysis of national space legislations from the CEE region, particularly focusing on Slovenia, Slovakia, and Poland, in the context of their historical development as well as Greece and current integration into the European space ecosystem, represents a novel approach. The research effectively highlights how these countries are addressing the legislative challenges and perspectives needed to regulate space activities at a national level.

Kaja Hopej demonstrates her deep engagement with the practical and legal challenges of the space sector. This empirical work, and its subsequent publication, further enriches the dissertation’s interdisciplinary approach, analyzing the space sectors of CEE countries from legal, policy, and economic perspectives.

The PhD thesis contains credible data, and the scientific results of the PhD thesis are the result of the candidate's own research work. The PhD thesis meets the formal requirements of the Doctoral School.

In conclusion, I recommend that the dissertation proceed to final defence within the candidate's doctoral procedure.

Budapest, 22 September 2025

Supervisors:

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List of important acronyms

CEE Region – Central and Eastern European Region

EGNOS - European Geostationary Navigation Overlay Service

ESA – European Space Agency

ESA BIC - European Space Agency Business Incubation Centres

ESRO - European Space Research Organisation

EUMERSAT - European operational satellite agency for monitoring weather,

EUSL – European Union Space Law

EUSPA - European Union Agency for the Space Programme

GEO – Geostationary Orbit

LEO – Low Earth Orbit

MEO - Medium Earth Orbit

IADAC - Inter-Agency Space Debris Coordination Committee

ISO - International Organization for Standardization

ECSS - European Cooperation for Space Standardization

FCC - Federal Communications Commission

GSTP – General Support Technology Programme

NSL – National Space Legislation

OECD – Organisation for Economic Co-operation and Development

PECS - Plan for European Cooperating States

PLIIS – Polish Industry Incentive Scheme

R&D – Research and Development

SSA – Space Situational Awareness

UN COPUOS - United Nation Committee on the Peaceful Uses of Outer Space

Introduction

The *Corpus Iuris Spatialis*[1], based on five international space treaties, constitutes an unprecedented basis for space law. Nevertheless, the growing presence of diverse space stakeholders, and the increasing congestion of outer space which has limited absorption capacity for certain orbits, requires consideration of the relevant legal environment for space activities, *inter alia*, at national level. Over the past few years, efforts to introduce national legal systems governing space activities has become increasingly noticeable. Similarly, activities to amend existing regulations have been intensified in order to keep pace with technological developments and current space sector demand. The reasons for this state of affairs lie in various aspects, which are discussed in detail in this dissertation. Furthermore, regional legislation is gaining in importance - for example, the recently proposed European Union Space Law (EUSL).

While international treaties provide a foundational legal framework, and there is no doubt about the need to comply with the provisions contained therein, the development of space law in the context of domestic space regulations requires careful consideration. Are there a clear boundaries between international space law and national law? Which areas are dedicated and imposed by International Space Treaties, and which ones remain within the remit of the regulator? Distinguishing between these boundaries is not a simple matter, given that national law must be consistent with international law, which obliges the States to fulfil international obligations. National space activities, however, have their own specifications which cannot be overlooked by the legislator if the sector is to be competitive, thus representing a high level of development. Regulations can have a positive impact on this market segment, but they can also have a negative consequences, slowing down its functioning due to unclear or comprehensiveness of regulations. This dissertation focuses on identifying legal factors that

[1] i.e. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, adopted by the General Assembly in its resolution 2222 (XXI), opened for signature on 27 January 1967, entered into force on 10 October 1967 ("Outer Space Treaty"); The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space adopted by the General Assembly in its resolution 2345 (XXII), opened for signature on 22 April 1968, entered into force on 3 December 1968 (The "Rescue Agreement"); Convention on International Liability for Damage Caused by Space Objects, adopted by the General Assembly in its resolution 2777 (XXVI), opened for signature on 29 March 1972, entered into force on 1 September 1972 ("Liability Convention"); Convention on Registration of Objects Launched into Outer Space, adopted by the General Assembly in its resolution 3235 (XXIX), opened for signature on 14 January 1975, entered into force on 15 September 1976 ("The Registration Convention"); The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, adopted by the General Assembly in its resolution 34/68, opened for signature on 18 December 1979, entered into force on 11 July 1984.("The Moon Agreement").

may influence the functioning of national space sectors, which the author of this dissertation examines below.

Due the increasingly visible tendency towards the implementation of National Space Legislations (NSLs), the author primarily focused on a region that shows certain gap in this area, which, however, has recently been systematically filled by implementing regulations or publishing draft legislation. Therefore this dissertation entitled "The development of national space legislations in the Central and Eastern European Region and its implications on space sector" aims at indicating the legislative challenges and perspectives that the CEE countries, wishing to regulate space activities at national level need to address. In order to achieve this, the analysis is based on existing European space legislations and laws that are currently being implemented or drafted with a focus on CEE Region. For the purposes of this dissertation, the countries of Central and Eastern Europe are classified on the basis of the so-called "Three Seas Initiative*",* which is a forum of 13 countries in Central and Eastern Europe whose territory is located between the Adriatic, Black and Baltic Seas. These countries include Slovenia, Slovakia, Romania, Poland, Lithuania, Latvia, Hungary, Greece, Estonia, Czech Republic, Croatia, Bulgaria and Austria.[2] Most of the countries in the region present deficiencies in space sector regulation and their examination in this dissertation serve as a reference for countries willing to regulate space activities, particularly for emerging space actors. Nevertheless, it would be a challenge to analyse in detail all the countries in the region, so in order to conduct a comprehensive study of aspects related to NSL, the author of the dissertation focuses on a few of them, namely Slovenia, Slovakia and Poland (which is currently working on its own Space Activities Act) and Greece therefore, placing them in the context of the broader CEE region concerned.

It should be borne in mind that the lack of regulation at national level implies, on the one hand the non-compliance with the obligations of international space treaties but from the other perspective it provides an opportunity to regulate the sector in such a way that national space legislations can serve as a lever for the development of indigenous space sector. Nevertheless it should be taken into consideration that, there is also a risk that inadequately tailored regulation to the needs of the market may hinder its development hereby discouraging any activity in the sector. Therefore, the subject matter of this dissertation is focus around the consequences of the lack of such legislation, but primarily, on the implications of introducing national space regulations, if any are present. This is achieved through the examination of

[2] Three Seas Initiative. *Three Seas Summit in Warsaw 2025.* Available at :https://3seas.eu/ (Accessed:30.08.2025).

existing space regulations at international, regional and national level, considering the European countries with the visible development of the domestic space sector in the last decade i.e. Luxembourg, France and United Kingdom as well as those from CEE Region, which have a development potential in relation to their own space industries.

Another objective of this dissertation is to identify the needs of the selected space markets in the *New Space* environment from a legislative perspective, in order to properly target regulatory measures at national level. To achieve this, the space sectors of the relevant CEE countries were analysed in an interdisciplinary manner i.e. from legal, policy (thorough the space strategies) and economics perspective (taking into account, among other things, the size of the sector, elements of space economy, etc.). Nevertheless, these aspects are presented in a general manner, with the aim of outlining the relevant factors, which are shaping the domestic space market and, possibly, influencing the development of selected regulations.

The fundamental research hypothesis posits that a robust national space legislative regime can stimulate and provide a conducive environment for the advancement of space endeavours. Therefore, the lack of regulation of space activities at national level, as well as the frequent changes in regulation that are a consequence of the dynamics that characterise space activities, can create significant risks in various forms. Existing regulations are often subject to change due to market or technological trends, and some services are not regulated at all national level or no agreement has been reached at the international level on their regulation. This implies an insecurity regarding legal framework, among space stakeholders, particularly those conducting commercial space activities.[3] It is worth noting that a narrowly focused regulatory framework could disturb technological progress, while an overly broad scope might limit innovation of space activities. For this reason, it is important to look at the premises for introducing National Space Legislation but also at the barriers that affects its implementation. To fulfill the objective, the author presents the following research problems:

Research Problem No. 1

What is the impact of existing space law on the space sector?

The priority for legislators should be to fulfill the international obligations imposed on countries through space treaties. While international treaties do not explicitly require states to

[3] Baumann, I., El Bajjati, H. and Pellander, E. (2018) *NewSpace: A Wave of Private Investment in Commercial Space Activities and Potential Issues Under International Investment Law*, Journal of World Investment & Trade, 19(5), pp. 930–950.p.950.

enact domestic space laws, doing so is the most effective way for fulfilling their obligations.[4] Currently, there are about 40 national space legislations worldwide in which international obligations are implemented. However, in addition to the basic clauses reflecting the provisions of international space law, through national space legislation, legislators can influence the market by either inhibiting or developing it. The question therefore arises as to how regulate the space sector not to under- or overregulate it. Whether the implementation of the space law at national level has had any impact on the development of the domestic space sector?

Ensuring clear and transparent legal mechanisms should therefore be the aim of introducing legislation at national level. In addition, the priority should be to regulate the market in such a way as to enable space stakeholders to develop in the long term, on the basis of both legal and financial instruments, in a sustainable manner and taking due account of the risks that a given space venture may assume. Appropriately targeted regulation can contribute to a certain security and stability in the sector and, consequently, to an increased interest in space activities in a given legal environment, both from the perspective of entrepreneurs, international organisations and potential investors. The risk of inadequate regulation, on the other hand, has far-reaching consequences, manifesting itself, *inter alia,* in the suppression of market competitiveness on international stage. In order to examine the research problem indicated above, the author of the dissertation analyses the national space legislations of Luxembourg, the United Kingdom and France, recognising that the sectors in question have seen the development and growth in recent years in the context of the space activities. [Regarding this specific research problem the author attempts to present a study verifying the number of space objects launched after the entry into force of space law in countries such as the UK, Luxembourg and France.

Research Problem No. 2

How does space law shape the landscape of the space sector?

The implementation of space regulation at the national level often involves minimising risks to mitigate international liability and mitigating the risk of limiting innovation and industry in the domestic space economy.[5] Regulatory uncertainty often creates risks to the potential revenues of projects and consequently reduces their profitability, innovation investment as well as private

[4] J.Tapio, A.Soucek: *The European Space Agency's contribution to national space law*. in: Karjalainen, K., Tornberg, I., Pursiainen, A. (eds) International actors and the formation of laws. Springer Online, 2022. p 117.

[5]. Sherbone, A.K.E. (2022) 'The Commercialisation of Space: An Overview of Legal Risks and Considerations', in Pozza, M.A. and Dennerley, J.A. (eds.) *Risk Management in Outer Space Activities: An Australian and New Zealand Perspective*. Singapore: Springer, pp. 19-46,p.33.

sector interest.[6] The implementation of space regulation at the national level involves minimising risks to mitigate international liability (through authorization, supervision or the insurance obligation)

As Ram Jakhu rightly points out[7] "However, it must be kept in mind that 'one size cannot fit all'; i.e. laws and policies are and ought to be unique to the specific political, constitutional, legal, economic, technological, social and other circumstances of each nation."[8] Therefore, the aim of this dissertation is to look at regulations determined by specific indigenous space sectors or, conversely, to analyse the development of sectors that have influenced the shaping of space legislation. The main analysis is based on countries that have introduced space regulation at national level and whose space sector has experienced a rapid development in recent years i.e. Luxembourg, France and United Kingdom.

Nevertheless the question also arise whether the space legislation introduced at national level is keeping pace with technological developments? Numerous revisions of national space legislation are noticeable. Countries that, despite an advanced sector, have been operating without space legislation for a long time are also taking steps towards regulating their national space activities. According to Baumann et al. (2018) "Laws and regulations concerning commercial space activities are established in many countries, but they are currently reviewed and amended in the light of technology and market trends. Certain new services and applications are not yet addressed under national laws at all, or there is no consensus on their treatment at international level. Overall, there are significant uncertainties and/or evolutions regarding the legal framework in which space companies are operating".[9] Therefore this dissertation undertakes an analysis of the evolving legal frameworks relating to space activities within selected jurisdictions (such as the United Kingdom and France which have recently updated their legislations), with the objective of examining their responsiveness to the dynamic advancements occurring within the space sector.

Research Problem No. 3

What might be the impact of a potential space law on the space ecosystems of the CEE countries?

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[6] European Investment Bank Group, *Investment barriers in the European Union 2023*. Available at: https://www.eib.org/attachments/lucalli/20230330_investment_barriers_in_the_eu_2023_en.pdf (Accessed:30.082025).
[7] Jakhu, R., 2009. *Capacity building in space law and space policy.* Advances in Space Research, 44(9), pp.1051-1054, p.1052.
[8] Ibidem.
[9] Baumann et al. (2018).

There are specific *rationales* behind the introduction of space legislation, which seem to be common to most countries. Nevertheless, what factors are influencing the countries of Central and Eastern Europe, which are increasingly bold in taking steps to actively participate in the space ecosystem both regionally and globally and express their willingness to regulate space activities.

The process of establishing cooperation with the European Space Agency has enabled many space emerging countries to obtain contracts and participate in large projects that they would not have been able to participate on their own. The impetus provided by programmes such as PILS in the case of Poland led to the development of national capabilities and expertise, which was reflected in the building of a space industry that in many cases was truly nascent. Countries began to introduce space strategies, create financial support programmes for R&D and, at a later stage, business incubators, with the aim of commercialising activities in the space sector. During the Cold War, the countries of Central and Eastern Europe were under the dictates of the Soviet Union, so their knowledge and expertise was related to programmes operating within that bloc. As a result, the countries of the region developed appropriate specialisations, financing mechanisms and political or economic support.[10] Nevertheless, this situation has resulted in certain limitations characteristic of this region, such as a lack of awareness among local authorities about the potential of space and the continued lack of priority given to the space sector, a low level of cooperation between institutions and industry, and a relatively low public and private investment rate in the space sector.[11] The lack of space legislation at the national level (which has recently improved slightly) was also a visible gap in the CEE Region countries. Nevertheless, the Central and Eastern European Region is characterised by high potential in terms of innovation and well-embedded international cooperation which gives it a good chance of increasing its importance in the space sector at the European scale.

Due to the dynamic development of space technologies and the resulting risks as well as challenges, the countries of the Central and Eastern European region may become pioneers in certain segments, such as environmental protection. The regulatory framework governing the space environment and its protection is undergoing rapid changes, necessitating a specialized approach to address critical concerns such as space debris. Due to this legal gap,establishing a novel regulatory regime from its inception may be a unique opportunity for nascent space

[10] European Space Policy Institute, 2014 *ESA Enlargement* Available at: https://www.files.ethz.ch/isn/176962/ESPI_Report_47.pdf (Accessed:30.08.2025).
[11] Bukała A. Malinowska K. Szwajewski M. *Barriers of entering space market. Case of entrepreneurs in Central Eastern Europe*, IAC-22- 5-GTS.1, 73rd International Astronautical Congress (IAC), Paris, France, 18-22 September 2022.

sectors like those for CEE Region. Setting up a new regulatory framework may allow for the facilitation of these emerging sectors while ensuring their operations align with principles of sustainable development.

Methodology

The research method used in this dissertation include dogmatic, historical, analytics and comparative law methodology based on an analysis of existing space law and policy instruments at international, regional and national level. The dissertation is complemented by an empirical method.

The historical method serves to examine the formation of international space law towards the *rationale* for the regulation of space activities at the time of the establishment of the *Corpus Iuris Spatialis* and thus to identify the common indicators that led to the formation of the legal foundations of space activities. This method is also partly used in the analysis of space strategies by identifying the circumstances for shaping space policies in a historical context.

A comparative method was used to analyse existing national space legislation in thesectors that have seen significant growth in space activities and the surrounding space ecosystem at a regional level, i.e. legislation from the UK, France and Luxembourg, as well as newly emerged space legislations from the Central and Eastern European region, i.e. Slovenia and Slovakia and also the draft law on space activities on the example of Poland as well as Greece.

The analytical method was used to investigate the space activities of the Central and Eastern European countries, i.e. countries belonging to the Three Seas Initiative in the context of development directions and assumptions of the space strategies of the countries concerned and the policies adopted, with particular emphasis on the countries of the region indicated above.

The empirical method was based on collecting the opinions of the Polish space stakeholders. The study was performed by the author of the dissertation as a co-author and subsequently published within the framework of the Working Group for Polish Space Law established at the Centre for Space Studies of Kozminski University (CSK ALK) in the Ad Astra. Astropolitics and Space Law Research Program.[12]

[12] K. Hopej , M. T. Kłoda , K.Malinowska , B. Malinowski , M. Polkowska *Survey for professionals and entrepreneurs of the Polish space sector on the scope of regulations and solutions of the Polish Space Law Act.*

Structure of the dissertation

The first chapter aims to provide an overview of the interaction between business law and economy. The main purpose of this chapter is to outline the general functions of law in the economy, with particular emphasis on the functions of business law. An important function is developed, namely the steering function, which, in the legislative sphere, is important for stimulating economic development but is also adjusted to current and necessary needs of the country as well as citizens. In addition to this function, which is of significant importance, the stabilising function is developed in detail. Guarantee of legal stability influences investment growth and other economic indicators.[13]

Focusing on space strategies, this section pays particular attention to how state policy consistently influences the sector's development. In addition to space strategies, the second part of the chapter is connected to characterisation of the space industry and its function in economy from global, regional and national perspective. An important part is the comparative characterisation of the so-called *Old Space* with the *New Space* approach. Special attention is paid to the characteristics of space segments, their impact on the state and society as well as the benefits and revenues generated from the space sector but also the challenges and dangers it creates. One of the tasks of the stabilisation function is to consolidate *the status quo* in terms of economic, social relations as well as state and legal development strategies.[14] Therefore, it is important in the context of the space sector to identify space strategies and analyse them on a national but also supranational background, as in the case of the European Space Programme[15] or European Union Space Strategy for Security and Defence[16]. As has been previously highlighted the business law is still guided by the economic policy of the state. For this reason, on the example of selected space strategies, their impact on the formation of law, more precisely space law, are analysed.

The second chapter presents the environment of space law from *Corpus Iuris Spatialis* to soft law mechanisms at international level. In addition to the five international space treaties,

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Ad Astra. Astropolitics and Space Law Research Program. Available at: https://adastra.im.edu.pl/ (Accessed: 30.08.2025).

[13] Bidziński, M. (2016) *Pojęcie, istota i zasady prawa gospodarczego*(, in Bidziński, M. and Jagiełło, D. (eds) Prawo Gospodarcze, Zagadnienia Wybrane. Warszawa: Wydawnictwo C.H. Beck p.7;8.

[14] Ibidem,p.8.

[15] Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021 establishing the Union Space Programme 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.

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

a proposal to implement space law at the EU level is examined as well as its potential influence on National Space Legislations in general. This chapter describes the concept of international space law, formation of international space law as well as historical background. Five space treaties are indicated, namely Outer Space Treaty, Liability Convention, Registration Convention, Rescue Agreement and the Moon Agreement. In this dissertation, the treaties are not analysed in depth, due to the numerous publications that have already been elaborated in this area. Rather, this analysis seeks to identify elements that met the needs of the Old Space era at the time in order to compare them with the current needs of space stakeholders. The classification of international space law plays an important role in this part. The conclusion of this sub-section is to answer the question to what extent the regulations adopted at the international level are reflected in the current environment of space activities.

Another aspect addressed in this chapter is the newly introduced European Union Space Strategy for Security and Defence, which implies the implementation of EU Space Law. Nevertheless, in accordance with Article 189 of the Lisbon Treaty[17] any harmonisation of the space laws and regulations of the Member States is excluded. The purpose of this analysis is to examine potential EU interference in space law and to verify the possible advantages and disadvantages of this actions as well as potential areas that the European Union Space Law may cover. The last part of this chapter is devoted to the current trend regarding the approach to regulating space activities towards soft law mechanisms. International action taken on space activities and e.g. environmental protection is often based on non-binding mechanisms such as guidelines or standards of the international organization i.e. UN resolutions etc. The purpose of this sub-section is to verify the effectiveness of such mechanisms compared to the established hard law that has so far formed the basis for space activities.

The third chapter devoted to National Space Legislations is presented from comparative perspective. Its purpose is to identify common elements but also differences in the regulation of the various national space sectors in order to identify support clauses for specific national space markets. The chapter concerns a general overview of National Space Legislations from regional, European perspective. Space law exemplary models such as e.g. UN Resolution Recommendations on national legislation relevant to the peaceful exploration and use of outer space (UN Resolution)[18] and Sofia Guidelines for a Model Law on National Space

[17] Consolidated version of the Treaty on the Functioning of the European Union Part Three- Union Policies and internal action title XIX-Research and Technological Development and Space . Article 189.
[18] United Nations General Assembly (2013*). Recommendations on national legislation relevant to the peaceful exploration and use of outer space*. A/RES/68/74. 11 December 2013.

Legislation(Sofia Model Law)[19] are described in detail. On the basis of selected space legislation i.e. UK, French and Luxembourg, relevant building blocks are identified. Within these elements, the following are indicated: Definitions, Authorization and Supervision, Registration Liability (together with Insurance), Environmental protection and additional components. The purpose of this part is to review how national legislators regulate space activities with a particular focus on supporting the development of the domestic space stakeholders. Despite the introduction of the same building blocks the regulations differ from each other and countries are focusing on specific space segments to create an innovative ecosystem around them, depending on their area of expertise and their particular needs.

The fourth chapter analyse the evolution of the space sector in the countries of the CEE Region and the impact of these developments on the growing demand for national space legislation. Particular attention is paid to the perspective of the space programmes of the existence of the Iron Curtain period, showing their characteristics and conditions. This is followed by a discussion of the fundamental paradigm shift in space activities that has occurred in the CEE region through the European Space Agency (ESA) Enlargement process. One implication of this transformation is, for example, development at the level of introduction of national regulations for the space sector in the region as in the case of Slovakia, Slovenia and the draft Polish Law on Space Activities . The legislative potential in the context of space activities in the countries of the Central and Eastern European Region is also analysed.

The concluding chapter, which is chapter five, includes aspects covered in the previous parts of the thesis. It focuses on the identification of clauses that have an impact on the space economy and, more specifically, its development in general or targeted at a specific segment of space activity in view of indigenous sectors. The final section examines the implications of the introduction of national space legislation on relevant space sectors opportunities related to the implementation of national space legislation and proposed postulates.

[19]Committee on the Peaceful Uses of Outer Space, Legal Subcommittee (2013) *Information on the activities of international intergovernmental and non-governmental organizations relating to space law: Draft model law on national space legislation and explanatory notes*. 52nd session. Vienna, 8-19 April 2013.

Chapter 1. Interaction between business law and economy

1.1.Introduction

The economy of the state, in a broad perspective, is one of the elements determining and forming the development of modern states.[20] A tool that can undoubtedly influence business activities- is the law. Nevertheless, demonstrating this impact is a difficult issue, in particular the level off this influence.[21] and requires careful consideration. W. Hoff points out that "In the case of legal sciences, the method of regulation is the set of legal instruments of state influence on the market and the enterprises operating in it. This plane is inextricably linked to the analysis of the legal conditions for the application of regulatory instruments".[22] On the one hand, the regulator's priority should be to regulate the market in such a way as to enable development in the long term on the basis of *inter alia* both legal and financial instruments. On the other hand, there is a risk that inept legislation could lead to monopolisation of certain sectors of the economy or result in capital flight.[23] In order to correctly identify the impact of regulatory instruments on the space economy, it is first necessary to identify the features of business law, to which a section of this chapter is devoted.

This chapter also identifies the respective space strategies which are increasingly being implemented at national and regional level worldwide. The *rationale* for their inclusion in this thesis, is closely related to the examination of the emergence of space law. According to the Cologne Commentary on Space Law: "History shows that the political effect of achievements in cosmonautics often proved to be so significant for state leaders that it determined the directions of development of space programs themselves. Strictly speaking, it was space policy to give an impetus to space activities." Furthermore in relation to the Commentary *"*And then what came first: space policy, space activities, or space law? It would seem that the answer to this question is clear: first, there was a space policy, space activities followed, and only then space law emerged. However, it is not that simple."*[24]* The author verifies the validity of this statement in this chapter.

[20] Bidziński (2016, p.3).
[21] Kufel, J. and Siuda, W. (1998) *Prawo Gospodarcze dla Ekonomistów*, Poznań: Scriptus, p. 23.
[22] Hoff, W. (2008) *Prawny model regulacji sektorowej* Warszawa: Difin.p.22.
[23] Bidziński (2016, p.8).
[24] Hobe, S., Schmidt-Tedd, J. and Schrogl, K. (eds) (2010) *Outer Space Treaty,* in Hobe, S., Schmidt-Tedd, J. and Schrogl, K. (eds) Cologne Commentary on Space Law. Carl Heymanns Verlag, Köln, 2010. p.23.

1.2. Features of business law and its impact on economic activity

Economic growth as well as the development of business practices largely depend on the legal environment. Regulations determine the conditions and content of business operations, but also the rights and obligations of market participants themselves (e.g. by establishing guarantees or restrictions on property rights), which can become a determinant of the economic behaviour of business participants, influence the structure of business entities and relations between market participants, as well as the state's relations with the business environment. Legal instruments may furthermore be introduced to stimulate economic activity, economic development or can contribute to increasing employment. [25]

It is worth looking at one concept developed by the American Professor J.D. Nyhart, who in his study "The role of law and economic development" presented several concepts in law that have a significant impact on economic development. According to Nyhart „The lawyer must be sufficiently aware of the economic issues and policies involved so that he can more than adequately meet the expectations of the planner and administrator. Thus a draftsman needs to be able to communicate with the legislator, the legislator with the planner, the judge with the economist, so intertwined are the two disciplines".[26] Nyhart outlined several jurisprudential concepts that are particularly useful in determining whether the law significantly assists or hinders economic development. These core elements include predictability, procedural capability, codification of goals, education, balance, definition and clarity of status as well as accommodation. According to Nyhart explanation a set of rules was established to facilitate economic activity for guiding economic relations between people in a wide variety of areas ranging from contract law to labor relations or regulating companies. Thus, predictability based on the traditional customs of a closed social group, as it is often seen in developing countries, will be replaced by systems of predictability (beyond their immediate traditional social environment), which can cover the expanded economic activity.[27] Another concept is based on procedural capacity (i.e. it relates to the enforcement of substantive law through dispute resolution procedures), on whose efficiency the level at which economic activity is located depends. The impediment to arbitrary action can arise from well-established procedures. The government's stated goals for the country's development are often reflected in legislation.

[25] Brodowicz, M. (2024) *The Impact of Legal Regulation on Business Practices and Economic Growth*. Available at: https://aithor.com/essay-examples/the-impact-of-legal-regulation-on-business-practices-and-economic-growth (Accessed: 30.08202).

[26] Nyhart, J.D. (1964) Working paper: the role of law and economic development. School of Industrial Management, Massachusetts Institute of Technology, no. 53-64;Section 1 p. 9 Available at: https://dspace.mit.edu/bitstream/handle/1721.1/48911/roleoflaweconomi00nyha.pdf. (Accessed: 30.08.2025) .

[27]Ibidem (1964,p.12) .

Education is about the ability of law to act as a force for habit formation, reinforcing old or creating new norms of behavior. The balance is connected with the system of law which can be a force that maintains the balance of social values, by mandating compliance with both substantive law and procedure. The definition and clarity of statute is related to the function of law, which clarifies the permissible or legitimate status of things as well as people. According to Nyhart, this is particularly important in times of dynamic change, in order to better understand the direction of these changes. Finally, accommodation is related to the maintenance of states of equilibrium in the event of change, where the legal system (through relevant channels) can provide redress for injustices resulting from sudden changes that have disturbed the existing, balance , thereby facilitating society's adjustment to the new reality.[28]

Law can have a neutral but also a reactive as well as a progressive function depending on the interests it serves, how it is applied, and how it influences other factors that shape individuals' decisions. Nevertheless, it can also be used as a proactive instrument to stimulate development, thereby changing and influencing the realities it is meant to reflect.[29] The role of legislative policy is to translate economic and social policies into procedures and rules as well as to ensure their effectiveness and consistency in achieving the objectives of these policies. One of the concepts is also the so-called presumption of acceptability which is a condition for effective legislative policy, i.e. that restrictions, approvals and prohibitions should be the exception rather than the rule.[30] Nevertheless, this is not the same as leaving business transactions (or the provision of public services by private entities) completely unregulated, as this could lead to a monopoly and stifle competition.[31] This interpretation represents a two-sided approach, i.e. to view authorizations or prohibitions as exceptions rather than rules, but also to not leave certain areas unregulated due to the various risks which can have a significant impact on the sector concerned. Therefore, the question is how can this concept work in the regulation of the space sector at national level, given the principles contained in international space treaties imposing specific obligations on State Parties.

Nevertheless, returning to the concept of the branch of law in question “business law in its broadest sense can be understood as the totality of legal norms regulating social relations that arise against the background of or in connection with the exercise of economic activity”.[32]

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[28] Ibidem (1964, pp.12-15).
[29] Shihata, I.F.I. (1996) *The Role of Law in Business Development,* Fordham International Law Journal, 20(5) p.1581 , Available at: http://ir.lawnet.fordham.edu/ilj. (Accessed: 30.08.2025).
[30] Ibidem.p. 1584.
[31] Ibidem p. 1585.
[32] Grabowski J. (2013) 'Rozdział I: *Prawo a gospodarka* in Hauser, R., Niewiadomski, Z. and Wróbel, A. (eds) System prawa administracyjnego Vol. 8A: Publiczne prawo gospodarcze Warsaw.p 15.

For the purposes of this thesis, a distinction must be made between public law and private law. It should be borne in mind that the public business law appears as "the law concerning the intervention of the state and its bodies and apparatus in the economic sphere, rather than the law of the entrepreneur"[33]. Whereas, the fundamental legal conditions on which the effective operation of market mechanisms in the economy is based include economic freedom, freedom of contract, the protection of property rights and the protection of free and fair competition.[34] The indication of public law relevance to this work is crucial when it comes to space activities, due to the subject matter of the analysis which centres around the implementation of space sector regulation. For this reason, it is important to analyse state interference in the activities of entrepreneurs through the introduction of national space legislation. A crucial aspect, therefore, is to look at the general functions of business law in order to be able to apply them appropriately to space law. It should also be noted that the intensive development of public business law, in recent times, has been caused, inter alia, by determinants such as technological development or new types of threats to state security.[35] This is particularly important for the space sector, which is characterised by highly advanced technology and is increasingly influencing various areas, such as for example cyber security, which has a key role to play for satellite systems and national and global security.

Among the basic functions of business law (from the public law meaning), the literature includes the following; steering, organisational, stabilising, distributive and protective function.[36] The organisational function can be defined as the creation of a legal framework, through various processes of structuring and uniformity, which guarantees free economic activity and the functioning of self-regulating market mechanisms. Adequate redistribution of goods and services is a form of state support for specific social groups, including entrepreneurs, which in turn is the essence of the distribution function.[37] The protective function, on the other hand, is related to the protection of individual economic participants, both entrepreneurs and consumers, as well as the protection of the public interest, manifested in the appointment by authorised entities of bodies for the protection, supervision and control of individual branches

[33] Kosikowski, C. (2007) Rozdział II: *Funkcje publicznego prawa gospodarczego'* in Kosikowski, C. Publiczne prawo gospodarcze Polski i Unii Europejskiej.)Warsaw: Legal Publishing House LexisNexis, pp. 44–45.
[34] Grabowski (2013, p 6).
[35] Kruk, E. (2018) *Funkcje publicznego prawa gospodarczego*, in Zdyb, M., Kruk, E. and Lubeńczuk, G. (eds.) Dysfunkcje Publicznego Prawa Gospodarczego. Warsaw: Wydawnictwo C.H.Beck, p.44.
[36]Bidziński, M. (2016) *Pojęcie, istota i zasady prawa gospodarczego*, in Bidziński, M. and Jagiełło, D. (eds) Prawo Gospodarcze, Zagadnienia Wybrane. Warszawa: Wydawnictwo C.H. Beck.p.7.
[37] Kruk (2018, p. 46).

of the economy.[38] Nevertheless, for the purposes of this dissertation, two functions appear to be of particular importance, namely, steering and stabilisation functions.

The steering function concerns the interaction of the legal and economic spheres. From a practical point of view, it manifests itself in the execution of appropriate legislative measures by state bodies aimed at stimulating economic development, but in such a way that it is directed at the current and most important state and social needs.[39] Another aspect relevant to the research conducted in this dissertation is the stabilization function. The validity of this function is related to the certainty of regulation. Based on Polish Constitutional Court judgment from 2007 "The principle of the citizen's confidence in the state and the law created by it is based on legal certainty, i.e. such a set of features vested in the law that ensure legal security for the individual; it enables him to decide his conduct on the basis of full knowledge of the premises of the state bodies' actions and the legal consequences that his actions may entail. The individual must be able to determine both the consequences of particular behaviour and events on the basis of the state of the law in force at a given time and to expect that the legislator will not change them arbitrarily. The legal security of the individual linked to the certainty of the law thus makes it possible to predict the actions of state bodies, as well as to foresee one's own actions".[40]

As mentioned earlier, the steering function as well as the stabilization function are especially relevant in regard with this dissertation. Objectives set by space policy and strategies dedicated to the space sector seek to the growth of the space sectors. As already emphasised, the law can be a tool to support an upward trend or to constrain the activities of entrepreneurs.

1.3. The role of space economy in shaping the regulatory environment

This section is dedicated to an analysis of the paradigm shift from the so called *Old Space* to *New Space*, highlighting the growing demand for regulatory frameworks governing commercial and civil space activities. The space activities that existed in the second half of the 20th century revolved around a traditional model and are often referred to as the *Old Space* Era. Although, the development of satellites had already begun during the Second World War, accelerating in the mid-1950s- in parallel with the Cold War, the launch of the first artificial satellite Sputnik 1 into orbit by the Union of Soviet Socialist Republics should be considered the beginning of the space age. From this point onwards, the era of space exploration is assumed to have occurred, also in the context of the formation of international space law, as this event laid the foundations

[38] Bidziński (2016, p.8).
[39] Bidziński (2016, p.7).
[40] Judgment of the Constitutional Tribunal of 19 March 2007.Ref. K 47/05in: Kruk (2007, p. 47).

for the creation of United Nation Committee on the Peaceful Uses of Outer Space (UN COPUOS) which was established by the UN General Assembly in 1959 .

Space missions were initially dominated by the two superpowers, the United States (US) and the USSR, establishing a traditional model focused exclusively on government-led space programs during the Cold War. These powers exercised complete control over space programmes and the associated development of technologies enabling rockets, probes and humans to be launched into low Earth orbit, ultimately leading to a manned flight to the Moon.[41] Nevertheless, it is crucial to emphasize that the impetus for developing space technology directly stemmed from the growth of global nuclear arsenals. [42] Consequently, early space activities were strictly military in nature, often evolving from broader aerospace and military programs. This military orientation, however, fostered increasing competition for defence contracts, particularly evident in the United States. Thus this competition has gradually led to greater commercialisation and intertwined dependencies between the government and private sectors.[43]

In the *Old Space* model, commercial ventures had limited access to government-dominated space activities, with some exceptions for launch services or satellite communications. This was due to high entry barriers, expensive technology, and significant risks that individual private entities couldn't bear.[44] Consequently, private actors functioned as contractors for public programs, fully dependent on public funding[45] and subject to strict control by space agencies like NASA[46].

The previously restricted space market, once dominated by two superpowers, began to integrate private industry into government operations. From the early 21st century, more actors emerged with the technological and financial capacity for space exploration. As more countries engaged in space, activities gained new importance, forming the *New Space* trend. This era is

[41] S. J.Piseno, *Cold War Merchants and the Commercialization of Space*, Liberty University Department of History, June 2024, p. iii.
[42] X.Pasco, *Evolution of the strategies of use of space for military purposes.* Available at: https://www.irsem.fr/media/documents-en-anglais/7-evolution-of-the-strategies-of-use-of-space-for-military-purposes.pdf, p.77 (Accessed: 30.08.2025).
[43] Piseno (2024, p.142)
[44] ESPI, *The Rise of Private Actors in the Space Sector.* Available at: https://www.espi.or.at/wp-content/uploads/2022/06/ESPI-report-The-rise-of-private-actors-Executive-Summary-1.pdf, July 2017, p. 1(Accessed: 30.08.2025).
[45] ESPI, Evolution of the Role of Space Agencies. Available at: https://www.espi.or.at/wp-content/uploads/2022/06/ESPI-Public-Report-70-Evolution-of-the-Role-of-Space-Agencies-Full-Report.pdf , October 2019, p. 1(Accessed: 30.08.2025).
[46] NASA, Commercial Orbital Transportation Services A New Era of Spaceflight, Access: https://www.nasa.gov/wp-content/uploads/2016/08/sp-2014-617.pdf , February 2014, p.2 (Accessed: 30.08.2025).

characterized by reduced launch costs, the emergence of mega-constellations, new data applications, and in-orbit servicing[47], therefore eliminating exclusive government control.

A model example of the transformation of the space market through inter alia the implementation of regulations aimed at the commercialisation of space, is the legislation introduced by the United States in the 1980s and 1990s. This involved the evolution of the space market, from the traditional model to the later *New Space* trend, which shifted to the creation of regulations covering commercialisation in order to encourage private sector commerce. At the time, four pieces of legislation were introduced, i.e. the Commercial Space Launch Act of 1984 and 1988 , the Land Remote Sensing Act of 1992 (covering the licensing of private ventures) as well as the Commercial Space Act of 1998 which aimed to stimulate the satellite communications segment, in isolation from the military activities.[48]

Therefore, the current space environment and the dynamics of its development have a huge impact on the formation of law. The *New Space* model mentioned earlier includes the dynamic commercialisation of space and the increasing number of actors emerging in the space ecosystem. As Manfred Lachs argued during the formation of the *Corpus Iuris Spatialis* "The great acceleration of social and economic change, combined with that of science and technology, have confronted law with a serious challenge: one it must meet, lest it lag even farther behind events than it has been wont to do".[49] Likewise today, where regulations are not keeping pace with technological advances, thus contributing to the legal uncertainty and the emergence of a number of risks which may arise while conducting space activities and thus affect the viability of businesses.

Chapter IV of Professor Lachs's book "The Law of Outer Space" raises questions about the potential link between lack of sovereignty and property rights. Perhaps the emergence of entrepreneurs will be linked to a revision of the Moon Agreement or the introduction of other solutions.[50] This prediction seems to be most relevant to the direction that current space exploration activities are taking. The example of provisions in the Moon Agreement raise many questions about the business profile of emerging companies which are focusing on the space mining segment and leads to multiple interpretations which further creates legal uncertainty.

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[47] OECD (2023), *Haressing "New Space" for sustainable growth of the Space Economy,* Report prepared for 4 th edition of G20 Space leaders Meeting under India's G20 Presidency .Bengaluru, India, p. 7.
[48] Piseno (2024,p.23).
[49] North Sea Continental Shelf Cases (Federal Republic of Germany/Denmark; Federal Republic of Germany/Netherlands) [1969] ICJ Rep 3, Separate Opinion of Judge Lachs, pp. 219, 231.See in: Lyall, F. (2013). Manfred Lachs (21.4.1914 – 4.1.1993). In S. Hobe (Ed.), *Pioneers of Space Law* (Chapter XI, p. 200). Leiden; Boston: International Institute of Space Law.
[50] (Lyall, 2013, p.208) See in: Hobe, S. (ed.) (2013) *Pioneers of Space Law*. Leiden/Boston: Martinus Nijhoff Publishers.

This shows that the change in the space activities landscape towards increasing commercialisation is in some way forcing a reflection on the applicability of these regulations. On the other hand, the small number of countries that have acceded to the treaty and even the withdrawal from the Moon Agreement (as was the case with Saudi Arabia which has withdrawn from the Treaty in 2024) raises doubts about its prospects. Despite the existing concerns about applicability of the Moon Agreement, commercially, a couple of milestones have nevertheless been achieved in recent years, e.g. the issuing of the first ever license by a Federal Communications Commission (FCC) to the commercial deep-space mining company.

The increasing commercialization and transformation from the *Old Space* era to *New Space* as described at the beginning has led to an existing environment of space activity like never before. In 2024, approximately 2,802 objects with a total mass of 1.8 million kilograms were launched into Earth orbit.[51] Space economy is currently estimated between $384 - $630 prospect to reach $1.8 trillion by 2038[52] and an increasing number of entities and industries not directly related to space activities are becoming dependent on space infrastructure. What this entails is a growing threat in the form of, space debris. There are currently 13,000 tonnes of all space objects in Earth orbit according to Space Surveillance Network estimates[53]..

A consequence of this direction of the space activity landscape is the increasing activity at the legislative level, which is examined in detail later in this dissertation. Similarly, the importance of space programmes and strategies plays a key role in the analysis of space sectors and their particular need for national space legislation.

Old Space	***New Space***
• Space activities were primarily led by the main global space powers • Programs were funded by governments. • Private companies mainly functioned as contractors, supporting government-led projects.	• Developing nations are increasingly contributing to the space industry. • A rise in business services with strong commercialization prospects. • The space ecosystem's encompass government bodies, international entities, private enterprises, investors, research institutions, and end-users as a main space stakeholders.

Table. 1.1. Characteristics of transition from *Old Space* to *New Space*, influencing the formation of new regulatory models

[51] Space Foundation (2025) The Space Report 2024, Q4. Available at: https://www.spacefoundation.org/2025/01/21/the-space-report-2024-q4 (Accessed:30.08.2025).

[52]Space Foundation, Space Foundation Announces $570B Space Economy in 2023, Driven by Steady Private and Public Sector Growth. Available at: https://www.spacefoundation.org/2024/07/18/the-spacereport-2024-q2/; World Economic Forum, Space Economy Set to triple to $1.8 Trillion by 2035, New Research Reveals. Available at: https://www.weforum.org/press/2024/04/spaceeconomy-set-to-triple-to-1-8-trillion-by-2035-newresearch-reveals/; BryceTech, 2022 Global Space Economy. Available at: https://brycetech.com/reports/report documents/Bryce_2022_Global_Space_Economy.pdf (Accessed:30.08.2025).

[53] European Space Agency (ESA). (2025). Space debris by the numbers. Available athttps://www.esa.int/Space_Safety/Space_Debris/Space_debris_by_the_numbers . (Accessed:30.08.2025).

The Space Economy was defined by the Organisation for Economic Co-operation and Development (OECD) in 2012 where it was broadly described as follows: "The space economy covers the entire range of space activities and their spillovers, bringing knowledge and benefits to society at large."[54] However, a more detailed definition already appeared in 2007 in the OECD Report and its defined as:

> "The space economy includes: all public and private actors involved in developing and providing space-enabled products and services. It comprises a long value added chain, starting with research and development actors and manufacturers of space hardware (e.g. launch vehicles, satellites, ground stations) and ending with the providers of space-enabled products (e.g. navigation equipment, satellite phones) and services (e.g. satellite-based meteorological services or direct-to-home video services) to final users."[55]

The range of actors, relationships and diversity of activities that the above definition of the Space Economy encompasses is very broad, so it is important to look at what constitutes the Space Economy and how it interacts with other sectors in order to look at space legislation from this perspective. This is although crucial in the context of what actually regulates space law at national level considering upstream, downstream and midstream activities in the space sector. Nevertheless, the space economy itself goes far beyond these three segments and includes other aspects as well. As defined by Institute for Defence Analyses – Space Economy is categorized into four groups such as space services (for instance services generated in space for use on Earth or in space), space service user support industry government expenditures on space, and space supplier industry[56]

In the context of this dissertation, the analysis of the space economy is of great importance due to the increasing number of countries interested in measuring it including those from the CEE Region. Today, more than 100 countries are involved in space activities and interest in developing unique strategies to scale activities and exploit opportunities in the space

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[54] OECD (2012) OECD Handbook on Measuring the Space Economy. Paris: OECD Publishing. Available at: https://www.oecd-ilibrary.org/economics/oecd-handbook-on-measuring-the-space-economy_9789264169166-en (Accessed: 30.08.2025).

[55] OECD (2007) The Space Economy at a Glance 2007. Paris: OECD Publishing. Available at: https://www.oecd.org/en/publications/the-space-economy-at-a-glance-2007_9789264040847-en.html. (Accessed: 30.08.2025).

[56] Crane, K.W., Linck, E., Lal, B. and Wei, R.Y. (2020) Measuring the Space Economy: Estimating the Value of Economic Activities in and for Space. Alexandria, VA: IDA Science & Technology Policy Institute. Available at: https://www.ida.org/-/media/feature/publications/m/me/measuring-the-spaceeconomy-estimating-the-value-of-economic-activitiesin-and-for-space/d-10814.ashx (Accessed: 30.08.2025).

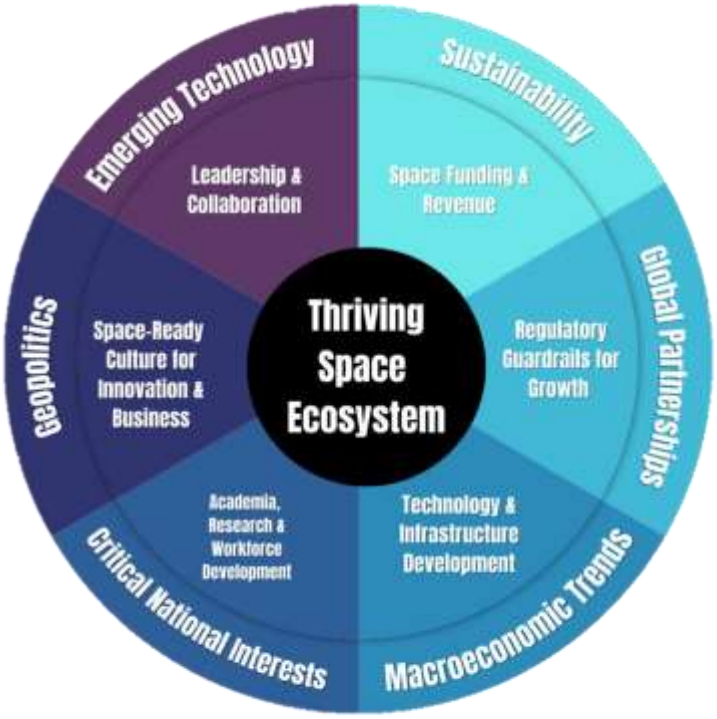
economy continues to grow.[57] A feature of the *New Space* Era, as mentioned several times already, is the possibility for more and more countries interested in this domain to participate. The emergence of the commercial aspect of space activities, the reduction of their costs and the greater accessibility encourage countries to make the space economy measurable, which must be understood by emerging countries. The proper characterisation of the space economy thus is crucial. In order to reliably reflect the space economy, it is necessary to identify, first and foremost, the types of products and space activities, to indicate accurate estimates of the space economy's share in specific space-related activities, including space products, and indication of the level of detail of the data available for each country.[58]

In this perspective an analysis of the six elements of a thriving space ecosystem presented by Kevin M. O'Connell and Kelli Kedis Ogborn in the NewSpace portal is useful. This analysis points out which of the identified components need to be developed, which need to be improved and which are already at a mature level depending on the country concerned. The authors of this article identify the following six elements (shown in the diagram below); leadership and collaboration; space funding and revenue; regulatory guardrails for growth; technology and infrastructure development; academia, research and workforce development as well as space-ready culture for innovation and business.[59]

[57] O'Connell, K.M. and Ogborn, K.K. (2024) 'How countries can increase their participation in the global space economy', *SpaceNews.com*, 15 October. Available at: https://spacenews.com/how-countries-can-increase-their-participation-in-the-global-space-economy/ (Accessed: 30.08.2025).

[58] Eurostat, European space economy thematic account: Wy are these statistics needed? Available at: https://ec.europa.eu/eurostat/web/experimental-statistics/european-space-economy-thematic-account?fbclid=IwY2xjawFgANZleHRuA2FlbQIxMAABHVZiRmuhfAckbbj9HllH5E-PHmS-LyK_b7D8zrtygCacYijYssIXqJB-OQ_aem_nwCrJqWsyLiAe2GZM_jlew (Accessed: 30.08.2025)

[59] O'Connell and Ogborn (2024).



FFigure.1.1 The six fundamental building blocks of a dynamic space ecosystem. [Source: Kevin M. O'Connell and Kelli Kedis Ogborn[60]]

Given the profile of this dissertation, the is the element called "Regulatory Guardrails for Growth" is of relevant importance. As highlighted in the article, national regulations tailored to today's space opportunities and challenges are essential for a growing space ecosystem. Furthermore, as the authors of the article point out, regardless of whether regulations are in place or changing, they must enable rather than restrict flexibility and speed by creating a business climate conducive to the development of companies and start-ups. Regulations must therefore be developed in consultation with industry to ensure their effectiveness and relevance in the space market globally. Space stakeholders should therefore be involved from the outset in the process to discuss barriers to entry, future opportunities or areas of technical interest. According to the authors of the study „It helps everyone understand and prepare for the coming landscape and also helps public sector leaders strategically design space regulations based on market realities, rather than top-down." As an example, they cite previous US policies that mandated streamlined regulations related to the commercial use of space or emphasized areas

[60] O'Connell and Ogborn (2024).

that were high priorities, i.e. navigation and time resilience, positioning or cyber security of space systems. [61]

The aforementioned observation emphasizes the critical need for active engagement of all the space stakeholders in the development of space regulations. Following the thoughts of the authors of the article discussed, this perception is reflected in the 2021 Survey for professionals and entrepreneurs of the Polish space sector on the scope of regulations and solutions of the Space Act, co-authored by the author of this dissertation. The survey was conducted to find out the position of entrepreneurs and professionals involved in various ways in the Polish space sector to contribute to shaping the future content of the Polish Space Act. The survey was divided into a general and a specific part with a total of 14 questions to the space stakeholders in Poland. Based on the survey, the author of the dissertation quotes below some of the questions and examples of the answers provided by the survey. The two main questions concerned the existence of barriers to starting and running space activities in Poland and the expectations of entrepreneurs towards the regulatory support proposed by the legislator in terms of the future Polish Space Activity Act. The responses regarding the existing barriers included the following:

1. "Lack of a mechanism to authorise and supervise 'upstream' activities at a higher scale than subsystem suppliers or technology providers. Regulations should be created and an entity responsible for permitting and supervision should be designated"[Respondent 2]
2. "Lack of 'harmonisation' of Polish law with laws currently being developed in the U.S. and the EU on the use of space, its resources, the supervision of traffic in space and liability for damage caused by activities in space. Adopt a more proactive stance on the Polish side (e.g. similar to Luxembourg in terms of asteroid exploitation and space mining) to safeguard the interests of entities sending objects into space and entities monitoring space for the purposes of the emerging Space Traffic Management. Reduce the cost associated with regulation, monitoring and insurance for small and medium-sized companies in the context of launching payloads into orbit. Ensure the use of national resources (companies, sensors, know-how, scientific and research centres) in space monitoring in order to reduce the cost of insurance, to take a good international position in the market of data and technology providers for Space Traffic Management." [Respondent 1]

[61] Ibidem.

The question on expectations for the future Space Act was answered as follows:

1. "There is a need for legal regulation of suborbital rocket flights. Currently, there are no procedures in place to ensure control (verification) of the safety of the conduct of the rocket mission (flight). A more detailed description of the problem and proposed solutions can be found later in the survey." [Respondent 1]
2. "A. Clear and transparent rules on which permission is granted.
   B. Rules limiting liability for damages in the event that IT security is breached and the space facility is used in a piracy (vide maritime piracy or forcible seizure of control of a maritime/ land vehicle).
   C. The existence of a 'one-stop-shop' institution to serve space entrepreneurs
   space entrepreneurs in their dealings with the administrative side in terms of permits, oversight, regulatory changes, and the handling of disputes." [Respondent 2]

In addition, the specific questions contained in the survey concerned:

- The authorization of space activities and the related obligation to obtain financial security for space liability; the nature of such security (third-party liability insurance, guarantee, other) and its exclusive or limited nature *vis-à-vis* certain entities (questions 3,4,5).
- Liability for the damage, namely its connection to a space object or space activity (question 6).
- Possible protection of space related equipment manufacturers under compulsory third-party liability insurance taken out by the operator, and possible limitation of manufacturer's liability to the amount of the insurance cover. (questions 7 and 8).
- Establishment of a lower outer space border, so-called *Kármán line* (question 9).
- Inclusion of High-Altitute Activitis in the scope of regulation (question 10).
- Aspects of environmental protection that should be regulated in the future Space Act (question 11).
- Regulation of space mining and spaceports (space infrastructure or space launch sites) in the territory of Poland (question 12,13).
- Conceptual issues specific to the Polish language in the context of the word 'launching'. (question 14).

Despite the broad reach of the survey, the response rate was low, which can be attributed to various factors, such as the protracted work on the implementation of the National Space

Act. Regardless, although the responses were limited in number, they proved to be highly informative, enabling the conclusion that respondents are well aware of the legislative needs of the space sector. The submitted responses also identified a number of gaps that could be addressed by national legislation (e.g., the authorization regime, liability, and harmonization issues). Furthermore, respondents provided valuable insights on expected regulatory support, particularly highlighting the need for clear and transparent authorization rules or the regulation of suborbital flights.

1.4. Functions of space strategies

1.4.1. Overview

The following section will examine space strategies as an expression of national space policies, which, to some extent, influence and encourage for the implementation of space regulations. It is worthwhile, in the context of national space legislation, to look at one of the which can be regarded as an impulse, namely national space strategies and their factors. It is space policy that gives impetus to space activities around the world. The process of decision-making and space policy-making at the state level is extremely complex and demanding especially for the space sector and space activities. Recent circumstances and conflicts highlight the need to implement space policy in an efficient and responsible manner from both civilian and military perspectives. Emerging initiatives at EU level such as the EU Space Strategy for Security and Defence[62], EU Space Law proposal or emerging space strategies at national level require an appropriate response from all space sector stakeholders as well as the proper implementation of strategic goals and objectives, which were indicated in national space strategies.

Public policies that are adopted by society and become social norms are eventually codified into laws and regulations. Law thus arises from the consolidation of a policy by a governmental entity that follows a specific procedure to achieve permanence. Therefore, law assists in creating greater certainty, stability and predictability. Both legal systems and space policy determine the nature, scope, pace, possibilities and development of space endeavours. For the initiation, operation and development of space activities at both international and national level, appropriate regulatory regimes and space policies are therefore essential. [63] As indicated by Jakhu, law and policy are necessary for a number of reasons, including the protection of the general public (he mentions economic, cultural, social and strategic threats),

[62] Council of the European Union (2023): Council Conclusions on the EU Space Strategy for Security and Defence. Brussels, 13 November 2023. Online: https://data.consilium.europa. eu/doc/document/ST-14512-2023-INIT/en/pdf (Accessed: 25.08.2025).

[63] Ram J. capacity building in space law and space policy. Institute of Air and Space Law, Faculty of Law, McGill University,Elsvier, Advances in Space Research 44 (2009) 1051–1054.p. 1051.

to maintain order, to manage resources that are limited in nature, e.g. the radio frequency spectrum, and finally to determine the pace, scope of the nature and possibility of developing space ventures and enhancing specific activities.[64] As global space activities become increasingly commercialized, many countries are adapting their policies to develop innovative space infrastructure and a competitive industrial base.[65] Activities are not only visible at national level, but also have a transnational dimension creating bilateral and multilateral cooperations between the nations as seen for example in Artemis Accords, as another form of international arrangements, which as can be seen, are currently growing in importance.

Analysing the origins of space exploration, starting with the launch of Sputnik 1 in 1957, space programmes have played a key role in public policy initiatives. As mentioned in the introduction, space activities were centred around the governmental programmes of the two leading powers in the Cold War. The impetus for the development of space technology was obviously the Cold War rivalry between the US and the USSR. Thus, the military nature of space activities was integral to the efforts being made towards space exploration, which was duly reflected in space strategies and programmes at the time. In addition to the defence dimension, the aspect of international cooperation was strengthened during the Cold War, manifested in cooperative programmes within the blocks to strengthen alliances and enhance international prestige. On the Soviet side, the Interkosmos programme enabled cosmonauts from countries such as the Czech Republic, Poland, Bulgaria, Hungary and Romania to fly on Soyuz spacecraft. On the American side, this concerned the Freedom space station project, which involved cooperation between the United States, Japan and Europe. A powerful political symbol at a time of loosening relations between the two superpowers was the joint Soyuz-Apollo flight in 1957, where the Apollo spacecraft docked with Soyuz capsule, which was a huge success with further consequences for the development of cooperation between the US and the USSR in the space segment. Nevertheless, the political dimension of space existing from the very beginning of space activities, the rise of the political importance of space increased with the end of the Cold War.[66]

For a long time, space was perceived as an area dominated by science technology and, above all, national security considerations, especially among experienced countries in this

[64] Ibidem, p. 1052.
[65] Paikowsky, D. and Ben Israel, I. (2010) 'Part 2 – Views and Insights 6. Trends in shaping space policies around the world', in Schrogl, K.-U. et al. (eds) Yearbook on Space Policy 2009/2010. Vienna: Springer-Verlag, pp. 260–271, p.264.
[66] Venet, C. (2011) 'Chapter 2 – Outer Space – a real issue', in Brünner, C. and Soucek, A. (eds) *Outer Space in Society, Politics and Law* (Studies in Space Policy, Vol. 8). Vienna: Springer Wien NewYork, p. 74.

domain. However, following the emergence of new space applications together with new perspectives as a consequence of global economic and political liberalization, the wider political value of space has been recognized, which can be used to address specific national and transnational issues, rather than being dedicated only as a foreign policy tool to increase power at the international level.[67] A consequence of this change in approach has been the interest of more and more countries in using space applications and developing capabilities in this domain, which has been reflected in the emergence of various space programmes and strategies in different parts of the world. The focus of government programmes on mostly defence dimension and technological development increasingly directed towards industry and the commercial nature of space activities. However, the current geopolitical situation is once again forcing a focus on the military aspects of space infrastructure and more specifically its dual use, as will be outlined in the following section.

Before proceeding to an analysis of national space strategies it is crucial to highlight the actions taken at regional level. For the purposes of this dissertation, the European space ecosystem is relevant. A variety of activities at regional level have elevated international European actors to key positions in the global space industry. They now influence both the technological trajectory (European Space Agency) and the political framework (European Union) at European level, through enhanced cooperation and specialized space programs. The European Space Agency (ESA) serves as the cornerstone of European space governance. As an intergovernmental organization with extensive space expertise, it cooperates with the European Union (EU). While separate entities, the EU relies on ESA's technical capabilities and has entrusted it with implementing specific EU space programs. This cooperation, rooted in the Treaty on the Functioning of the European Union (Lisbon Treaty) , on the basis of which the Commission has negotiated a first Framework Agreement with European Space Agency, which came into force on May 28, 2004[68]. Based on this Agreement ESA and EU have expressed a willingness to closer cooperation, which contribute to economic growth and European cohesion through the peaceful use of space, and allow space activities to be integrated into the wider economic, political, scientific, social and environmental framework, thus serving European citizens in more direct way.[69]. Therefore, the ESA and EU share a vision of integrating space

[67] Ibidem p.76.

[68]Council of the European Union (2003) *Council Decision on the signing of the Framework Agreement between the European Community and the European Space Agency*. Doc. 12858/03. Brussels, 7 October. Available at: https://data.consilium.europa.eu/doc/document/ST%2012858%202003%20INIT/EN/pdf, European Space Agency European milestones. Available at: https://www.esa.int/About_Us/Corporate_news/European_milestones.

[69] European Community (2004) 'Framework Agreement between the European Community and the European Space Agency', Official Journal of the European Union, L 261,, pp. 64–68.

into European society and economy, fostering a competitive European space sector, and ensuring European autonomy in space.[70]

Since the signing of the first framework agreement between the two institutions, this cooperation has been expanded and improved.[71] However, recent milestone that has been achieved over the years has been the implementation of the European Space Programme. The European Union Space Program together with the European Union Agency for the Space Program, were formally established in 2021 based on (EU) 2021/696 Regulation.[72] It focuses on Satellite Navigation, Earth Observation, Space Research and Innovation, and Connectivity. The Regulation establishing the new European Space Program created the European Union Space Programme Agency (EUSPA), the EU's decentralized agency responsible for managing the Space Program. EUSPA oversees the operational security of EGNOS and Galileo and coordinates user-related aspects of GOVSTACOM. It promotes downstream and integrated applications based on these systems and leverages funding mechanisms from the Horizon Europe Program. EUSPA's key tasks include security accreditation, ensuring operational security, communication and promotion, data and service provision, and providing expertise to the European Commission. The European Union (EU) is a supranational organization, while the European Space Agency (ESA) is an intergovernmental one with substantial technological capabilities. These entities operate under distinct frameworks, with the EU responsible for formulating European space policy and the Council and Parliament tasked with implementing specific measures through the European Space Program, excluding the harmonization of member state space laws. This scheme derives again from the Lisbon Treaty, where particularly according to article 189 it is expressed.[73]

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[70] "Pursuant to this Agreement, ESA and the EU have expressed a mutual desire to enhance their collaboration. This strengthened partnership aims to foster economic growth and European cohesion through the peaceful utilization of space. By integrating space activities into broader economic, political, scientific, social, and environmental frameworks, we can more effectively serve the needs of European citizen"See in: European Community (2004) 'Framework Agreement between the European Community and the European Space Agency', *Official Journal of the European Union*, L 261, pp. 64–68.

[71] Through various white papers, space councils etc.See in:European Space Agency European milestones. Available at: https://www.esa.int/About_Us/Corporate_news/European_milestones (Accessed: 25.08.2025).

[72] Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021 establishing the Union Space Programme 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.

[73] "1. To promote scientific and technical progress, industrial competitiveness and the implementation of its policies, the Union shall draw up a European space policy. To this end, it may promote joint initiatives, support research and technological development and coordinate the efforts needed for the exploration and exploitation of space.2. To contribute to attaining the objectives referred to in paragraph 1, the European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall establish the necessary measures, which may take the form of a European space programme, excluding any harmonisation of the laws and regulations of the Member States.3. The Union shall establish any appropriate relations with the European Space Agency.4. This Article shall be without prejudice to the other provisions of this Title".

Given their inherent influence to shape national policies and strategies in the European space ecosystem, the aforementioned three institutions (ESA, EU, EUSPA) are an integral consideration in the formulation of European countries' space strategies, as evidenced by the increased cooperation and many other factors.

The first decade of the 21st century already saw a significant increase in the emergence and re-evaluation of space programmes and future policies by many countries. Already then, the space market was experiencing rapid growth and many countries began to focus on developing national space expertise. At the time, it was assumed that countries with a growing need for space applications for everyday use would turn to procurement of services and relevant technologies. As more countries expanded their space activities and capabilities, it became necessary to organize and coordinate such activities, which needed to be formalized to some extent.[74] As Deganit Paikowsky and Isaac Ben Israel have pointed out - the enhancement of a state's status (both power and deterrence capabilities) can be presented by technological capabilities of a peaceful nature but with a clear indication of dual-use potential, of which the space sector is a prime example. A manifestation of this trend at the time was the modernization of existing programmes, the growing number of national space agencies and the increase in space budgets of international governments. In 2009, there were almost 60 national space agencies, compared to less than 20 in the early 1980s. [75] In the first decade of the 21st century, several trends in space programmes were noticeable, namely the expansion of space activities to include national security missions, the focus on international cooperation, and the improvement of industrial scale, competitiveness and capabilities through cost reduction, the expansion and improvement of space applications by states, and efforts to miniaturize space products and technologies.[76]

Currently the number of national space agencies has increased significantly. In 2019 there were around 72 national space agencies and over 70 nations were operating space programs. [77] Another noticeable trend, alongside the revision and implementation of a new space strategies, is the emergence of defence strategies dedicated strictly to the space sector. The threats that have emerged over the past few years have increased the focus of the international community on security and defence matters, with the result that space assets are

[74] Paikowsky and Ben Israel (2010, p. 260).
[75] Ibidem p. 261.
[76] Ibidem p.262.
[77] Adriaensen, M., Giannopapa, C., Sagath, D. and Papastefanou, A. (2015) Priorities *in national space strategies and governance of the member states of the European Space Agency,* Acta Astronautica, 117, pp. 356–367;Exploring insights from emerging space agencies BY Renata Knittel Kommel, Ashley Peter, Mackenzie Puig-Hall, and Luc Riesbeck.

gradually being recognised as critical elements of defence strategies around the world. While a decade earlier there was also a focus on the military aspect, currently government spending on defence exceeds investment in the civilian programmes.[78] The emergence of space defence strategies are visible in the case of Luxembourg (Luxembourg's Defence Space Strategy 2022[79]) France (The French Space Defence Strategy 2019[80]) and the United Kingdom (UK Space Defence Strategy 2022[81]).

Given the purpose of this dissertation and the selected legislation which are examined further in its analysis, the space strategies of countries such as Luxemburg, the United Kingdom and France (together with their recently implemented space defence strategies), as well as those of individual Central and Eastern European countries, which have emerged in the last few years, are briefly outlined below. The aim of this examination is to identify common elements, but also differences in the development of policies and strategies at national level. This analysis also seeks to demonstrate how important it is for national space segments to strengthen the industry through relevant instruments whether political or regulatory. In many of these strategies there is a strong emphasis on developing the commercial space segment and supporting entrepreneurs in this area, which is extracted in the following part. In addition, the author distinguishes, on the basis of the strategies analysed, the segments of the space sector on which a given national strategy is focused in order to review the national space legislation in this respect.

1.4.2. Western countries

1.4.2.1. UK Space Strategy

Implemented in 2021, the UK's National Space Strategy is based on four pillars related to unlocking growth in the indigenous space sector together with developing in science and technology, fostering resilient space capabilities and services as well as strengthen international

[78] Euroconsult, New historic high for government space spending mostly driven by defense expenditures. Available at:https://www.euroconsult-ec.com/pressrelease/new-historic-high-for-governmrnt-spacespending-mostly driven-by-defense-expenditures.

[79] Luxembourg's Defence Space Strategy (2022). Online: https://gouvernement.lu/dam-assets/documents/actualites/2022/02-fevrier/28-bausch-strategie-spatiale-defense/32022-0012- (Accessed: 30.08.2025) Strategie-spatiale-EN-24p-WEB.pdf.

[80] The French Ministry of the Armed Forces (2019): Space Defence Strategy. Report of the "Space" Working Group. Online: https://www.archives.defense.gouv.fr/content/download/574375/9839912/Space%20Defence%20Strategy%202019_France.pdf. (Accessed: 30.08.2025)

[81] Ministry of Defence (2022): Defence Space Strategy: Operationalising the Space Domain. Online: https://assets.publishing.service.gov.uk/media/61f8fae7d3bf7f78e0ff669b/20220120-UK_Defence_Space_Strategy_Feb_22.pdf. (Accessed: 30.08.2025).

cooperation.[82] The work being undertaken to support growth in the UK's space sector involves using government to unlock the potential of both entrepreneurs and innovators, as well as industry as a whole. This approach, according to the strategy is concerted on ensuring that innovative companies in the space sector have access to private finance through space-focused venture capital funds (such as the Seraphin Space Investment Trust supported by the British Business Bank) and through state-of-the-art space regulation and commercial partnerships (as exemplified by the UK-Australian 'Space Bridge'[83] success story).[84]

According to data presented in the strategy, An important part of the British economy is the space sector, which is worth over £16.4 billion annually and employs over 45,000 people., with . The UK specializes in spacecraft manufacturing and highly complex payloads, with a particular focus on small satellites. The indigenous space sector also has many achievements in the ground-based manufacturing and services for satellite communications and navigation systems, as well as broadband applications. The strategy focuses on fostering and developing these segments. In addition, space services are vigorously supported by other segments, i.e. legal services, consulting, insurance and IT.[85] In the area of development priorities, the UK focusing on Earth observation, navigation applications and services as well as satellite broadband, considering its strengths in analytics, artificial intelligence (AI) or application development. There are also plans to develop potential and emerging markets such as on-orbit servicing, active debris removal and space travels. An important element within the UK space strategy is to support activity clusters and business incubation centers in the context of accelerating space activities. The following map contained in the strategy shows the proposals to create spaceports and space hubs across the UK.

[82] Government (2021) National space strategy. Available at: https://www.gov.uk/government/publications/national-space-strategy/national-space-strategy p.23 (Accessed:30.08.2025).
[83] This partnership aims to foster cooperation between their respective space industries. See in:
UK Space Agency (2022) Successful first year for UK-Australia Space Bridge, 23 February. Available at: https://www.gov.uk/government/news/successful-first-year-for-uk-australia-space-bridge.
[84] Government (2021) National space strategy. Available at: https://www.gov.uk/government/publications/national-space-strategy/national-space-strategy, p.7 (Accessed:30.08.2025).
[85] Ibidem p. 14.

Figure 1.2. Potential spaceports and hubs based on the UK Space Strategy (Source: UK Space Strategy)

Nevertheless, an important part of every space strategy analyzed in this dissertation, as highlighted earlier, is the regulatory relevance. As indicated in the UK strategy :

> *"The UK is leading the world in modern regulation of space activities, in line with the ambitions of the Integrated Review. The Space Industry Act 2018 delivered a new global benchmark in space launch, while our UKSA cyber-security toolkit has provided exemplary guidance on the security of commercial space systems.* ***New Space Industry Regulations enacted this year have propelled the development of commercial spaceflight technologies, from rockets to space planes. Government has created a new UK space regulator in the Civil Aviation Authority, which is regulating these emerging technologies.*****"**[86]

In addition, the strategy identifies the dual use nature associated with UK space capabilities both civilian and defence, through investment in military satellite communications and in new technologies and capabilities through the first defence space portfolio. A continuation of this objective became the introduction of Defence Space Strategy in 2022. The UK's first space defence startegy is based on three strategic themes, i.e. the development of

[86] UK Space Strategy, p.26.

space capabilities for protection and defence as well as the identification of threats to space systems and the associated appropriate responses to hostile action. The strengthening of military operations through the integration of space with other defence activities and the provision of resilient space services fundamental to military operations is another element of the strategy. The development of coherent space plans and policies, as well as the retention of human capabilities, is a skills enhancement component. As part of the strategy, the UK has committed to improving the Skynet 6 programme to support government operations and better meet military objectives.[87]

1.4.2.2.Luxembourg space strategy

The Luxembourg space sector is structured around a number of segments, including space segment companies (concentrated around manufacturing satellite structures and instruments, microsatellite systems integration, electrical propulsion or robotic payloads), ground segment companies focusing on the development of ground stations, mechanisms and electrical ground support equipment and communication and operational networks, service segment companies (such as satellite media or telecommunications services) and other companies that are an important part of the Luxembourg space ecosystem.[88] "Luxembourg's space strategy 2023–2027 centers on sustainability"[89]. The strategy aims to further develop the Luxembourg space sector towards economic sustainability, sustainability of activities on Earth and in space as well as sustainable and responsible use of space resources. Among the objectives identified in the strategy are; positioning Luxembourg in new segments offering attractive commercial prospects, developing expertise focused on segments that can contribute to some of the sustainable development goals and developing national competence in space traffic management and on-orbit services. With reference to the space resources policy R&D resources are planning to be dedicated to addressing sustainability, closed-loop and resource management issues while ensuring the economic viability of the measures developed, through business and public research. In the context of space law, with reference to Luxembourg's strategy:

> "The legal and regulatory framework plays a key role in the development of space framework will be more precise following the adoption of the law of 20 July 2017 on

[87] Ministry of Defence (2022): Defence Space Strategy: Operationalising the Space Domain. Available at: https://assets.publishing.service.gov.uk/media/61f8fae7d3bf7f78e0ff669b/20220120-UK_ Defence_Space_Strategy_Feb_22.pdf. (Accessed: 30.08.2025)

[88]Deloitte(2025)*Luxembourg space initiatives*. Available at: https://www.deloitte.com/lu/en/Industries/technology/analysis/luxembourg-space-initiatives.html (Accessed:30.08.202)

[89] Luxembourg Space Strategy: 2023 National Space Strategy 2027. Action Plan, p.5. Available at: https://space-agency.public.lu/dam-assets/publications/2024/nationalspacestrategy-2023-2027.pdf (Accessed: 30.08.2025).

space exploration and the use of space resources, and the law of 15 December 2020 on space activities. A system of authorization of new operators is being set up and will be backed by Grand Ducal regulations and corresponding procedures. By the end of 2022, the activities of the current operators, authorised and supervised by the SMC via the law on electronic media, were revised in line with the law of 2020. In the past five years, Luxembourg has seen powerful growth in the number of objects registered."

According to the Strategy, there are also plans to propose two laws: one dealing with sensitive ultra-high resolution Earth Observation data, and the other approving an Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space.[90]

Due to the awareness of the vulnerability of space systems, which is particularly important in the current geopolitical situation, Luxembourg (like the UK) has introduced a Space Defence Strategy in 2022. Similarly, the strategy focuses on improving the resilience of Luxembourg's space capabilities and the consolidation of current capabilities, supporting freedom of action in and from space and fostering national and international cooperation. General objectives are complemented by an emphasis on the development of specific segments such as satellite communications to ensure the resilience of communications systems targeting multi-orbit access, participating in various programmes preferring the dual use of commercial and military bands as well as investing in strategic GEO, MEO or LEO systems .[91]

1.4.2.3. French strategy

In addition to the introduction of a space defence startegy in France in 2019, elements related to space segment are included in the overall document France 2030 strategy[92]. It is of great importance in the context of support instruments for the domestic space sector. The space component is based on two approaches related to public procurement and aid in the form of grants and repayable advances for seed capital as well as support for the development of breakthrough technology industrialisation.[93] The main assumptions of the France 2030 Strategy for the space sector is to reinforce the New Space trend in order to secure France's position in fast-growing markets. Another important element is the investment aspect, dealing with disruptive technologies and focusing investment on emerging markets but also on proven user

[90] Luxembourg Space Strategy, p.22.
[91] Luxembourg Space Strategy , p.12.
[92] which was initiated by the government on October 12,2021. See more in: CNES, *France 2030 Spatial*. Available at: https://cnes.fr/entreprises/france-2030-spatial (Accessed: 30.08.2025).
[93] Ibidem.

needs.[94] Key areas centre around strengthening the indigenous constellation-based space industry, fostering space research excellence and innovation, taking a sovereign and strategic position in new space markets, promoting dual-use applications and ensuring the independence of space infrastructure.[95]

As for the French space strategy dedicated to the defence dimension recognition of space as a major factor in its strategic independence already took place in the 1960s, since the 1990s space capabilities as an instrument to support military operations have been used by the national armed forces. The French Space Defence Startegy, published in 2019, focuses around developing comprehensive Space Situational Awareness (SSA) capabilities, protecting France's indigenous capabilities as well as strengthening the resilience of its armed forces. It is important to point out the commercial aspect, namely according to the strategy:

> „They must be given support: innovation must be stimulated by a revised system of state governance, and balances within the ecosystem of start-ups, SMEs, intermediate-sized enterprises and major contractors should be reset. For launchers, the current model will be sustained by the reassertion of European preference for institutional launches. European cooperation will be pursued mainly around a Franco-German core based on complementary SSA resources with a view to laying the foundations for an autonomous European space capability in the future. However, this does not rule out the pursuit or development of cooperation with other international partners, especially the United States."[96]

The strategy also highlights issues related to regulations, concerning military aspects, which are currently not adequately adapted to this type of activity, in terms of prior authorization of space activities. An extension of the prior assessment and declaration system is called for due to the dynamic growth of private activities in segments that are relevant to national security. Nevertheless, as emphasized in the strategy, any adaptation of the law in this direction must be balanced between maintaining the competitiveness of the defence technological and industrial base and protecting the fundamental interests of the nation.[97]

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[94] Ministère de l'Économie, des Finances et de la Souveraineté industrielle et numérique (2024) France 2030 : stratégie spatiale, 24 October. Available at: https://www.entreprises.gouv.fr/priorites-et-actions/autonomie-strategique/soutenir-linnovation-dans-les-secteurs-strategiques-17.

[95] Ibidem.

[96] French Space Strategy,p.10.

[97] Armed Forces Ministry (2019) SPACE DEFENCE STRATEGY: Report of the "Space" working group. Available at:https://cd-geneve.delegfrance.org/IMG/pdf/space_defence_strategy_2019_france.pdf?2194/80ea1f07a5171e4ee796a52752c9bce695d34acb.pp.27-28 (Accessed:30.08.2025).

1.4.3. CEE Region

Taking into account the Central and Eastern European Region, most of the countries have implemented national space strategies in the last decade. Of the CEE countries , Poland, Hungary, Lithuania, Slovenia, Slovakia and the Czech Republic have a dedicated space sector strategy or relevant Plan. With regard to the other countries, due to the early stages of the relationship with the European Space Agency, the indigenous sectors are still working on the implementation of the relevant policies. Nevertheless, the following are the most important highlights of the national space strategies of the CEE countries, taking into account market-oriented policies in particular and the willingness to implement national space legislation.

1.4.3.1.Polish space strategy 2017

The Polish Space Strategy[98] was implemented in 2017 and the *rationale* for its introduction was related to the pursuit of efficient and stable cooperation between industry and science, support for foreign cooperation to stimulate economic growth based on innovation in the space sector and the development of innovative technologies.. By 2030, strategic objectives were identified consisting in the ability of the domestic space sector to compete effectively on the European market (indicating a turnover of at least 3% of the total turnover of this market), support for the Polish administration in using satellite data for a more efficient implementation of its activities (in cooperation with domestic enterprises) and the objective related to meeting the needs of the Polish economy and public institutions in terms of access to satellite infrastructure adjusting to their needs in particular in defence and security matters. In order to achieve these three goals, the strategy assumes not only an increase in the competitiveness of the Polish space sector, but also the development of satellite applications, building personnel for the needs of the Polish space sector and creating favourable conditions for the development of the sector as well as developing capabilities in the security dimension. [99]

In the context of the set goals, the strategy indicates the prospect of participation in the upstream segment, emphasising the development of satellites (micro/nano satellites) as part of developing the competitiveness of Polish entities. Potential specialisations developed by Polish stakeholders in the space sector include on-orbit orientation and orbit correction systems, optics, space and terrestrial software, optoelectronics, robotic solutions, precision mechanics, avionics, power systems, materials technology and composites, propellant technologies including eco-

[98]Rada Ministrów (Council of Ministers) (2017) *Uchwała nr 6 Rady Ministrów z dnia 26 stycznia 2017 r. w sprawie przyjęcia Polskiej Strategii Kosmicznej* (Resolution No. 6 of the Council of Ministers of 26 January 2017 on the adoption of the Polish Space Strategy), 26 January. Available at: https://www.gov.pl/web/rozwoj-technologia/polska-strategia-kosmiczna (Accessed:30.08.2025).

[99] Polish Space Strategy p. 6;7.

propulsion systems or fuels for satellites and small space rockets, and ground test support systems.[100] Polish entities have gained experience in these fields due to their participation in the Polish Industry Incentive Scheme (PLIIS) under the European Space Agency coordination, which has contributed to the development of know-how in various technological domains . In addition to the upstream segment, as highlighted in the strategy, the technological and financial potential is in applications based on imaging, connectivity and satellite navigation, which is part of the downstream segment[101]

Among the objectives of the 2017 Strategy, an increase in the contribution to the European Space Agency (which is expected to be brought in 2025, the contribution increased to 193,4 mln EUR) Development and implementation of a key document such as the National Space Programme, increased participation in European Union space programmes or bilateral cooperation, and participation in international initiatives such as The European operational satellite agency for monitoring weather (EUMESAT) or The European Organisation for Astronomical Research in the Southern Hemisphere (ESO) were indicated. Particular emphasis was also placed on the development of the *New Space trend*, which in the Polish realities of space activities could have a chance of success due to the lack of burdens associated with the long-term implementation of projects under government agency contracts. The objectives for the development of satellite applications include the provision of permanent, reliable and fast access to data, the development of commercial services, the dissemination of the use of satellite data, especially among public administrations, and increased participation in international programmes. Specific objective No. 3 indicates in addition to expansion of a national Earth observation satellite system also the development of rocket technology in the domestic market, which have recently been successfully implemented, i.e. the launch of the ILR-33 Bursztyn 2K suborbital rocket beyond the Karman line in October 2024.[102]

In the context of this dissertation, however, the most important aspect related to the strategy is the creation of favourable conditions for the development of the space sector in Poland. To this end, the strategy identified as key mechanisms to support the sector the creation of the European Space Agency Business Incubator Centre (ESA BIC) business incubator (already launched in 2022) the introduction of facilities for entrepreneurs especially SMEs and

[100] Ibidem p.10.
[101] Ibidemp.10-11.
[102] The rocket, which was the first in the world to use 98% hydrogen peroxide as an oxidiser, was successfully tested in its final version, flying to a ceiling of 101 km. See in: POLSA (2024) *Historyczne osiągnięcie polskich inżynierów – polska rakieta suborbitalna ILR-33 BURSZTYN 2K sięgnęła kosmosu* 5 July. Available at: https://polsa.gov.pl/wydarzenia/rakieta-ilr-33-bursztyn-2k-siegnela-kosmosu/ (Accessed:30.08.2025).

science as well as an increase in the level of private investment and, most importantly, the development of a draft law on a national register of space objects. According to the 2017 Polish Space Strategy

> "In order to ensure the fulfilment of the obligation for Poland under Article 2 of the United Nations Convention, it is necessary to draft an act on the National Space Objects Register, which is to contain, first of all, provisions for keeping a register of space objects launched into space by Polish entities, while notifying this information to the Secretary-General of the United Nations each time. The register will be kept by the Polish Space Agency, which will also supervise the space activities of Polish entities."[103]

Nevertheless, the Polish Space Strategy does not indicate the implementation of a comprehensive space law here, focusing only on the implementation of the international obligation to register space objects at the national level, Polish legislator is currently working towards the enactment of a Space Act, which is discussed in section 4 of this dissertation. The last objective is concentrated around building of human resources for the Polish space sector by creating new fields of study or developing a diverse programme of internships and apprenticeships. To date, only some of the strategic objectives have been fulfilled, no less, the indicated directions of space sector development from 2017 are reflected in the current activities of Polish space sector entities

1.4.3.2.Hungary's space strategy

The Hungarian Space Strategy was published in 2021. Its main objectives are related to stimulating development and innovation in the national economy, increasing the role of the Hungarian space sector on the international stage and developing knowledge-based social and economic conditions as well as the relevant infrastructure. According to the strategy: *"The creation of a national space market prospering in the course of legislation, promoting commercial space activities, but considering the state interests, is of key importance."*[104]

The Hungarian space ecosystem is made up of small and medium-sized enterprises, with around 40 companies involved in space activities to some extent. In the context of the development of the commercial space market, the Hungarian strategy has set the goal of doubling the number of companies and strengthening the existing ones, which means about 60-70 existing companies in the home space ecosystem. In connection with such plans, the number

[103] Polish Space Strategy, p.40.
[104] Hungarian Space Strategy p.37.

of specialised employees in the space sector would also increase. Strategic goals focus on the development of Hungarian satellite and ground segment capabilities, an ambitious astronaut programme - Hungarian to Orbit (HUNOR) as well as support for education in the space sector.[105] Hungary's Space Strategy,, aims for long-term economic growth and specialized competence development within the space sector. A key component of this strategy is the creation of a dedicated Hungarian space law, driven by both international obligations and national economic interests. The strategy also includes the establishment of a Coordinating Authority and leverages existing capabilities like the ESA BIC Hungary, which was opened in 2021.[106]

> "For the establishment of an effective legal and institutional background for the Hungarian space sector, it is essential to create a predictable and supportive regulatory environment (Hungarian Space Law) at the national level as soon as possible, in accordance with international obligations. At the same time, the active participation of the state is necessary worldwide in the interests of national defence, national security and the maintenance of sovereign communication."[107]

1.4.3.3. Czech Republic National Space Plan

In 2019 the New National Space Plan for years 2020-2025 was approved by the Government.[108] The strategy aims to develop the capabilities and capacities of both academia and industry in the space sector by ensuring, first and foremost, competitiveness as well as maximizing the return on public investment in space activities.[109] The new plan is based on a vision of an economy with high added value, being innovative and competitive. The Czech Republic also intends to seek to retain and absorb the intellectual capital it creates and to become a proficient user of space infrastructure resources in services and operational products.[110] Although the Czech Republic does not have dedicated national space legislation it does have a national register, required by the Convention on Registration of Objects Launched into Outer Space from

[105] Activities concerning education are related to the establishment of post-graduate education program (UniSpace consortium)with a broader space-qualification involving 17 Hungarian universities.
[106] Hungarian Space Strategy p. 9,16.
[107] Hungarian Space Strategy, p.36.
[108] The Czech Republic previously already had two National Space Plans in 2010 and 2014.
[109]'National Strategy of the Czech Republic in Space Activities Available at: https://www.czechspaceportal.cz/en/national-space-strategy/national-space-plan-2020-2025/.p.4,(Accessed: 20 November 2022).
[110] National Space Plan 2020-2025, p. 26.

1975 (Registration Convention). In accordance with the decision of the Government of the Czech Republic dated 5 May 2014 The Czech National Register of Space Objects is maintained by the Ministry of Transport of the Czech Republic.[111]

The segments on which the Czech space industry focuses are satellite navigation, space science, space exploration, earth observation, launchers and propulsion systems. Czech entities have extensive experience in satellite remote sensing and data analysis, are actively involved in the development and deployment of satellite navigation systems, and contribute to the manufacture and operation of GNSS components and infrastructure. The country's increased interest is directed towards the planetary and lunar domains and its tradition of science-based astronomy, planetary science and astrophysics involves Czech scientists in various international research projects and observatories. In addition, the Czech space industry has experience in producing mechanical systems for space applications. (such as the provision of solar panel hinges for the new generation of *Iridium* satellites, antenna and thruster guidance mechanisms or mechanical structural components).[112]

1.4.3.4. The space strategy of Latvia 2021-2027

On May 2025 Lithuania has officially joined the countries that have ratified Outer Space Treaty, thus confirming its commitment. to actively participate in the global space ecosystem. However the impetus for Lithuania's space strategy was the country's accession as an associate member state of the European Space Agency. The Latvian space sector has been involved in the PECS programme since 2013, with a total of 51 contracts awarded to 16 Latvian entities. High-level research has been conducted in segments such as; radio astronomy, detection of small planetary bodies (meteors, asteroids, comets) electronics and telecommunications, remote sensing, satellite technologies, data processing or algorithms for EO applications and solutions based on remote sensing data, among others.[113] Industry, on the other hand, has provided many scientific instruments, electronic components or materials for EO solutions.[114] The technological potential of Latvian entities is focused around fibre-optic gyroscopes and the development of radiation detection and measurement instruments for the development of scientific payloads in space. The strategic goals of the Lithuanian space ecosystem are directed towards education

[111] 'Czech National Register of Space Objects.Available at: https://www.czechspaceportal.cz/en/databases/czech-national-register-of-space-objects/ (Accessed: 20 November 2022) .
[112] Czech National Space Plan Page 17.
[113] The Space Strategy of Latvia 2021-2027. Available at: https://www.em.gov.lv/sites/em/files/media_file/the-space-strategy-of-latvia-2021-2027.pdf pp. 8;10 (Accessed:30.08.2025).
[114] Ibidem,p.11.

and skills development through an adequate educational system and attractive training opportunities. In addition, the indigenous sector aims to support and encourage start-ups and the expansion of specific activities in the areas of research and development. A strong emphasis is placed on cooperation between industry and research, especially in the context of infrastructure necessary for space activities such as laboratories or equipment for testing and qualifying components and their sharing between companies, institutes, governmental units or laboratories cooperating in neighboring countries.[115] With regard to regulatory issues, according to the strategy:

> "The responsible authorities review Latvia's regulatory framework for licensing the use of radiofrequency spectrum for satellite communication purposes. The laws, regulations and policies will be analysed and amendments suggested so as to create an environment that encourages the development of the space sector, including the private use of satellite spectrum, while safeguarding the interests of Latvia."[116]

1.4.3.5. Slovenian space strategy

This strategy due to the fact that the Slovenia is one of the few countries from CEE Region to have national space legislation implemented in 2022, is of particular importance. Slovenian is involved in Earth observation programmes, General Support Technology Programme (GSTP), human and robotic exploration and as in the case of Czech Republic, PRODEX scientific programme. The first native satellites (Nemo HD and TriSatand) were launched into space in 2020. TRISAT-R as the third Slovenian satellite was launched into orbit in 2022. [117] As of today, the Slovenian space sector includes around 90 entities.

The Slovenian Space Strategy 2023-2030 formulates 5 pillars, namely: support and development of space technologies and R&D (including exploitation of new opportunities in the field of satellite communications), expansion of participation in responsible international space exploration (in connection with technologies targeting human and robotic exploration missions). Supporting the development of space applications, using next-generation technologies, strengthening the two Slovenian space ecosystems, i.e. securing the future generation of engineers, scientists and young professionals as well as stimulating entrepreneurship and university development through relevant space innovation programmes. However, the Slovenian Space Strategy did not explicitly indicate the implementation of space

[115] Ibidem ,p. 20.
[116] Ibidem, p. 22.
[117] Slovenian Space Strategy p.8.

law at the national level. Slovenian space capabilities relate to a number of segments, such as in the development of satellite systems including telecommunications and radio technologies as well as Industry 4.0[118] technologies for data processing. In addition, within the Slovenian space ecosystem, there are actors demonstrating capabilities in the development of equipment for ground infrastructure or ground stations.[119]

1.4.3.6. A conceptual framework of space activities in the Slovak Republic and the Slovak space strategy 2030+

The Slovak Conceptual Framework of Space Activities for years 2020+ covers two main aspects where the long-term time horizon is based on defining the country as "successfully established quality supplier of solution in the field of space activities on both the European and worldwide level". Slovakia has already several achievements in the field of space activities namely Slovak cosmonaut: Ivan Bella, 199; participation in ESA Rosetta Mission as well as its own satellite launched in 2017 – the project "skCUBE: the civic society SOSA. Responsibility for space activities is distributed among 10 ministries i. e.:The Ministry of Transport and Construction of the Slovak Republic (Galileo/EGNOS, Public Regulated Service), The Ministry of Education, Science, Research and Sport of the Slovak Republic (cooperation with the ESA and implementation of the PECS program), The Ministry of Interior of the Slovak Republic (national level: the agenda of the GovSatCom program), Ministry of Foreign and European Affairs of the Slovak Republic (international security, political and legal aspects of the use of outer space), Ministry of the Environment of the Slovak Republic (national level: Copernicus Program) Commission for Space Activities (made up of representatives from different ministers) in the Slovak Republic as established by the Ministry of Education, Science, Research and Sport. For the purposes of the aforementioned skCUBE Satellite, a temporary register was created at the Ministry of Education, Science, Research and Sport. According to the Slovakian conceptual framework:

> "Ministry of Foreign and European Affairs of the Slovak Republic provides the platform and initiates preparation of Slovak space legislation in cooperation with Ministry of Transport and Construction of the Slovak Republic Ministry of Economy of

[118] Slovenian Space Strategy, p.1.
[119] Slovenian Space Strategy, p.5.

the Slovak Republic and Ministry of Education, Science, Research and Sport of the Slovak Republic."[120]

Nevertheless The Slovak Space Strategy 2030+ was published recently i.e. February 2025, this strategy is centered around couple of visions dedicated to the Slovak space activities development, namely in terms of research and education, services for state population and administration, development of space industry as well as popularization of space activities and security and defence dimension. This strategy was developed mainly by the Ministry of Education, Research, Development and Youth of Slovak Republic, however as the space activities in Slovak Republic fall within the remit of several ministries, often simultaneously, thus several of them contributed to the preparation of the strategy. This strategy outlined work on national space legislation, which was ultimately implemented in January 2025. A separate section of this analysis is devoted to Slovak space legislation.[121]

1.5. Conclusions

The aspects of business law and its impact on the economy raised in the first chapter were not insignificant, especially in the context of the steering and stabilizing or development function. The overriding goal of national space legislation should be to fulfill the international obligations imposed by the international space treaties enacted during the Cold War years and still used today as the foundation of space activities. Among the main obligations that countries ratifying the treaties have committed themselves to are authorization and continual supervision of space activities, registration of space objects at the level of a national registry, and regulation of liability for damage caused by space objects.

This is nothing more than the introduction of regulations with a steering function, i.e. on licensing and authorization of space activities, norms and standards for the safety of space activities and liability associated with minimizing the risks that are associated with such activities. The system of authorization of space activities serves to ensure not only national security, but also internationally, by carefully selecting entities that meet the conditions that can ensure such safety and minimize the risks that are associated with space activities. Norms and Standards, which are often technical in nature, require operators to follow internationally developed best practices, which also contribute to the safety of space activities by reducing excessive orbital congestion, implementing collision avoidance or safe deorbit procedures (controlled or uncontrolled). This also involves mitigate space debris and contributing to the sustainability of space. Liability regulations, on the other hand, perform a steering function after

[120] A conceptual framework of space activities in the Slovak Republic. Available at: https://slovak.space/wp-content/uploads/2019/07/Koncepcia-FINAL-AJ.pdf (Accessed:24.04.2024).
[121] Slovak Space Startegy 2030+ Available at: https://slovak.space/wp-content/uploads/2025/02/Slovak-Space-Strategy-2030_.pdf p.23(Accessed:30.08.2025).

through a system of obligations and sanctions to enforce legal and financial consequences for damage caused by space activities. The detailed conditions for obtaining an authorization for space activities force operators to take a responsible approach to both safety and sustainability, reducing the tendency to take excessively risky actions and thus shaping an appropriate approach to managing such risks.

Efforts to establish legal stability for space stakeholders are evident in the National Space Legislations, striving for predictability despite the inherently advanced and extremely demanding conditions of space operations. The stabilization function, therefore, indicates which activities are covered by the regime of the National Law on Space Activities and which are not ,- clearly indicating the directions and activities that the addressee of the law should undertake. A well-formed law on space activities at the national level should clearly indicate who in the entire chain of space activities is subject to the provisions of the law, and who is excluded from them. Thus, analyzing the regulations at the national level, we are mainly dealing with only a fragment of space activities, which in most cases take place in outer space. The stabilization function also has an impact on long-term decision-making which is an important aspect of space activities based on projects that can take up to a dozen years to complete. This, in turn, translates into the level of investment, which in stable regulations can increase and, with the right regulations and instruments, can encourage investors to invest funds in the space sector.

Business law also serves a crucial development function: to ensure regulations facilitate, rather than obstruct, space activities. National Space Legislation often has among its objectives the support of the domestic space sector, through various types of clauses designed to assist entrepreneurs, scientists and institutions undertaking or already conducting such activities. Regulation focused on the development of space segments, especially those that are strengths of the countries concerned, is important and can contribute precisely to the growth of the domestic space sector.

Nevertheless, there is the other side of regulation, which can be restrictive and, as a result, none of the functions mentioned above, may not be fulfilling their role. This is the case when the process of obtaining an authorization or license is too time-consuming and requires enormous effort from operators, which in turn creates huge barriers to entry. The lack of adequate verification of authorization applications, the disparity in the evaluation of requirements and the pool of experts who should perform such verification requires a responsible approach by the state and demands activities based not only on strict guidelines but a certain degree of freedom, for example, in the context of selecting standards for the relevant

space mission. Nevertheless, it should be borne in mind that despite the high sums insured or the distribution of liability between the State and the operator, these mechanisms serve to safeguard the interests not only of the State but also of the operator, whom such insurance protects and minimizes the risk of insolvency and also guarantees the possibility of continued space activities in the event of damage, which may involve serious consequences not only financial but also legal.

Another aspect addressed in the chapter is the impact of Space Economy on the regulation of space law. In this aspect it must be borne in mind that Space Economy covers a significantly wider range of entities and activities than the space sector itself.Defining the Space Economy is a complex term, yet it's essential to underline all its constituent elements, extending beyond just traditional space activities. Different methodologies exist for this categorization. The OECD Handbook on Measuring the Space Economy, for instance, divides it into three segments: upstream (manufacturing and launch), downstream (services derived from space, e.g., satellite TV), and non-space activities that, while independent, originate from space technologies [122]. In contrast, the Institute for Defence Analyses categorizes the Space Economy into four distinct groups: government expenditures on space, space services (such as those used on Earth or in space), industries supporting space service users, and the space supplier industry [123]. To further clarify these components and illustrate the broader scope of the Space Economy (which, as noted, significantly exceeds the core space sector), a simplified model from the Northern Territory Government can be referenced [124]

[122] OECD, OECD Handbook on Measuring the Space Economy, 2nd Edition. Available at: https://www.oecdilibrary.org/docserver/1b214362- en.pdf?expires=1728641570&id=id&accname=guest&checksum=4AF31BDD226D4A9CC3B1F74E5BDD6DC 5, p. 2;5;20. (Accessed:30.08.2025).

[123] IDA, Measuring the Space Economy: Estimaitng the Value of economic Activities in and for Space. Available at: https://www.ida.org/- /media/feature/publications/m/me/measuring-the-spaceeconomy-estimating-the-value-of-economic-activitiesin-and-for-space/d-10814.ashx (Accessed:30.08.2025).

[124] Government of the Northern Territory (2019), Territory space industry 2020, Available at: https://apo.org.au/node/227241(Accessed:30.08.2025).

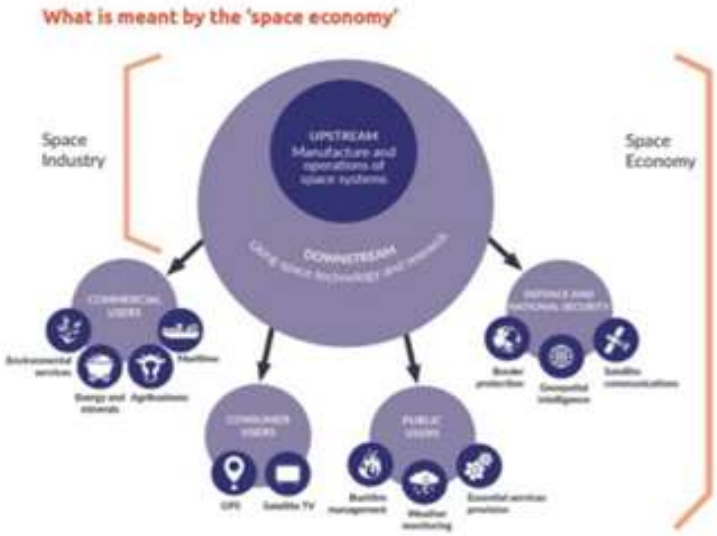

Figure 1.3. Identification of the elements of the Space Economy (Source: *Government of the Northern Territory, Territory space industry 2020*)

In this regard, it is important to keep in mind that the appropriate regulation of space activities, affects a whole range of segments from government expenditures on , space services (such as services generated in space for use on Earth or in space), space service user support industry and space supplier industry. These regulations also affect a wide scope of space stakeholders who extend far beyond operators. Space laws mostly regulate the upstream segment concerning the launch of space objects into orbit , their operation or control in orbit and possible deorbiting (controlled or not). Rarely do they apply to the manufacturing process, and one is unlikely to find regulation of the downstream segment involving the use of data and services from upstream activities.

Upstream	**Downstream**
• Launching • Operating and control of space objects • Eventually manufacturing	• Navigation • Earth Observation • Communication • Miliatry

Table. 1. 2. what space law regulates (upstream) vs. its main areas of application(downstream)

Finally, an important element that determines the direction of development of space activities are space strategies and Programs, that stimulate taking appropriate actions. Paying attention to the strengths of the space sector's side and its shortcomings allows to understand the relationship between the State and the private sector. Visible practices included in space strategies are the promotion of initiatives, international agreements and participation in international forums. Developing human resource capabilities by creating a talent pool and supporting the acquisition of expertise through public support for research and education is a key factor in virtually any

space strategy. Promoting industrial R&D activities as a driver for industrial development and establishing appropriate and long-term funding mechanisms for commercial projects are other elements that can be found in national space strategies.[125] The emphasis on space legislation to encourage sector development and responsible behaviour is increasingly evident in national space strategies"[126], especially in the countries of the CEE Region who are willing or are in the process of drafting national space legislation and its implementation.

Chapter 2. International legal landscape of space sector

2.1.Introduction

During the Space Race and the height of the Cold War, space capabilities were absorbed by two states as an expression of demonstration technological predominance and aspirations for space exploration. *Corpus Iuris Spatialis* created decades ago, were in line with the realities in space exploration, created and directed by United States and the Union of Soviet Socialist Republics. On the backdrop of international space law, that is the Outer Space Treaty, the Rescue Agreement, the Liability Convention, the Registration Convention and the Moon Agreement, the relations between states have been shaped while excluding private entities as addressees of the norms of space law, whose presence in space was rather impossible. As Pershing stressed out: "Private individuals and corporations were not mentioned in the Treaty, likely not because they were purposefully excluded, but rather because the drafters at the time had no reason to imagine a need to extend the application of the Treaty to such parties. The Treaty was drafted under the assumption that States would be the only actors in space. Indeed, given the technological capabilities at the time, launching a human being into space required the full support of an entire nation—it would have been very near impossible for a private company to marshal the necessary resources to accomplish something similar on its own."[127] In the 21st

[125] Knittel Kommel, R., Peter, A., Puig-Hall, M. and Riesbeck, L. (2020) *Exploring Insights from Emerging Space Agencies*. Washington D.C.: The George Washington University, Elliott School of International Affairs, for CSIS Aerospace Security Project. Available at: https://aerospace.csis.org/wp-content/uploads/2020/10/2020_GWU_ExploringInsights_FINAL_2nd-Edits-101920-compressed.pdf (Accessed:30.08.2025).

[126] Hopej, K. and Malinowska, K. (2023) 'Economic Implications of National Space Legislations. Development Support Clauses as a Lever for Indigenous Sector', 74th International Astronautical Congress, Baku, Azerbaijan, 2-6 October. Paper ID: 78218.

[127] Pershing,A.D. Interpreting the Outer Space Treaty's NonAppropriation Principle: Customary International Law from 1967 to Today: 7: Available at: https://openyls.law.yale.edu/bitstream/handle/20.500.13051/6733/Pershing.pdf?sequence=2 (Accessed: 30.08.2025).

century, the space discourse has changed and increasing number of states across the globe are expanding their space capabilities."[128]

Therefore the current space sector has witnessed a significant expansion, with an increasing number of emerging states integrating space infrastructure into their strategic plans. In the era of New Space the commercial space industry is having an increasing impact on the functioning of the global space ecosystem. New business services with commercialisation potential have emerged. This change is certainly influenced by growing commercialisation and cost reduction associated with, deployment of megaconstellations, launching services, the development of new technologies (such as in-space manufacturing or on orbit servicing as well as introduction of new applications from micro- and nano satellites constellations as well as)[129] and many more. This state of affairs has a definite impact on the current international discussion on space law.

The development of space law at international level started with the adoption of the Declaration of Legal Principles[130] and five aforementioned space treaties between 1967 and 1979. The following stage involved declarations and legal principles from the 80s and 90s such as Broadcasting Principles from 1982[131], Remote Sensing Principles from 1986 [132], Nuclear Power Sources Principles from 1992[133], as well as 1996 Benefits Declaration.[134] The newest period concerns, mostly provisions of a guideline nature as well as technical aspects related to space activities, based on UN COPUOS Resolutions and various Guidelines, which takes rather the form of so-called “soft law” instruments.[135]

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[128] Ibidem.
[129] OECD (2023, p.7).
[130] Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space General Assembly resolution 1962 (XVIII) of 13 December 1963.
[131] The 1982 Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting.
[132] The Principles Relating to Remote Sensing of the Earth from Outer Space General Assembly resolution 41/65 of 3 December 1986.
[133] The Principles Relevant to the Use of Nuclear Power Sources in Outer Space General Assembly resolution 47/68 of 14 December 1992.
[134] The Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries General Assembly resolution 51/122 of 13 December 1996.
The Rule of Law in Outer Space: The Effects of Treaties and Nonbinding Agreements on International Space Law Brian Wessel:7.
[135] These resolutions include: International Cooperation in the Peaceful Uses of Outer Space (A/RES/5/122 2000); Application of the concept of the "launching State" (A/RES/9/115); Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects (A/RES/62/101); Recommendations on national legislation relevant to the peaceful exploration and use of outer space (A/RES/688/74); Safety Framework for Nuclear Power Source Applications in Outer Space(A/AC.105/934); Space Debris Mitigations Guidelines of the Committee on the Peaceful Uses of Outer Space (ST/SPACE/49); Declaration on the fiftieth anniversary of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (A/RES/72/78) .

From the international perspective, instruments describes above form a diverse regulatory framework of binding and non-binding nature, have been implemented due to the growing possibilities for outer space utilization and the consequences that this entails. Nevertheless, despite its nascent stage, the field of space law was already emerging in the 1930s. Due to the subject of the dissertation focused around Central and Eastern European Region, particular attention is focused on two key pioneers in space law from this region: Czech lawyer Vladimír Mandl (1899-1941) and Polish lawyer Manfred Lachs (1914-1993), whose significant contribution were crucial in development of the doctrine[136] and in shaping the later foundations of international space law in the global perspective.

This chapter describes the concept of international space law, its formation and development as well as historical background on the basis of the five space treaties. Particular focus is especially oriented towards the last element which is connected to *rationale* of the treaties formation. In relation to space law formation the reasons for the involvement of the UN COPUOS in the work of international space law, rather than the International Legal Committee (ILC), are of great importance, as the Author explains in this dissertation. However, the treaties will not be interpreted, neither analysed in depth, due to the numerous studies that have already been elaborated in this area. Rather, this analysis seeks to identify elements that met the needs of the so-called *Old Space Era* at the time, in order to compare them with the current necessities of space stakeholders. This is particularly relevant in the context of the space stakeholders, who currently represent a diverse range of actors compared to the formative period of international space law.

The objective of this chapter is to verify to what extent the internationally adopted regulations in the *Old Space Era* are reflected in the current environment of space activities i.e. in the *New Space Era*. On the basis of international space treaties, the author selects a number of legal issues that are emerging in the space sector of XXI century and which require appropriate action from the legislative perspective . The author additionally identifies gaps, the filling of which is important for the shaping of the national space law system nowadays.

2.2. The relevance of international space law in New Space Era

*"*It is impossible to plan economic, political, and social behaviour if one cannot know what rules apply to one's conduct or if one has no assurance that the rules will not be changed

[136] Kopal, V. and Hofmann, M. (2013) 'Vladimír Mandl (20.3.1899 – 8.1.1941)', in Hobe, S. (ed.) Pioneers of Space Law: A Publication of the International Institute of Space Law. Leiden; Boston: Martinus Nijhoff Publishers, pp. 56–69.

retroactively"[137]. The states, along with international organizations were the main addressee of the norms contained in the space treaties. In the current New Space Era, the paradigm shift is mainly focused towards non-governmental actors, and private entities are beginning to affect the space ecosystem to an increasing degree. With such intensified endeavours, the international community is realizing that existing international treaties are failing in the current reality.

The international legal framework governing space activities emerged during the Cold War era, a period characterized by intense competition between the two super powers. However, the contemporary space landscape has witnessed a significant expansion, with an increasing number of states developing their space capabilities and integrating space infrastructure into their strategic plans. This diffusion of space activity, while offering numerous benefits, is also accompanied by substantial risks, both for those directly involved in space endeavours and for the broader global community.

It is therefore essential to indicate the legislative aspects and challenges undertaken by international, EU and national legislators to create the most favourable conditions for conducting space activities from the perspective of all stakeholders, not only states but also non-governmental entities including private actors. The relevance of the present issue stems not only from the paradigm shift that occurred in the space sector at the turn of the century, from its duopoly nature, towards commercialization, but also from the awareness of risk and highly hazardous nature of space activities. It is true that the law usually does not keep up with technology. Nevertheless, having learned from experience by introducing appropriate regulations, it is possible to prevent many negative consequences of human interference in space and on the other hand to open the path for the development of many solutions which may be made possible by respective legal landscape .

According to Article I of the Outer Space Treaty *"*The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind" and following the concept of sustainable development in outer space we should preserve it for present and future generations, through maintaining "the conduct of space activities indefinitely into the future in a manner that realizes the objectives of equitable access to the benefits of the exploration and use of outer space for

[137] Wessel, B. (2012) 'The Rule of Law in Outer Space: The Effects of Treaties and Nonbinding Agreements on International Space Law', Hastings International & Comparative Law Review, 35(2), p. 289. Available at: https://repository.uclawsf.edu/hastings_international_comparative_law_review/vol35/iss2/1 (Accessed: 30.08.2025).

peaceful purposes".[138] The cited values derive from both binding international law and non-binding mechanisms, nevertheless, their universality should be reflected in the current activities undertaken by entities involved in the exploration and exploitation of outer space. The international provisions of space law are strict in this respect. Ensuring, in line with the international concept, that space exploration benefits countries regardless of their economic or scientific development is a huge challenge for society.

Given the contemporary trends of *New Space* and the increasing commercialization of the space sector, it is imperative to assess whether existing instruments are adequate to fulfill international commitments. Thus, international as well as national space law plays a crucial role in creating an enabling environment for countries to participate in the global space ecosystem. The development of effective national space legislation requires a comprehensive understanding of the industry's characteristics, encompassing legal, engineering, economic, and investment perspectives. A narrowly focused regulatory framework could disturb technological progress, while an overly broad scope might stifle innovation. The objective of national space law should be to strike a balance between complying with international obligations and addressing the specific needs of domestic space stakeholders. This entails creating an environment that supports the interests of the state, facilitates scientific research, and satisfies the commercial demands of the industry. Otherwise, there is a risk that the law will not reflect the current needs of the sector (which, in the case of outer space, is dynamically evolving), becoming literally useless. This is just a "drop in the ocean" of needs and demands which should be included when considering the regulation of space activities at the national level.[139]

2.3. The classification of space law

The space law ecosystem is made up of five international treaties as a foundation (Outer Space Treaty, Liability Convention, Registration Convention, Rescue Agreement, Moon Agreement), customs and practice of countries, UN General Assembly Resolutions, International Agreements (bilateral and multilateral)[140],UE law (i.e. communication directives) as well as national laws.

[138] Guidelines for the Long Term Sustainability of Outer Space Activities (UN COPUOS LTS Guidelines).
[139] Hopej, K. and Malinowska, K. (2023) 'Economic Implications of National Space Legislations. Development Support Clauses as a Lever for Indigenous Sector', 74th International Astronautical Congress, Baku, Azerbaijan, 2-6 October. Paper ID: 78218.
[140] Such as International Telecommunication Union, International Space Station legal framework.

First of all it need to be stressed out that space law in the general field of international law is recognized as *lex specialis*, as evidenced in particular by Article I[141] and II of the OST. According to Article II:

> " States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding."

Therefore, space law is complemented by international treaties of general application and customary international law. In carrying out space activities, the subject of international space law are bound not only by space law but by general international law including the UN Charter. Other areas of international law (such as international liability or environmental law) may be used to fill in the gaps and inadequacies of space law. *"As lex specialis of international law, space law has its own features. As far as its legal nature is concerned, space law regulates the interests of the international community, thus containing obligations erga omnes.*"[142] Furthermore the "*Resolution 721, of December 20, 1961, set forth the essential legal principles applicable to outer space in an enlightened fashion that has no precedent in any previous age of exploration. One of these principles was that international law, including the Charter of the United Nations, applies to outer space*."[143]

The primary objective of international space law is to guarantee that all States engage in the exploration and use of space, to set the outer limits of space activities and to define broad rules of the field for States that choose to engage in space activities. International space law does not

[141] According to the article I of the Outer Space Treaty: "The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind. Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies. There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation*"*.

[142]The Development of Space Law: Framework, Objectives and Orientations Speech at United Nations/China/APSCO Workshop on Space Law MA Xinmin.

[143] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1967) Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies: analysis and background data: staff report. Washington, D.C.: U.S. Government Printing Office.

impose an obligation on states to have any space programmes or identify specific activities, it only sets a benchmark for those activities.[144]

International aspects of space law are well established and have been in operation for several decades. Nevertheless, with the changing landscape of space activities, the private legal aspects are growing in importance. Thus, the regulation of space activities is not just the domain of international public law but it is an interpenetration of *inter alia* international law with increasingly emerging national space legislations. It must be borne in mind, in particular that, for non-state actors, priority is given to the space law at national level applicable in those states in which (or under whose authority) the non-state actor operates. For these actors, the generally permissible character of space law at the international level is relevant to the extent that the state (where the business is registered or state of citizenship) has not imposed any additional restrictions on space activities.[145]

In the context of the development of international space law (more precisely in relation to the 1963 Declaration of Legal Principles Governing the Activities of State in the Exploration and Use of Outer Space), the Theory of Immediate Customary Law was developed, i.e. the emergence without uniform long-term practice, seen as the second element next to *opinio iuris*- an international customary rule. [146] Generally, there are two premises on which the customary law is built upon. Firstly, there must be an objective, or in other words, material element consisting of the concerted practice of involved entities. Secondly, the belief that this practice creates a law is based on subjective element (*opinion iuris sive necessitais*). Furthermore, although the element of time is not of primary importance, the practice leading to the formation of a custom must be of sufficient duration to be established.[147] In the perspective of space law and its very recent development, can the possibility of shaping custom be considered, if only with regard to a few of elements of space law, taking into account in particular the last factor? According to International Court of Justice and the case regarding the North Sea Continental *Shelf "the passage of only a short period of time is not necessarily, or of itself, a bar to the formation of a new rule of customary international law."*[148] However, the premise of time is countered by other elements considered to have influenced the formation of custom and it is

[144] . Trepczynski, S. (2020) *Rules of the Domain: The Impact of Law on the Evolution of Space Activities and Technologies*, in M. de Zwart and S. Henderson (eds.) Commercial and Military Uses of Outer Space. Sydney, NSW: The Federation Press, pp. 54-80.
[145] Ibidem .
[146] The applicable accountability law: Responsibility and Liability Distinguished, Chapter 2 Studies in Space Law
[147] Trzciński, K. (1998) *Zwyczaj i prawo zwyczajowe jako źródła prawa prywatnego* (Custom and customary law as sources of private law), *Rejent*, 8(3), pp. 3–9.
[148] North Sea Continental Shelf, p. 43, para. 74.

from their angle that the question of the formation of customary law in relation to space law is analysed. These potential elements include decisions of national courts and international tribunals, treaties, national legislation, opinions of national legal advisors, diplomatic correspondence and the practice of international organizations.[149] When it comes to space law, elements of the formation of customary law are clearly visible in the non-appropriation principle. According to Pershing: ”Despite an original broad interpretation of the non-appropriation principle during the Treaty’s drafting, customary international law has since carved out an exception to this principle for extracted space resources. A second shift could be similarly underway. Driven by economic incentives, States may reinterpret the non-appropriation principle to allow for private appropriation of space property.” Furthermore, even in the domestic space law, on the example of United States Regulations provides evidence surrounding the issue of non-appropriation principle, of the shift in customary law, as it relates to extracted space resources.[150]

The issue of space delimitation should also be considered in view of distinguish between space law and air law. “With regard to these special travels of astronautics, the independence of the law of outer space even with regard to air law must be stated (also at present one must start to a certain extent from the provisions of the air law). […] And if the air law applies to space travel only according to the text of the law, then it is immediately obvious that the legal problems of space travel as a whole cannot be include in any existing area of the law and that, at present, there is no law to regulate legal problems of space travel. The most extensive analysis of the existing legal principles would never lead to the desired purpose, to a legal regulation of space travel, so that we must take refuge in analogy.”[151] Although almost a century has passed since this statement expressed by Professor Mandl, some elements are still relevant today, such as the issue of space delimitation. In the Ad Hoc Committee Report, the issue of space delimitation was additionally raised in the context of liability regulation, but this was not reflected in any of the five space treaties, and consensus on this issue has not been reached to date at international level. The term "outer space", frequently used in all documents and treaties

[149] International Law Commission (1950) 'Ways and Means of Making the Evidence of Customary International Law More Readily Available', Report of the International Law Commission to the General Assembly (Part II), U.N. Doc. A/1316 I, Yearbook of the International Law Commission, pp. 367–372.
[150] Ibidem.
[151] Outer Space Law: A Problem Of Astronautics Vladimir Mandl Translation of "Das Weltraum-Recht. Ein Problem der Raumfahrt," J. Bensheimer Verlag, Mannheim, Berlin, Leipzig (Germany), 932, pp. 1-48:23 Available at: https://ntrs.nasa.gov/api/citations/19850008388/downloads/19850008388.pdf. (Accessed: 30.08.2025)

concerning space activities, has never been defined by them.[152] There is no legal definition of the outer space in international law. Despite the fact that in practice it is known more or less where the space area begins, agreement on a recommended interpretation of the concepts of delimitation of airspace versus space, not to mention the adoption of a legally binding definition, has ended in failure. It is also worth noting the unresolved issue of recognizing the right to fly a space object of one country, through the territory of other countries in order to return to Earth or reach orbit. International customary law has also not been formed in this regard.[153] This matter is unresolved at international level, but some states in their national space legislation have made an attempt to regulate at least the delimitation of outer space, which may in some ways facilitate the legal interpretation and simplify possible disputes on this matter. The relevance of such demarcation is questioned, due to the nuisances for certain activities, for example in the airspace. Nevertheless, even though consensus at international level has not yet been reached in order to avoid legal ambiguity, some opinions are in favour of designating precise line.[154] A commonly accepted measure of space "demarcation" is the so-called Kármán Line which lies at an altitude of 100 km above sea level. Several countries have introduced such delimitation in their legislation, such as Kazakhstan, Australia, Denmark and recently – Slovakia from the CEE Region.

2.4. The formation of international space law

While the field of space law has been enriched by numerous pioneering contributions[155], particular attention should be directed towards the two important figures, namely Professor Mandl and Professor Lachs. One of the first attempts of a conceptualization of space law can be tracked back to the work of Czech lawyer Professor Vladimir Mandl in the 1930s. Mandl, a legal scholar with an interest in both law and engineering, conducted a comprehensive survey of the emerging legal landscape of space exploration. His early work, which focused on civil law and air law, laid the groundwork for his later contributions to the development of space

[152] Vereshchetin, V.S. (2006) 'Outer Space', in *Max Planck Encyclopedia of International Law*. Available at: https://opil.ouplaw.com/display/10.1093/law:epil/9780199231690/law-9780199231690-e1202?rskey=WhUdlf&result=2&prd=EPIL.

[153] United Nations (2003) Proceedings of the United Nations/International Institute of Air and Space Law Workshop on Capacity Building in Space Law, The Hague, Netherlands, 18-21 November 2002. ST/SPACE/14. Vienna: United Nations Office for Outer Space Affairs. Available at: https://www.unoosa.org/oosa/oosadoc/data/documents/2003/stspace/stspace14_0.html (Accessed:30.08.2025)

[154] European Space Policy Institute (2017) Delimitation of Outer Space https://www.espi.or.at/briefs/delimitation-of-outer-space/ .(Accessed:30.08.2025).

[155] from the 19th century onwards and the work of Alexa Mayera, Eugène Pépin, John Cobb Cooper, Jr. See in: Pioneers of Space Law .

law.[156] In 1932 Mandl received doctorate at the Erlangen University defending a dissertation entitled "civil structure of tort law". Shortly afterwards his attention turned to technological innovations propagandize by rockets experimentalists.[157] Inspired by publications in this area, in 1932 he issued two analyses, namely; *Outer Space Law: A problem of Astronautics* [158] and *The legal problems of space activities.*[159] Mandl's pioneering efforts established the direction of the future of space legislations. The first study advocated the creation of space law, through; *"For all problems of astronautics, the qualities of this outer space must be defined, whose dimensions, contents, temperature and suchlike are distinguished in the same way as the properties of sea or maritime navigation, and those of the air for aeronautics. Therefore, we consider it necessary to establish, besides maritime and air law, a law for outer space"*. [160]

Accordingly, the author considered many aspects that underpinned international space law. In these deliberations, he highlighted such elements as: an attempt to define the outer space[161], the identification of damage caused by a spacecraft and liability[162] to a third party on person and property as well as compulsory liability insurance.[163] Furthermore, he incorporated references to preventive measures *("the space traveler is committed to every general obligation to take precautions, whose nonfulfillment could result in punishable consequences by virtue of a penal code"*)[164] as well as the aspects of environmental protection[165]. In addition, the analysis

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[156] Mandl (1984).
[157] Kopal and Hofmann (2013).
[158] Translation of "Das Weltraum-Recht. Ein Problem der Raumfahrt," J. Bensheimer Verlag, Mannheim, Berlin, Leipzig (Germany), 1932, pp. 1-48 According to the abstract: "This paper discusses the theory of space law, primarily from the point of view of similarities and differences between hypothetical space law and current (1932) aviation law; international legal aspects are also discussed. Available at: https://ntrs.nasa.gov/api/citations/19850008388/downloads/19850008388.pdf (Accesed:30.08.2025).
[159] Kopal and Hofmann (2013).
[160] Mandl (1984)
[161] In designating) the corresponding branch of law, on the other hand, we wish to maintain the more exact term "outer (space", to define clearly the object, travels in outer space, as y compared with other legal space problems, for example those of n aeronautics, radio, or any other "laws on space", Mandl (1984), p. 5.
[162] "Accordingly we must consider that the space traveler should provide compensation for all damages caused to third parties through the operation of the space vehicle, that is through the legal astronautical disposal of the vehicle, without regard to his guilt, and !12 that at most he may argue the guilt of the victim Mandl (1984)," p.15
[163]" it does not need to be mentioned particularly that space mission contractors must be liable to third parties, that is except for the members of the space mission and all members of the enterprise, for all bodily and material damages, without regard to their own guilt, that this liability cannot be limited by maximum amounts and that the liability must be insured by means of compulsory liability insurance, by depositing money or securities and suchlike."
[164] "Before takeoff, the material (the spacecraft and the ground devices) and personnel must be checked to make sure that both satisfy the required qualifications, while the regulations regarding testing and approval of aircraft as well as pilot or aero- /14 nautical personnel do not come into question; each astronautic company must judge at its own risk whether the instruments and the crew have the necessary qualifications so that their use would not justify the claim of negligence and in case of need it could claim immunity from criminal prosecution. Mandl (1984)," p. 6.
[165] With regard to the intense influence on the environment of the take off site […] the approval of an astronautic experiment, a launch site, etc. ,would have to be preceded by a thorough establishment of all the decisive circumstances.

addresses intellectual property rights[166], the question of sovereignty as well as space demarcation. According to the author *"The international law today is made as we know very generally on the fact that each country has territorial sovereignty over the zone lying above the country's territory, without imposing if possible, maximum limit; but the country's sovereignty must have some limit in space, it cannot extent to infinity. But at what distance from the ground would this limit lie?."*[167]

This comprehensive legal analysis of space activities, constitutes the attempt made to investigate the legal aspects associated with space exploration. Despite its reliance on initial technological capabilities, or even nascent ones, it contains elements visible in current *Corpus Iuris Spatialis*, which only proves that his ideas were reflected in the current regime of international space law.[168]

The idea of shaping a framework of space law at the international level was initiated by the economic and political situation during the Cold War, especially in the 1950s. The origins of the space race however are linked to nuclear arms race between two superpowers US and USSR as a consequence of the Second World War[169] and its peak includes the moon landing in 1969 and moon race itself, which involved both nation-states.[170] With the launch of the USSR's first artificial satellite, Sputnik-1[171], in 1957, which marked the beginning of the space age, the international community realized the significance of this event for the technological and military race on a global scale. At the same time, it was an awakening for the international law community. One year later, in 1958 following the USRR, U.S. Explorer-1[172] satellite was placed into orbit which clearly highlighted the huge capabilities in space technologies of both states.

After launching the first artificial satellite in orbit by Soviet Union, in 1958 President D. Eisenhower, in the Letter to Bulgarin[173], said: „I propose that we agree that outer space should be used only for peaceful purposes. We face a decisive moment in history in relation to

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[166] "In order that the inventor's rights to a spacecraft design should be used properly, as we stated above, this benefit is usually a nonmaterial, nonprofit one, and extension of the patent law protection period could also be recommended; since from the time of the experiments until the first flight of the spacecraft, considerable time will elapse and the inventor must make his intentions public early for the purpose of obtaining financial funds and for the purpose of official approval". Mandl (1984), p. 5.

[167] Mandl (1984).

[168] Kopal and Hofmann (2013,p.62).

[169] From the end of the Second World War until the early 1990s, the United States and the Soviet Union pursued nuclear superiority intensively during the Cold War.

[170] Wikipedia (n.d.) Space Race. Available at: https://en.wikipedia.org/wiki/Space_Race

[171] Earth's first artificial satellite. Launched by the USSR on 4 October 1957.

[172] First US satellite to carry sciences instruments.

[173] Letter to Nikolai Bulganin, Chairman, Council of Ministers, U.S.S.R. Released January 13, 1958. Dated January 12, 1958 See in: Eisenhower, D.D. (1958) Letter to Nikolai Bulganin, Chairman of the Council of Ministers, USSR, 12 January. Available at: https://www.presidency.ucsb.edu/documents/letter-nikolai-bulganin-chairman-council-ministers-ussr.(Accessed:30.08.2025)

this matter. Both the Soviet Union and the United States are now using outer space for the testing of missiles designed for military purposes. The time to stop is now."[174]. In the same year he signed the National Aeronautics and Space Act which established the National Aeronautics and Space Administration (NASA). Less than one decade later his words have been reflected in the provisions of the Outer Space Treaty which came into force in 1967 according to which *„The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden."*[175]

In the formative era of space law, Professor Manfred Lachs's work on space law was instrumental. As a renowned international lawyer, Judge and President of the International Court of Justice, Manfred Lachs' contribution to the shaping of international space law has been invaluable due to several reasons. One of these was the contribution he made to the work of the United Nations' Committee on the Peaceful Uses of Outer Space.

Manfred Lachs devoted considerable attention to the development of the canon of international space law in works such as the following; 1966 Przestrzeń kosmiczna – nowy wymiar prawa międzynarodowego (*ang. Space - a new dimension in international law*); Some reflections on the State of the Law of Outer Space (1981), The law of Outer Space. An Experience in Contemporary Law-Making (1972) or Tendencje rozwojowe prawa kosmicznego (1978) (*eng. Development trends in space law*)

2.4.1. Outer Space Treaty

International Space Law as relatively young field of international space law is based on the fundamental document - *"It is safe to say that the Outer Space Treaty is the touchstone and source of legitimacy for all other international space law."*[176] *Rationale* behind the great success of the treaty, with 115 member states joining it and 23 more signing[177] it was various and exceptionally complex. The essence of treaty interpretation is based on several considerations, where the economic or historical background is of minor importance according to the Vienna Convention of the Law of the Treaties.[178] Nevertheless, the process by which such a treaty was negotiated is essential, in order to understand the implications of their implementation.

[174] Ibidem.
[175] Article IV Outer Space Treaty.
[176] Walker A. Smith, Using the Artemis Accords to Build Customary International Law: A Vision for a U.S.-Centric Good Governance Regime in Outer Space, 86 J. AIR L. & COM. 661 (2021): 668.
[177] Not yet ratified.
[178] Hobe, S., Schmidt-Tedd, J. and Schrogl, K. (eds) (2010) 'Outer Space Treaty', in Hobe, S., Schmidt-Tedd, J. and Schrogl, K. (eds) Cologne Commentary on Space Law. Carl Heymanns Verlag, Köln, 2010. p.107.

To verify the current, worldwide trend for National Space Legislations, it is important to point out the indicators underpinning the emergence of space law at international level. Conductive to distinguish these indicators, the negotiating process of the Outer Space Treaty which was based on the work of United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS)[179], is crucial. In 1958, the Ad Hoc Committee on the Peaceful Uses of Outer Space was established by the Resolution 1348 (XIII) December 13, 1958,[180] following the launch of the first artificial satellite Sputnik-1 and, a year later, Explorer 1. The ad hoc committee was set up to manage the exploration and use of outer space for the benefit of all mankind, i.e. for peace, security and development. The main activities of COPUOS have included, and continue to include, exploring space-related activities that could be undertaken by the UN, reviewing international cooperation in the peaceful uses of space, and investigating legal issues arising from space exploration and encouraging exploration programmes. The Committee serves as a forum for the development of international space law and its work has produced five international space treaties and sets of principles for space-related activities.[181]

In parallel with the work on legislation within the works of UN COPUOS, various discussions on the scope of cooperation between two space powers took place. It is worth mentioning at this point an example of a document that outlines the form of cooperation entitled "Draft Proposals for US-USSR Space Cooperation" from 1961. This Proposal aimed to establish cooperation in space exploration, rather than competitiveness and intended to reduce Cold War tensions by "maximizing acceptability by the USSR, and minimizing the potential for misunderstanding and obstructionism which must be recognized to exist in any joint program with the Soviet Union."[182] This proposal was divided into 3 categories of cooperation concerning; 1) ground facilities for mutual services; 2) equitable participation of the US and USSR in the coordinated launch of experimental satellites (such as meteorological satellites) and other fields than meteorology (i.e. communications satellites) as well as 3) coordinated and

[179] The ad hoc Committee on the Peaceful Uses of Outer Space (COPUOS), was created in 1959 by the General Assembly in resolution 1348 (XIII).
[180] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1967) *Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies: analysis and background data: staff report*. Washington, D.C.: U.S. Government Printing Office.
[181] UNOOSA (United Nations Office for Outer Space Affairs) (2025) History of COPUOS, 16 May. Available at: https://www.unoosa.org/oosa/en/ourwork/copuos/history.html (Accessed: 30.08.2025)
[182] Document 1-36 Document title: "Draft Proposals for US-USSR Space Cooperation," April 4,1961. Source: NASA Historical Reference Collection, NASA History Office, NASA Headquarters, Washington, D.C. NASA SP4407 EXPLORING THE UNKNOWN Selected Documents in the History of the US. Civilian Space Program Volume 11: External Relationships John M. Logsdon, Editor with Dwayne A. Day and Roger D. Launius.

simultaneous rocket launchings[183] and exploration of celestial bodies which fell within the third category. These field of cooperation has been proposed on the basis of an expanding US space science and exploration programme, but without prejudice to assistance to the free world and the continuation of joint ventures.[184]

On the basis of the negotiations that occurred later, during the XVI session of the Committee, some of the crucial provisions were proposed. The most important one concerned the principles of freedom of use of outer space and its non-appropriation, in its initial form "outer space and celestial bodies are free for exploration and use by all States in conformity with international law, and are not subject to national appropriation".[185] It is worth emphasising that despite the Soviet Union being the first to send an artificial satellite into orbit, they did not claim any right to sovereignty.[186] Part of the wording of the preamble that was implemented into the final version of the Outer Space Treaty, has been also proposed under the United Nation General Assembly Resolution 1721 (XVI).

Furthermore the registration aspects were subject to the deliberations and no less important, was the emphasis on the establishment of UN as focal point for international cooperation when it comes to space activities. A milestone in the negotiations was achieved in 1963 when the General Assembly approved 1962 (XVIII). Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space (Declaration of Legal Principles),[187] as well as Resolution 1963 (XVIII) on International-cooperation in the peaceful uses of outer space.[188][189] Following the submission of two proposals from the US and the USSR to the Legal Sub-Committee at its second session, on November 22nd 1963 unanimously decided to submit to General Assembly the draft declaration. This draft contained aspects on authorization and supervision, registration of space objects, international responsibility of States "for national activities in outer space, whether carried on by

[183] *from a number of stations covering a wide range of latitudes and longitudes would for the first time provide a global picture of the properties of the atmosphere at a given instant of time, if conducted on a scale greater than now done during International Rocket Weeks*
[184] Ibidem.
[185] United Nations. Committee on the Peaceful Uses of Outer Space (1973) Report of the Committee on the Peaceful Uses of Outer Space (16th Session). A/9020. New York: United Nations.
[186] Dembling, P.G. and Arons, D.M. (1967) 'The Evolution of the Outer Space Treaty', Journal of Air Law and Commerce, 33, pp. 419–456.
[187] United Nations General Assembly (1963) Resolution 1962 (XVIII). Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, 13 December. Available at: https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/legal-principles.html
[188] Declaration of International Co-operation in the peaceful uses of outer space 1963. Available at: https://www.unoosa.org/pdf/gares/ARES_18_1963E.pdf. (Accessed:30.05.2025)
[189] Simsarian, J. (1963) 'Outer Space Co-Operation in the United Nations in 1963', American Journal of International Law, 57(4), pp. 854–867.Available at: https://www.jstor.org/stable/2196668. (Accessed:30.05.2025)

governmental agencies or by non-governmental entities"[190], liability for damage on person and property, the principal of cooperation and mutual assistance, as well as the principle of treating astronauts as envoys of mankind. During fifth session of COPUOS in 1966 the agreement was reached on nine principles[191]. Although there were some aspects, for which reasons the proceedings of Legal Subcommittee were suspended and postponed to a later date. Issues of contention included, inter alia, the question of mandatory or voluntary nature of reporting space activities on celestial bodies, the status of international organizations (namely should the space activities conducted by them have the same status as sovereign state), the relationship between the provision of Outer Space Treaty and future agreements on the law of outer space, and others.[192] The further process of negotiation led to the agreement on the first Treaty governing activities in outer space, among the states adhering to widely disparate political philosophies, often in conflict with each other.[193]

The cornerstone of international cooperation in the development of this Treaty was a shared recognition of the potential risks arising from misunderstandings and disagreements among the negotiating parties. The significance of political tensions cannot be overlooked as expressed in the following statement: "The negotiation of an outer space treaty is the latest in a series of steps taken in accordance with the continuing policy of the United States to reduce international tensions and secure world peace."[194] The consensus reached on the Outer Space Treaty was the first and virtually the only such huge accomplishment in the negotiation of aspects of space activities on a global scale, placing it alongside success stories such as the

[190]Resolution adopted by the general assembly 1962 (XVIII). Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space Available at: https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/legal-principles.html.(Accessed:30.08.2025).

[191] "concerning outer space, the moon and other celestial bodies for the benefit of all countries, the principle of non-appropriation, application of International law (including UN Charter), jurisdiction and control of the space objects by launching State, international liability the prohibition of placing in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction , regarding astronaut as envoys of mankind and international responsibility for national space activities of government agencies, nongovernmental entities, and international organizations of which they are members and the last principle concerning avoidance of harmful contamination of the earth and interference with the space activities of other states". See in : United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1967) Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies: analysis and background data: staff report. Washington, D.C.: U.S. Government Printing Office.p.9, 10

[192] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1967, p. 10).

[193] Dembling, P.G. and Arons, D.M. (1967) 'The Evolution of the Outer Space Treaty', Journal of Air Law and Commerce,33,pp.419–456.p.42Availableat:https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1002&context=spacelawdocs. (Accessed: 40.08.2025)

[194] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1967, p. 8).

Treaty of Antarctica of 1958[195] and the Limited Test Ban Treaty from 1963.[196] The success of this treaty, was decisively influenced by concerns about the consequences of the super powers gaining legal basis to appropriate space and celestial bodies from which there was a risk of launching nuclear weapons. Therefore, the treaty was designed to prevent such danger.[197]

The consensus reached under the Outer Space Treaty was undoubtedly an achievement on an international scale. In the current reality facing space actors, reaching such a consensus seems unlikely, especially from the perspective of the global tensions and interests involved in space exploration and the development of state-of-the-art technology in this connection. Hence, there is a noticeable trend towards the introduction of instruments of a non-legally binding nature in the form of resolutions or technical standards, which in the case of the latter often serve as a reference in National Space Legislations. Another mechanism that is becoming increasingly important is the creation of agreements such as Artemis Accords, which are a form of cooperation expressed in common directions and assumptions related to space exploration.[198]

2.4.2. Rescue Agreement

The possibility of manned spaceflight was considered in the space race from the very beginning. The main space powers were aware of the importance of protecting their own interests in this aspect. The idea of regulating this issue came up in 1959 during the ad hoc Committee on the Peaceful Uses of Outer Space. The perspective of being able to send a man into space became a reality when Soviet cosmonaut and military pilot Yuri Gagarin became the first man in history to circle the Earth in space on 12 April 1961.[199] In 1962, the space powers, through the exchange of letters, agreed for further legal codification at international level in this regard, thereby providing a basis for further negotiations.[200] The consideration of this aspect begun in June 1967, within the Legal Subcommittee. Two working groups were created to work on the texts of the agreements on assistance and liability. The UN Resolution 2345 (XXII) was adopted by General Assembly on December 1967.[201]The Rescue Agreement, which was negotiated

[195] As of 2024, there are 58 states party to the treaty.
[196] The 1963 Limited Test Ban Treaty, also known as the Partial Nuclear Test Ban Treaty (PTBT), has 125 state parties.
[197]Smith, W.A. (2021) 'Using the Artemis Accords to Build Customary International Law: A Vision for a U.S.-Centric Good Governance Regime in Outer Space', Journal of Air Law and Commerce, 86, pp. 661–668.
[198] China's ILRS the International Lunar Research Station (ILRS), developed in partnership with Russia
[200] Sleeping Beauty/ Proceedings: United Nations/International Institute of Air and Space Law Workshop on Capacity Builidng in Space Law 2003 page 59 https://www.unoosa.org/pdf/publications/st_space_14E.pdf
[201] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1968) Agreement on the Rescue of Astronauts, the return of Astronauts and the return of Objects Launched into outer Space: analysis and background data: staff report. Washington, D.C.: U.S. Government Printing Office.

between 1962 and 1967, actually expands on two articles contained in the Outer Space Treaty, namely: Articles V and VIII.[202] Article V imposes an obligation on states to protect astronauts as envoys of mankind in outer space.[203] The second perspective concerns the protection of space objects, which is expressed in Article VIII of the OST:

> "[…] Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return."

It would appear that in this case the treaty was intended to satisfy the interests of only two powers capable of sending humans into space, whereas the introduction of the provision on space objects meant that other states were also able to develop launch capabilities. Moreover, through the definition of "launching authority" contained in article 6[204] of the Rescue Agreement, intergovernmental organisations have gained in importance from a formal perspective in the space environment, where this was rather uncommon in international law.[205] The Rescue Agreement, thus plays an indispensable role as it protects not only the non-space powers but also all States involved in conducting space activities.[206]

In the New Space Era, the missions of astronauts, cosmonauts or taikonauts are still predominantly present, nevertheless it need to be born in mind that there is visible trend

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[202] Rescue Agreement.
[203] Additionally According to article V of the Outer Space Treaty, regarding this issue, provides that "In carrying on activities in outer space and on celestial bodies, the astronauts of one State Party shall render all possible assistance to the astronauts of other States Parties. States Parties to the Treaty shall immediately inform the other States Parties to the Treaty or the Secretary-General of the United Nations of any phenomena they discover in outer space, including the moon and other celestial bodies, which could constitute a danger to the life or health of astronauts."
[204] According to Article 6 of the Rescue Agreement: "For the purposes of this Agreement, the term "launching authority" shall refer to the State responsible for launching, or, where an international intergovernmental organization is responsible for launching, that organization, provided that organization declares its acceptance of the rights and obligations provided for in this Agreement and a majority of the States members of that organization are Contracting Parties to this Agreement and to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.
[205] "For the purposes of this Agreement, the term "launching authority" shall refer to the State responsible for launching, or, where an international intergovernmental organization is responsible for launching, that organization, provided that organization declares its acceptance of the rights and obligations provided for in this Agreement and a majority of the States members of that organization are Contracting Parties to this Agreement and to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies."
[206] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1968)

emerging towards the commercialisation of space flight, and thus the emergence of a new category of space and suborbital flights, involving not only trained scientists and engineers but increasingly - space tourists. In addition, the issues related to space objects are of great importance, from the perspective of, for example, space debris, in view of their increasing number and the dangers associated with them, and consequently the development of increasingly sophisticated technology to remove them. However, there are further legal challenges associated with this aspect, which relate, inter alia, to the article VIII of the OST cited above.

2.4.3. Liability Convention

As early as 1959, the Ad Hoc Committee on the Peaceful Uses of Outer Space raised questions about regulating liability for damage caused by the space objects. Concerns included the question of the type of conduct giving rise to liability (fault-based or not), the type of interest protected, the question of distinguishing the location of the damage (on the ground, in the air or in space), the issue of joint and several liability and whether the State's liability should be unlimited in amount[207]. In the Report of this Committee the following have been stated: "Since injury or damage might result from the launching, flight and return to earth of various kinds of space vehicles or parts thereof, a number of problems exist with respect to defining and delimiting liability of the launching State and other States associated with it in the space activity causing injury or damage".[208] Since 1965, there has been great emphasis on the urgency of adopting a convention on liability for damage caused by a space object. In 1971 at the tenth session of the Legal Sub-Committee the agreement was reached on a draft convention concerning liability aspects of space activities.[209]

The Liability Convention, like the Registration Convention and Rescue Agreement, expands and develops the rules contained in the Outer Space Treaty, that is Article VI[210] and

[207] Report of the Ad Hoc Committee on the Peaceful uses of Outer Space 1959, II. Legal Problems Susceptible of Priority Treatment. B. Liability for injury or damage caused by space vehicles:24.

[208] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1972)Convention on International Laibility for damagae caused by space objects analysis and backround data. Washington, D.C.: U.S. Government Printing Office.p.7

[209] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1972).
Report of the Ad Hoc Committee on the Peaceful uses of Outer Space 1959, II. Legal Problems Susceptible of Priority Treatment. B. Liability for injury or damage caused by space vehicles:24.p. 9,10.

[210] "States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international

VII[211] were the international responsibility and liability are concerned (The distinction between these two types will be examined in the framework of liability, in the context of formation of National Space Legislation, later in the dissertation). Importantly, the concerns that were the subject of the 1959 Report were resolved in the text of the Convention. The concept of damage has been defined[212] as well as absolute and fault-based liability have been distinguished, depending on where the damage was caused by the space object[213]. Furthermore, joint and several liability[214] and unlimited liability of the State[215] were addressed in the definitive version of the convention.

As Professor Armel Kerrest emphasised "Space States' responsibility and liability are a counterpart for the freedom of access in outer space. [..] A freedom of use of outer space was far from clear. It seems that, in order to obtain the recognition of this freedom, the two space States agreed to accept and recognise a very large responsibility and liability for any damage caused on Earth, i.e., to non-space-faring States." The agreement by States for absolute liability is an exceptional phenomenon on the scale of international law. This broad responsibility regime, contained in the Convention but also in the Outer Space Treaty has been fully accepted, as a whole, by the international community - indicating a major advance in international law.[216] As Professor further noticed "the Liability Convention does not deal with liability of one State, whichever it may be. It sets in place a global system able to guarantee compensation for the victim as far as the damage is caused to it by a space object."[217]

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organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.

[211] "Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air or in outer space, including the moon and other celestial bodies."

[212] "As The term "damage" means loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations;"

[213] "A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft flight, Article III In the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible."

[214] "Whenever two or more States jointly launch a space object, they shall be jointly and severally liable for any damage caused.[…]"

[215] Article II of the Liability Convention: "A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft flight."

[216] Santos, M.A. (2019) '6 - International Responsibility and Liability of States in the Conduct of Space Activities', in Achilleas, P. and Hobe, S. (eds.) Fifty Years of Space Law / Cinquante ans de droit de l'espace (Centre for Studies and Research in International Law and International Relations, Vol. 21). Leiden; Boston: Brill | Nijhoff, pp. 225–255. Available at: https://referenceworks.brill.com/display/entries/CILO/A9789004448056-06.xml?language=en (Accessed:30.08.2025)

[217] United Nations (2003)

A problematic issue in the current realm of the New Space Era is the absolute responsibility for the activities of non-governmental actors assumed by states under international treaties. The task of national space legislation is the dispersal of this responsibility which is intended to protect both the state and the non-governmental entities. In addition to the above, another gap is the responsibility for damage to the space environment, which is only mentioned in international treaties and is now, as has been highlighted several times, of great importance in the context of ensuring the feasibility of future space activities.

2.4.4. Registration Convention

Mike Gold rightly indicated that the: "Registration is the foundation that everything else is built upon. We can't get to issues of liability, we can't deconflict activities properly if we're not following registration."[218] The UN Secretary General was requested by the General Assembly in 1961 to maintain “public registry” of object launched into outer space, and responsibility for this function was given to the Outer Space Affairs Division. The Registry was started on March 7, 1962. Australia, Canada, France (also on behalf of ESRO[219]), the Federal Republic of Germany, Japan, Italy, UK, US as well as USSR provided the information on their launchings to the United Nations.

This voluntary system led to UN efforts toward establishing the mandatory system of registration of space objects[220]. The establishment of a mandatory registration system hinges upon the maintenance of national registries by individual launching states and the maintenance of a central registry by the United Nations Secretary-General, relying upon the reported data from member states.[221] This was one of the justifications that led to the implementation of the Registration Convention which entered into force on 15 September 1976. The Registration Convention directly supports the Outer Space Treaty and Liability Convention by ensuring their provisions on space safety, liability, and responsibility are legally enforceable. It doesn't expand these treaties but rather provides practical rules for control, jurisdiction, and registration requirements that launching states must incorporate into their own laws.[222]

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[218] Smith, W.A. (2021) 'Using the Artemis Accords to Build Customary International Law: A Vision for a U.S.-Centric Good Governance Regime in Outer Space', *Journal of Air Law and Commerce*, 86, pp. 661–668.
[219] European Space Research Organization.
[220] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1975)Convention on Registration of objects launched into outer space analysis and backround data. Washington, D.C.: U.S. Government Printing Office.p 4-5.
[221]. United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1975).p.19.
[222] Malinowska, K. and Hopej, K.'Liability for Environmental Damage in Outer Space and Its Insurance', in Malinowska, K. and Maśniak, D. (eds.) Managing Environmental Risks through Insurance: Legal and Economic Aspects. p. 367-387.

The Registration Convention became crucial in the context of identifying damages and filling the gap that existed in the Liability Convention, which was one of the reasons why, for example, the Netherlands decided to ratify earlier treaties with delay together with this particular Convention.[223] The greatest likelihood of damage from space objects involved the activities of the countries with the highest launch frequency so the registration convention ensured that the interests of countries not involved in space activities were also protected. However, nowadays the famous saying based on the registration convention "once launching state, always a launching state" which means that once obtained, the status of the launching state cannot be changed[224] may raise many questions in the case of, for example space debris removal activities which involve taking over someone else's space object, transfer of ownership and complex international projects is becoming increasingly problematic.

2.4.5. Moon Agreement

Agreement Governing the Activities of States on the Moon and Other Celestial Bodies adopted on December 5, 1979 by the General Assembly in its resolution 34/68, was negotiated from 1970. The whole process took the longest and yet it was the least successful of all the negotiations regarding international space treaties.[225] The proposal was submitted by Argentina and one year later the USSR expressed strong willingness for preparation of this treaty during the 26th session of the Committee, by presenting their first proposal under the discussion. In 1972 the United States prepared second draft extending the principles of the treaty to celestial bodies. After the 1972 session of the Committee, the consensus was reached against 21 articles. Although the "common heritage of mankind" principle was welcomed in the international discussion, the USSR opposed it until July 1979. "*The prevailing opinion among delegates was in favour of the common heritage concept and a number of countries introduced proposals for declaring the Moon and other celestial bodies to be 'the common heritage of all mankind'* "[226]. By this time no agreement still had been reached on three aspects, namely: the scope of the treaty whether include celestial bodies; the conditions concerning the exploration of natural resources on the Moon and celestial bodies and; the type of information to be provided on mission to the Moon. To resolve the contentious issues an informal working group, chaired by

[223] United Nations (2003)
[224] ScienceDirect State of Registry. Available at: https://www.sciencedirect.com/topics/engineering/state-of-registry(Accessed:30.05.2025).
[225] Moon Agreement has 17 Parties. Saudi Arabia withdrew from the agreement on January 5, 2024.
[226] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1980)Agreement Governing the Activities of States on the Moon and Other Celestial Bodies analysis and background data. Washington, D.C.: U.S. Government Printing Office.

Gyula K. Szlei[227]was set up, through which agreement was finally reached on the questionable aspects, which were reflected, respectively in Articles 1[228],11,[229]5[230] of the final content of the Moon Agreement.

The argumentation of regulating lunar activities took on new meaning after Neil Amstrong landed on the Moon in 1969. In the work on the new treaty, more than 16 proposals were submitted, including from the United States, Argentina, the Soviet Union and others.[231] However, the Moon Agreement is an example of a regulation of space activities that was well ahead of technological predictions, and the consequences of its provisions are felt in nowadays realm of space activities, as will be further developed when analysing National Space Legislations.

As it was already mentioned in the first chapter, as Professor Lachs suggested, future space entrepreneurship might necessitate a revision of the 1979 Moon Agreement or a similar solution.[232] This prediction aligns with the current direction of space exploration, where commercial activities are on the rise. The Moon Agreement's limitations, particularly concerning ownership of space resources, raise questions about the legal framework for emerging space businesses.

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[227] United States. Congress. Senate. Committee on Aeronautical and Space Sciences (1972)Convention on International Liability for damage caused by space objects analysis and background data. Washington, D.C.: U.S. Government Printing Office.

[228] Article 1 of the Moon Agreement: "The provisions of this Agreement relating to the moon shall also apply to other celestial bodies within the solar system, other than the earth, except in so far as specific legal norms enter into force with respect to any of these celestial bodies. 2. For the purposes of this Agreement reference to the moon shall include orbits around or other trajectories to or around it. 3. This Agreement does not apply to extraterrestrial materials which reach the surface of the earth by natural means."

[229] According to the Article 11 of the Moon Agreement:" The moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement, in particular in paragraph 5 of this article. 2. The moon is not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means. 3. Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person. The placement of personnel, space vehicles, equipment, facilities, stations and installations on or below the surface of the moon, including structures connected with its surface or subsurface, shall not create a right of ownership over the surface or the subsurface of the moon or any areas thereof. The foregoing provisions are without prejudice to the international regime referred to in paragraph 5 of this article."

[230] According to Article 5 of the Moon Agreement: "States Parties shall inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of their activities concerned with the exploration and use of the moon. Information on the time, purposes, locations, orbital parameters and duration shall be given in respect of each mission to the moon as soon as possible after launching, while information on the results of each mission, including scientific results, shall be furnished upon completion of the mission. In the case of a mission lasting more than sixty days, information on conduct of the mission, including any scientific results, shall be given periodically, at thirty-day intervals. For missions lasting more than six months, only significant additions to such information need be reported thereafter."

[231] Bini, A. (2008) The Moon Agreement: Its effectiveness in the 21st century (ESPI Perspectives No. 14), October. Vienna: European Space Policy Institute. Available at: https://www.files.ethz.ch/isn/124689/espi_%20perspectives_14.pdf (Accessed: 30.08.2025)

[232] (Lyall, 2013).

2.5. Soft law mechanisms as a driver for common practices

The article 38 of the Statute of the International Court of Justice (ICJ Statute) clearly provides the sources of international law which includes international conventions, international custom, general principles of law as well as juridical decisions and the teachings of the most highly qualified publicists of the various nations(as subsidiary means).[233] In view of which, soft law mechanisms are not indicated within these frames. Therefore, these instruments can be understood as follows: "soft law describes regulations which have the purpose of steering behaviour and conduct of states by creating recommendations and guidelines, which do not have sanctions that can be implemented in case of violations".[234] Such instruments from the space sector level are implemented by the European Space Agency, UN COPUOS [235] but also formulated by other international organizations, i.e. Inter-Agency Space Debris Coordination Committee (IADC) or International Organization for Standardization (ISO) as well as European Cooperation for Space Standardization (ECSS) which are more applicable to private entities.

In addition to their non-binding nature, they are characterized by a high degree of flexibility as well as they focus mainly on the technical aspects of space missions. Furthermore, these mechanism also often serve to clarify and supplement so-called hard law (e.g. international treaties) not to mention strengthening the international cooperation in aspects of space activities[236] due to the common practice of their implementation.

From the international perspective, there is a noticeable trend towards the adoption of non-binding forms of legal instruments. However, at the level of the UN General Assembly, instruments of international soft law were already introduced in the 1960s, such as the Resolution on International Cooperation in the Peaceful Uses of Outer Space[237]. Nevertheless, this approach has increased since the beginning of the 21st century, where 6 resolutions have been adopted: again, the Resolution on International Cooperation in the Peaceful Uses of Outer Space (2000)[238], Application of the concept of the "launching State" (2004)[239],

[233] Article 38 of the Statute of the International Court of Justice. Available at: https://www.icj-cij.org/statute (Accessed:30.08.2025).
[234] Haager, A.G. (2022) The importance of non-binding instruments in international space law. NPOC Space Law Austria. Available at: https://austria-in-space.at/resources/pdf/news/npoc-space-law-essay-competition-sumbmission-haager-importance-of-soft-law.pdf (Accessed.30.08.2025).
[235] Ibidem; Brünner, C. and Königsberger, G. (2012) 'Regulatory Impact Assessment', in Marboe, I. (ed.) *Soft Law in Outer Space: The Function of Non-binding Norms in International Space Law*. Vienna: Böhlau Verlag, pp. 43–64.
[236] Haager (2022) .
[237] A/RES 1721 (XVI).
[238] A/RES/55/122.
[239] A/RES/59/115.

Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects (2007)[240], Recommendations on national legislation relevant to the peaceful exploration and use of outer space (2013)[241] (which are essential to this analysis and are explored in depth later in the thesis), as well as Declaration on the fiftieth anniversary of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (2017). [242] Recently, in response to the Russian direct-ascent anti-satellite missile test conducted in 2021[243], the United Nations General Assembly adopted resolution A/RES/77/41 in support of the destructive DA-ASAT testing moratorium.[244]

In addition to international legal instruments in the form of resolutions, the two documents were prepared by Committee on the Peaceful Uses of Outer Space, namely Safety Framework for Nuclear Power Source Applications in Outer Space in 2009[245] and Space Debris Mitigations Guidelines of the Committee on the Peaceful Uses of Outer Space in 2010.[246] In addition, in 2017 UN COPUOS formulated Guidelines for the long-term sustainability of outer space activities which in 2021 was revised again under the title "Guidelines For The Long-Term Sustainability Of Outer Space Activities of The Committee On The Peaceful Uses Of Outer Space".[247]

These Resolutions and documents have been a constant driving force behind the development of international cooperation of Member States in their space activities and have been of great importance for the development of space law and still are. In spite of their non-binding nature, they are widely recognized as they address space activity issues containing valuable guidance for many states.[248] As can be inferred from the above documents, they cover a wide range of aspects from international cooperation to national space legislation and even nuclear power issues. In addition to the 2013 Resolution, which is analyzed in the section on

[240] A/RES/62/101.
[241] A/RES/68/74.
[242] A/RES/72/78.
[243] Due to this test an inactive Russian satellite, Cosmos 1408, was destroyed.
[244] Secure World Foundation (n.d.) Direct-Ascent Anti-Satellite Missile Tests: State Positions on the Moratorium, UNGA Resolution, and Lessons for the Future. Available at: https://swfound.org/media/207711/direct-ascent-antisatellite-missile-tests_state-positions-on-the-moratorium-unga-resolution-and-lessons-for-the-future.pdf (Accessed:30.08.2025).
[245] A/AC.105/934.
[246] ST/SPACE/49
[247]United Nations Office for Outer Space Affairs (UNOOSA) (n.d.) Publication on Promoting Space Sustainability. Available at: https://www.unoosa.org/documents/pdf/PromotingSpaceSustainability/Publication-_Final_English_version.pdf (Accessed: 30.08.2025)
[248] UNOOSA (United Nations Office for Outer Space Affairs). Resolutions. Available at: https://www.unoosa.org/oosa/sk/ourwork/spacelaw/resolutions.html (Accessed:30.08.2025)

national space legislation as one of the models for regulating space activities at national level, special attention is given to standards for sustainability and safety of space activities in the context of sustainable development. The soft law instruments are presented below using the example of safety standards due to their particular impact on private actors involved in space activities.

The dynamic of space activities has increased awareness among stakeholders of the associated risks. Inappropriate regulations or inadequate risk assessments can lead to significant consequences, including environmental harm and disruptions to the broader space ecosystem. The trend towards the implementation of soft law measures in the form of guidelines or best practices is especially visible in the context of the environmental protection, therefore these instruments are analysed at this level

International space law includes limited and often general provisions regarding the environmental protections, as exemplified by the Outer Space Treaty. According to Article IX of the OST:

> " […]States Parties to the Treaty shall pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose[…]."

Apart from the Moon Agreement, the rest of the international treaties do not refer to environmental damage, which o Accordingly to article 7 section 1:

> "In exploring and using the moon, States Parties shall take measures to prevent the disruption of the existing balance of its environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-environmental matter or otherwise. States Parties shall also take measures to avoid harmfully affecting the environment of the earth through the introduction of extraterrestrial matter or otherwise."

There are noticeable deficiencies in the regulation of the space environment at the international level to protect it or address issues like space debris, which can influence safety and security not only to the environment but also to all of the space activities itself. Consequently, countries regulate environmental issues in their own way. The implementation of recommendations and

guidelines related to space activities often occurs through legal acts in the form of executive orders, decrees, or regulations. When analyzing national space legislations, a common approach is to reference to internationally recognized standards and guidelines, particularly in the context of state authorization and supervision of non-governmental space activities. However, the choice of specific guidelines while referring to "international recognized standards" can vary, leading to legal uncertainty and differing requirements for space activities. Several well-recognized and widely used standards currently include The International Organization for Standardization (ISO) Standards, Space Debris Mitigation Guidelines from COPUOS and Inter-Agency Space Debris Coordination Committee (IADC): Space Debris Mitigation Guidelines, which provide recommendations for i.e. reducing space debris. The scope of the IADAC Space Debris Mitigation Guidelines is following: "The IADC Space Debris Mitigation Guidelines describe existing practices that have been identified and evaluated for limiting the generation of space debris in the environment. The Guidelines cover the overall environmental impact of the missions with a focus on the following: (1) Limitation of debris released during normal operations (2) Minimisation of the potential for on-orbit break-ups (3) Post-mission disposal (4) Prevention of on-orbit collisions." The UN COPUOS Guidelines covers "the mission planning, design as well as manufacture and operational (launch, mission and disposal) phases of spacecraft and launch vehicle orbital stages"[249]. However, the guidelines formulated by IADAC and UNCOPUOS are very general in nature and while they share similarities, there are differences in their specific requirements. COPUOS and IADC guidelines, by the way of example, recommend minimizing debris release during normal operations and considering alternative actions if complete avoidance is not feasible. Regarding prevention of on-orbit collisions, both COPUOS[250] and IADC[251] emphasize estimating and limiting the probability of accidental collisions. However, IADC's guidelines also address the consequences of collisions with small debris and the need for post-mission disposal. The concept of "known objects" is crucial in determining the scope of these recommendations. While COPUOS and IADC

[249] Committee on the Peaceful Uses of Outer Space, Scientific and Technical Subcommittee (2025) *IADC Space* Debris Mitigation Guidelines, A/AC.105/C.1/2025/CRP.9.

[250] According to guideline 3 of the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space. "in developing the design and mission profile of spacecraft and launch vehicle stages, the probability of accidental collision with known objects during the system's launch phase and orbital lifetime should be estimated and limited. If available orbital data indicate a potential collision, adjustment of the launch time or an on-orbit avoidance manoeuvre should be considered" .

[251] According to guideline 5.4 of the Inter-Agency Space Debris Coordination Committee : Space Debris Mitigation Guidelines" in developing the design and mission profile of a spacecraft or orbital stage, a program or project should estimate and limit the probability of accidental collision with known objects during the spacecraft or orbital stage's orbital lifetime. If reliable orbital data is available, avoidance manoeuvres for spacecraft and co-ordination of launch windows may be considered if the collision risk is not considered negligible".

guidelines focus on known objects, the IADC's broader scope includes addressing potential collisions with unidentified space debris.[252] The issue of standardisation through soft law instruments is also developed in Chapter 3, using national space legislation as an example.

One of the reasons for implementing instruments of such a non-binding nature is the low probability of reaching a consensus (especially in the current geopolitical situation) as was the case with the formation of the space treaties. Moreover, soft law mechanisms are easier to change and adapt to such a dynamic environment in which the space sector currently operates. Nevertheless, due to minor differences and lack of international consistency, doubts and differences in interpretation may arise when different standards are applied by various entities. Therefore, efforts should be made to encourage national lawmakers to adopt consistent and widely recognized standards, reflecting real needs but also keeping pace with rapidly changing technology. In the current trend of soft law, these instruments in the form of best practices can be standardised internationally, thus providing the basis for customary rules for various space activities. Soft law regime in the space sector is intended to guide the best practices and behaviour of space actors through the influential role of a number of international resolutions and documents as a reflection of general interests and international will[253]. In currently existing practices related to space activities there is a diverse cross-section of standards, guidelines and recommendations. Their implementation is one of the methods of managing the space activities, in particular within the context of outer space environment and the problem of the growth of space debris. Due to the lack of enforceability and the non-binding nature of the standards, their effectiveness is still not satisfactory enough. From the other side, there is a noticeable increase in the application of appropriate mechanisms regarding the management of space debris mitigation, especially at the domestic level, considering that more than 30 countries have already implemented national space legislation into their legal systems.[254]

2.6. European Union Space Law (EUSL)

Most EU Member States have ratified the main space treaties with the exception of Estonia, Lithuania, Malta and Latvia, which have not ratified the 1967 Outer Space Treaty. The

[252] A. Soucek, J. Tapio, Normative References to NonLegally Binding Instruments in National Space Laws: A Risk Benefit Analysis in the Context of Public International and Domestic Law, Proceedings of the International Institute of Space Law, vol. 2018, no. 4, p. 560.
[253] Pelton, J.N. (2017) 'Overview of the Existing Mechanisms', in Jakhu, R.S. and Pelton, J.N. (eds.) Global Space Governance: An International Study. Cham: Springer International Publishing AG, p. 45.
[254] Hopej, K. and Malinowska, K. (2023) 'Legal Instruments Supporting Sustainable Development Of Space Exploration', 17th International Conference on Space Operations (SpaceOps-2023), Dubai, United Arab Emirates, 6-10 March, pp. 1–3. Paper ID: 524.

European Union has not ratified the treaties but is bound by international law as such. The European Space Agency has made a declaration of acceptance of 3 international space treaties[255] including the Liability Convention. A key factor in analyzing space law from an international point of view, in this dissertation, is the European plane. The functioning of the European space ecosystem, as already mentioned in the first chapter, is based on several institutions including the European Space Agency, the European Union (through the European Commission) and the European Union Space Programme Agency. While the remit for space issues in the broader sense is complex and difficult to distinguish (and for the purposes of this analysis secondary), the competences for the regulation of space activities appears to be clearer. Crucial in this context is the Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community 2007 (Lisbon Treaty) namely Article 189.

> "Article 189
>
> 1. To promote scientific and technical progress, industrial competitiveness and the implementation of its policies, the Union shall draw up a European space policy. To this end, it may promote joint initiatives, support research and technological development and coordinate the efforts needed for the exploration and exploitation of space.
> 2. To contribute to attaining the objectives referred to in paragraph 1, the European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall establish the necessary measures, which may take the form of a European space programme, excluding any harmonisation of the laws and regulations of the Member States.
> 3. The Union shall establish any appropriate relations with the European Space Agency.
> 4. This Article shall be without prejudice to the other provisions of this Title."

Under this article, the European Union has competence to carry out activities, in particular to define and implement programmes 'in the fields of research, technological development and space', but the exercise of this competence must not result in Member States being prevented from exercising theirs. These parallel competences of the EU and the Member States in the field

[255] ESA has declared its acceptance of the Rescue Agreement, Liability Convention, and Registration Convention.

of space law are conferred by virtue of Article 4(3) TFEU[256] according to which: "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."

For a long time, the European Commission has been raising its voice on the regulation of space activities at European level. One of the first steps in this direction was publication of the joint communication of 15 February 2022 on an EU Approach for Space Traffic Management in order to maintain security, protection and sustainable development of space operations urging for relevant actions in a number of a high-level policy documents. Based on the Communication: "The EU approach on STM will build on four avenues developed in parallel 1) assessing the STM requirements and impacts for the EU, 2) enhancing EU operational capabilities to support STM, 3) fostering the STM regulatory aspects and 4) promoting the EU STM approach at the international level." [257] The next step was the publication of the first joint communication related to the EU Space Strategy for Security and Defence on 10 March 2023.[258] Based on the Communication on STM Approach an EUSL has been proposed for the first time:

> "To ensure a consistent EU-wide approach, and building on the joint communication on an EU Approach for Space Traffic Management , the Commission will consider proposing an EU Space Law. While protecting national security interests, such legislative proposal could provide the framework to collectively enhance the level of resilience of space systems and services in the EU and ensure coordination between Member States, including in remote strategic ground infrastructure locations such as the EU outermost regions."[259]

The EU Council approved the Council Conclusions on the EU Space Strategy for Security and Defence on 13 November 2023 (Council Conclusions) according to which the Council of the European Union:

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[256] European Union (2012) Consolidated Version of the Treaty on the Functioning of the European Union. OJ C 326, 26.10.2012, p. 47. Available at: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12012E/TXT:en:PDF (Accessed:30.08.2025).

[257] European Commission and High Representative of the Union for Foreign Affairs and Security Policy (2022) Joint Communication to the European Parliament and the Council: An EU Approach for Space Traffic Management – An EU contribution addressing a global challenge. JOIN/2022/4 final, 15 February. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022JC0004(Accessed:30.08.2025).

[258] European Commission and High Representative of the Union for Foreign Affairs and Security Policy (2023) Joint Communication to the European Parliament and the Council: European Union Space Strategy for Security and Defence. JOIN/2023/9 final. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52023JC0009 (Accessed:30.08.2025).

[259] Ibidem.

> "ACKNOWLEDGES the intention of the Commission to propose, based on an impact assessment and stakeholder consultation, a legislative proposal ('EU space law') tailored to the needs of the space sector and addressing key aspects for the resilience, safety, and sustainability of space activities, which would complement the NIS 2[260] and CER[261] Directives, contribute to the definition and promotion of common standards, and promote responsible behaviours in space in line with ongoing discussions in the UN"[262]

Such a framework would take into account the specificities of the space sector, avoiding fragmentation of the single market for space services and products, while enhancing the global competitiveness of the EU space industry.[263] Therefore the European Space Law proposal is based on three pillars namely: safety pillar, resilience pillar as well as sustainability pillar. The security pillar is based on ensuring safe and secure satellite traffic, the coherent protection of both national and EU space infrastructure and assets against malicious threats, in particular cyber attacks, is linked to the resilience pillar. The last pillar of sustainability relates to ensuring the long-term sustainability of space operations in order to have its own EU-level capability to provide services and economic growth.[264]

Given the content of Article 189 of the Lisbon Treaty, which excludes the harmonisation of national space legislation, there are several options for implementing space law at EU level. In view of the three pillars of resilience, security and sustainability already mentioned, non-binding standards with appropriate criteria established by a steering committee, based on a non-binding Charter, could come into play. Another option is to establish a binding framework in the context of national licensing, with harmonized minimum rules for both European and non-European companies. There is also the possibility of combining the two options above, to implement both mandatory and optional elements (through mandatory benchmarks and

[260] European Parliament and Council of the European Union (2022) Directive (EU) 2022/2555 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. Available at: https://eur-lex.europa.eu/eli/dir/2022/2555/2022-12-27/eng (Accessed:30.08.2025).

[261] Directive On The Resilience Of Critical Entities . See in: European Commission (2023) Enhancing EU resilience: A step forward to identify critical entities for key sectors. IP/23/3992, 24 July. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_3992(Accessed:30.08.2025).

[262] Council Conclusions on the EU Space Strategy for Security and Defence 13 November 2023 https://data.consilium.europa.eu/doc/document/ST-14512-2023-INIT/en/pdf(Accessed:30.08.2025).

[263] Ibidem.

[264] European Commission (2023) Targeted consultation on EU Space Law. Available at: https://defence-industry-space.ec.europa.eu/newsroom/consultations/targeted-consultation-eu-space-law_en(Accessed:30.08.2025).

voluntary - introduced at the level of contractual provisions, e.g. in the case of institutional public procurement). [265]

The escalating risk posed to the space environment by irresponsible behavior necessitates the establishment of shared objectives for safeguarding and enhancing European space infrastructure. In response to threats of intimidation, destabilisation and economic disruption from hostile space activities, the common EU resilience framework was established. This represents that for the first time such a framework has been focused solely on space infrastructure, and space itself is considered strategic, as demonstrated by the statement that "space is key for the EU's freedom of action and autonomous decision-making in security and defence". The need for a common resilience framework (based on the sector's specifications and industrial base), in order to enhance the global competitiveness of the EU space sector also stems from the need to avoid the fragmentation of the single market for space services and products. Therefore, important in this aspect is the proposal to introduce a European Space Law on the basis of the strategy published.[266] Nevertheless, taking into account Article 114 of the TFEU[267] in conjunction with Article 189 TFEU, it would seem that harmonization at the level of technical standards and norms would be optimal for security purposes and in order to avoid obstacles to the single Europen market. Nevertheless on June 2025 European Comission proposed the EU Space Law Act, which has been submitted for public consultation.

2.7 Conclusions

Space treaties are unusual in the scale of international law. Several factors contribute to the remarkable aspects of space law, namely:

1) the negotiation process;
2) the status of the international organisation;
3) acceptance of absolute liability by states.

The first indicator consist of the negotiation process itself. "Nations often in conflict with one another and adhering to widely divergent political philosophies have agreed on the first Treaty

[265] Cesari, L. (2024) 'Developing EU Space Law: The Process of Harmonising National Regulations'. McGill University, Institute of Air and Space Law (IASL). Available at: https://www.mcgill.ca/iasl/article/developing-eu-space-law-process-harmonising-national-regulations (Accessed:30.08.2025)

[266] Council Conclusions on the EU Space Strategy for Security and Defence 13 November 2023 https://data.consilium.europa.eu/doc/document/ST-14512-2023-INIT/en/pdf p.5, 6, 10, 22.

[267] Article 114. "1. Save where otherwise provided in the Treaties, the following provisions shall apply for the achievement of the objectives set out in Article 26. The European Parliament and the Council shall, acting in accordance with the ordinary legislative procedure and after consulting the Economic and Social Committee, adopt the measures for the approximation of the provisions laid down by law, regulation or administrative action in Member States which have as their object the establishment and functioning of the internal market."

of general applicability governing activity in outer space."[268] Furthermore, the international instruments applied in space law (in this case mainly contained in the Liability Convention) have, on the one hand, taken into account the desire of space-faring states to continue their peaceful, lawful and orderly space activities and, on the other hand, protect the interests of non-space-faring states as potential victims of such endeavours.[269]

The second indicator that an international organisation obtains a significant legal statute as expressed in Article VII of the Registration Convention, Article XXII of the Liability Convention and Article 6 of the Moon Agreement is rather rare. This particular statute of organisation provided for in space law is a result of the important role that international organisations play in outer space and space activities themselves. Space law, in this case, is one of the few areas where such a function can be attributed to organisations - although they cannot be attributed the same statute as a state (from a law-making perspective) they are more directly subject to the obligations and rights provided for in the regime than would otherwise be the case.[270]

As has already been considered unique in the scale of international law is the agreement of states to absolute liability for damages. The international community's agreement to such a broad liability regime is evidence of how, through space law, significant progress has been made in international law.[271]Again as Prof. Kerrest underlined: "As we know, the liability of the launching State is quite uncommon within international law. We do not have such rules in any other field (not even for the activities of nuclear industry)." [272] Recognising the unavoidable dangers that are associated with space activities regardless of whether they are peaceful in nature, the legal instrument of international liability represented a significant evolution of the system of general international law.[273]

The shaped international space law in the second half of the 20th century corresponded to the realities of a space environmentbased on US and USSR activities..

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[268] Dembling, P.G. and Arons, D.M. (1967) 'The Evolution of the Outer Space Treaty', Journal of Air Law and Commerce, 33, pp. 419–456.:420.
[269]. Achilleas and Hobe (2020).
[270]von der Dunk, F. (1999) 'International Organisations as Creators of Space Law: A Few General Remarks', in Proceedings of 3rd ECSL Colloquium on International Organisations and Space Law, Perugia, 6-7 May. ESA SP-442 European Space Agency, pp. 335–343. Available at: https://digitalcommons.unl.edu/spacelaw/5/(Accessed:30.08.2025).
[271] Santos (2019) .
[272] Proceedings United Nations/International Institute of Air and Space Law Workshop on Capacity Building in Space Law. Available at: https://www.unoosa.org/documents/pdf/spacelaw/capacitybuilding/Proceedings_Capacity_Building_Workshop.pdf,p.26 .(Accessed;30.08.2025).
[273] Achilleas and Hobe (2020).

These are several gaps in existing international space treaties that are becoming increasingly problematic in the "New Space Era," characterized by a growing commercialization of space activities.

Firstly, a significant gaps exists concerning the absolute responsibility of states for the activities of non-governmental actors, as enshrined in treaties like Article VIII of the Outer Space Treaty (OST). While states currently bear full liability for their private entities' operations in space, the burgeoning commercial spaceflight sector necessitates a distribution of this liability. This gap creates a disproportionate burden on states and hinders the development of a more equitable risk distribution framework for private enterprises. The National Space Legislation is attempting to address this by reallocating liability.

Secondly, the current international legal framework is deficient in its provisions for liability for damage to the space environment and prevention mechanisms. Existing treaties only "mention" this aspect, which is inadequate given the escalating number of space objects and the consequent growth of space debris as well as the conjunction of Earth’s orbits. The increasing hazards posed by orbital debris underline the urgent need for more robust and actionable regulations to protect the long-term sustainability of space activities and the orbital environment itself.

Thirdly, the principle derived from the Registration Convention, often summarized as "once launching state, always a launching state," presents a significant challenge. This principle implies that the status and associated jurisdiction and liability of a launching state cannot easily be transferred . This state of affairs is increasingly problematic for emerging activities such as space debris removal, which inherently involve interacting with, potentially taking over, and even transferring ownership of other states' or entities' space objects. The principle creates legal uncertainty for complex international projects where liability aspect can be much more complex.

Finally, the limitations of the 1979 Moon Agreement regarding the ownership and exploitation of space resources constitute another critical gap. Despite its intent to govern celestial bodies, the Moon Agreement's "common heritage of mankind" principle and its prohibition on national appropriation of resources on celestial bodies are at odds with the rising commercial interest in space resource extraction. Given its limited ratification by major spacefaring nations, this treaty's provisions create significant legal uncertainty for emerging space businesses. The future space entrepreneurship will likely necessitate a revision of this agreement or the development of alternative legal solutions to provide a clear framework for commercial resource utilization In summary, the existing international space law, largely

designed for a state-dominated era, is proving increasingly inadequate for the complexities of the New Space Era, particularly concerning the liability of private actors, environmental protection, the dynamic nature of space operations (like debris removal), and the commercial exploitation of space resources.

Today, the realm of space activities is different and private actors in the global space ecosystem are playing an increasingly important role, which the space treaties at the level of their formulation did not foresee. The activities of private actors and the increasingly advanced technologies they are developing have contributed to these results. Public funding continues to be the majority in the sector, and an increasing number of countries are committing their resources to the development of space technology, particularly recently, for security purposes. Notwithstanding that public support for space activities remains the vast majority, private financing of the space sector is becoming increasingly important and often necessary for commercial space ventures due to their potential profitability. The functioning and development of the space ecosystem is currently not possible without the participation of private actors. In order to enable them to develop in an appropriate environment, the priority should be to regulate their activities in a way that gives them both legal stability and the flexibility to adapt regulatory instruments to such dynamic changes as are associated with the space sector.

The increasing threats to the space environment from irresponsible actions highlight the urgent need for shared objectives to safeguard and enhance European space infrastructure. In response to intimidation, destabilization, and economic disruption stemming from hostile space activities, the EU has established its first-ever common resilience framework specifically for space infrastructure. This initiative underscores that space is now considered strategic, as evidenced by the statement, "space is key for the EU’s freedom of action and autonomous decision-making in security and defence."Beyond security, a common resilience framework is also crucial for boosting the EU space sector's global competitiveness and preventing market fragmentation. This framework must be tailored to the sector's unique specifications and industrial base. Consequently, there's a significant proposal to introduce a European Space Law, based on the recently published strategy However, considering Articles 114 and 189 of the TFEU , harmonization of technical standards and norms appears to be the optimal approach. This would not only enhance security but also prevent obstacles to the single European market.

A cornerstone of space law, established by the Outer Space Treaty, dictates that space exploration and use must benefit all nations, irrespective of their economic or scientific development. This principle, asserting space as "the province of all mankind," is strictly enforced by international space provisions. The challenge for society lies in ensuring this global

benefit in practice. With the rise of the *New Space* trend and increasing commercialization, a crucial question emerges: are there mechanisms to uphold this commitment? Specifically, can national space laws create an environment that empowers countries with less established space programs to participate in the global space ecosystem? According to Article I of the Outer Space Treaty, the exploration and use of space, including the Moon and other celestial bodies, must be for the benefit and in the interests of all countries, regardless of their economic or scientific advancement. This is further reinforced by the concept of sustainable development in outer space, which advocates for preserving space for current and future generations by ensuring "equitable access to the benefits of the exploration and use of outer space for peaceful purposes"[274] indefinitely. These fundamental values, stemming from both binding international law and non-binding agreements, should guide the actions of all entities involved in space exploration and exploitation. Ensuring that space exploration truly benefits all countries, regardless of their development level, remains a significant societal challenge.[275]

Chapter 3. National Space Legislations

3.1. Introduction

As already highlighted space law is part of the public international law system, where a significant element concerning general international law also applies to principles of space exploration.[276] With the increasing commercialization of outer space, appropriate legal mechanisms not only on international level (in the form of soft-law mechanisms) but also on national level - are necessary, for various reasons which are examined in this section. International space law has inadequate instruments to preserve the space ecosystem in the realm of XXI century. The realities of the New Space era are forcing the legal community to take relevant actions in this regard on a national level. Therefore some states are expanding their domestic space laws, and countries that are developing their space activities are introducing more and more space legislation at national level to address this challenges.

Already in 2013, in order to universalise, at least to some scope, the national framework for space legislation, the UN Resolution (A/RES/68/74) stated:

> "Recognizing the different approaches taken by States in dealing with various aspects of national space activities, namely by means of unified acts or a combination of

[274] UNOOSA, Guidelines For The Long-Term Sustainability Of Outer Space Activities Of The Committee On The Peaceful Uses Of Outer Space.
[275] Hopej, K. and Malinowska, K. (2023).
[276] Article III of the Outer Space Treaty.

national legal instruments, and noting that States have adapted their national legal frameworks according to their specific needs and practical considerations and that national legal requirements depend to a high degree on the range of space activities conducted and the level of involvement of nongovernmental entities".[277]

Thus, in the absence of a unified scheme for regulating national space activities, countries on their own have started to introduce legal instruments, depending *inter alia* on the needs of the internal space market. Nowadays, the situation is even more dynamic, due to the opening up of participation opportunities in space projects for many countries. There is a noticeable trend to amend already introduced space acts in order to meet the demands of the current space market environment which is rapidly changing and evolving. On the other hand, countries entering the space market are increasingly expressing a willingness to implement national space law, for example in their national space strategies which was already presented in chapter 1 of this dissertation.

The diversification of space industry stakeholders and the increasing commercialization of space activities are growing proportionally to the importance of domestic space law in the overall governance of space activities. It is in States interest to ensure that non-governmental space stakeholders are organized in responsible manner. To ensure that sufficient resources are available throughout the life cycle of space activities, the adequate financial and technical safeguards are also necessary.[278] One of the solutions is developing and implementing the national space legislations, which seems to be the common approach of many European countries (but not only European) who thus wish to provide the above measures for the proper governance of space activities.

While international treaties do not explicitly require states to enact domestic space laws, doing so is essential for effectively fulfilling their obligations. These laws play a crucial role in supervising and authorizing non-governmental space activities, registering space objects, and addressing liability issues.[279] Many European countries have comprehensive national space legislation (i.e. Italy, Netherlands, Denmark, United Kingdom of Great Britain and Northern Ireland, Belgium, Austria, Luxembourg, France, Portugal, Slovenia and Greece). However,

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[277] United Nations General Assembly. (2013). Recommendations on national legislation relevant to the peaceful exploration and use of outer space. A/RES/68/74. Available at: https://documents-dds-ny.un.org/doc/UNDOC/GEN/N13/454/22/PDF/N1345422.pdf?OpenElement (Accessed: 30.08.2025).

[278] Tapio, J. and Soucek, A. (2022) 'The European Space Agency's Contribution to National Space Law', in Karjalainen, K., Tornberg, I. and Pursiainen, A. (eds) International Actors and the Formation of Laws. Cham: Springer, pp. 125–127.p.117 Available at: https://link.springer.com/chapter/10.1007/978-3-030-98351-2_6#Fn19 (Accessed: 30.08.2025).

[279] Ibidem.

some countries, such as , Germany[280], and Spain[281], lack such legislation despite their significant contribution to the European space sector. While other ESA member states, including Poland[282], Hungary, Ireland, Estonia, Switzerland, Romania, and Czech Republic , have not yet established comprehensive legislative frameworks to address this specific issue, several of these states are currently engaged in the process of drafting national space legislation.[283]

The development of national space laws can both promote and hinder the growth of domestic space sectors. On the one hand, they provide legal stability and certainty, attracting investment and fostering innovation. On the other hand, the process of for example obtaining a license can be time-consuming and complex, potentially slowing down the pace of development. Additionally, the rapid technological advancement can make it challenging for legislators to keep up with emerging trends and applications. To address these challenges, countries can draw on existing models like the UN General Assembly Resolution and the Sofia Model Law or with a more specific purpose such as Building Blocks for the Development of an International Framework for the Governance of Space Resource Activities.[284] These models offer guidance on key aspects of national space legislation, such as authorization, liability, international cooperation, and the registration of space objects.

This chapter first presents a general overview of implemented regulations on space activities within European countries. The author then analyses the elements that propose different models for the regulation of space activities at national level. The legislations of the United Kingdom, France and Luxembourg are examined in depth as countries with a highly developed space sector and in order to identify appropriate Building Blocks and development support clauses. Draft laws as well as newly introduced national space legislations in CEE countries are another element found in this chapter. The final aspect is the *de lege ferenda* proposals for countries wishing to introduce space regulations, especially from the CEE region.

[280] German law relating to space activities concerns 1) Law governing the transfer of administrative functions in the sector of outer space activities; 2) Law governing the transfer of responsibilities for space activities as well as 3) Satellite Data Security Act.
[281] Spanish legislation only covers the registration of space objects through the Royal Decree 278/1995, dated 24th February 1995, establishing in the Kingdom of Spain of the Registry foreseen in the Convention adopted by the United Nations General Assembly on 2nd November 1974.
[282] Poland has only implemented the act governing the Polish Space Agency (ct of 26 September 2014 creating the Polish Space Agency (POLSA) (as amended in 2019). Nevertheless, a draft of the Law on Space Activities and Registration of Space Objects in 2017 and 2020 has been drawn up. Work is currently underway to implement the Polish Space Act into the legal system based on recently published draft of space Activities act from 14 of May 2025.
[283] Englender, D. (2021) ESA National Space Legislation – Purpose and Scope. Lecture delivered at the ESA/ECSL Executive Course on Space Law and Regulations, November 2021. European Centre for Space Law (ECSL).
[284] Adopted in 2019 by The Hague International Space Resources Governance Working Group.

3.2. European landscape of NSL – overview

The European landscape of space law at national level is based on 14 comprehensive National Space Legislations (NSL) of countries such as Sweden, Finland, the Netherlands, Denmark, UK, Belgium, Austria, Luxembourg, France, Portugal (together with the Autonomous Region of Azores[285]), Italy, Greece, Slovenia and recently – Slovakia. In the case of countries such as Norway, Spain, Italy and Germany there are fragmented regulations. The comprehensive analysis of legislation in this dissertation nevertheless covers only UK, Luxembourg and French legislation due to the advanced and developed space market they represent. The undertakings of the Central and Eastern European countries in the context of the regulation of space activities is examined separately with a most of the countries in the region do not have space regulations, only strategies, programmes or draft acts on space activities. Examination of legislation in Central and Eastern European countries concerns Slovenia, Slovakia, Greece and Poland.

Analysis of legislation that covers all the international obligations imposed by the space treaties aims to identify the basic Building Blocks and distinguish those which aim to strengthen the national space sector by focusing on specific segments of space activities. The important aspect is the recognition of common elements but different solutions of Building Blocks of National Space Legislations as well as the verification of measures taken in terms of impact on the indigenous space sector. In order for the analysis to be complete, the key issue is the classification of these acts as "space law", in view of the fact that many countries have only fragmentary regulations for space activities, which do not exhaust the obligations imposed by international space law. Elements of such identification are clearly verified in this dissertation. Thus, in order for a country to be considered to have comprehensive space legislation, firstly, elements that fulfil the obligations imposed by international treaties are necessary, i.e. authorization and continuous supervision, liability as well as registration. These aspects serve as the fundamental pillars of national space legislation. This finding aligns with the broader body of research conducted by institutions examining the space sector in the broader sense - according to the European Space Policy Institute (ESPI)[286] "[…] Space Laws which can be defined as the national legal acts dedicated to the implementation of international obligations laid down by the UN space treaties and which contain provisions on the authorization,

[285] The Azores Regional Space Act advocates for the coordination of the National Space Law and the Regional Space Act (as well as the Space Authority and the Regional Space Authority), to ensure a coherent and efficient space governance framework.

[286] Euroepan Space Policy Institute was founded in 2003 and is the independent think thank for space, located in Vienna – Austria.

registration, supervision and liability of space operations."[287] In addition, components that provide an additional base for space activities are taken into account (for instance regulation of specific activities such as suborbital flight or space resources aspects) ,
and finally soft law elements implemented in national space regulations concerning, for example, safety standards or environmental protection are also essential. Referring again to a study conducted by the ESPI "The variety of national space laws is as wide as their number, ranging from a single Act containing solely a prohibition on carrying out space activities without permission from the relevant Ministry to a set of specific Acts separately addressing launching activities, earth observation or telecommunications."[288]

All these components comprise the framework indicated in the model space regulations, complementing them with the latest requirements that the space sector is progressively imposing on legislators and which is particularly presented in the context of standards and good practices. To maintain a focused analysis, mostly national laws are examined, excluding regulations, as the inclusion of them would introduce excessive fragmentation to the study.
The following table presents a comprehensive overview of the national laws and regulations within the countries in Europe:

COUNTRY	LAW	DATE	SCOPE
Sweden	Act N. 1982:963 of 18 November 1982 LAG (1982:963) OM RYMDVERKSAMHET *(Act on Space Activities)*	18 November 1982	Complex space law
	Decree 1982:1062 of 25 November 1982 FÖRORDNING (1982:10169) OM RYMDVERKSAMHET *(Decree on Space Activities)*	25 November 1982	
Finland	Act on Space Activities (63/2018)	12 January 2018	Complex space law
	Decree of the Ministry of Economic Affairs and Employment on Space Activities (74/2018)	23 January 2018	
The Netherlands	Rules Concerning Space Activities and the establishment of a Registry Of Space Objects	13 June 2006	Complex space law
	Decree of 13 November 2007, containing rules with regard to a registry of information concerning space objects	13 November 2007	
	Order of the Minister of Economic Affairs dated 7 February 2008, no. WJZ 71119929, containing rules governing license applications for the performance of space activities and the registration of space objects	7 February 2008	

[287] ESPI,(2009) Economic and Policy Aspects of Space Regulations in Europe Part I: The Case of National Space Legislation – Finding the Way Between Common and Coordinated Action (ESPI Report 21). Vienna: European Space Policy Institute (ESPI). Available at: https://www.espi.or.at/reports/economic-and-policy-aspects-of-space-regulations-in-europe-part-i-the-case-of-national-space-legislation-finding-the-way-between-common-and-coordinated-action/,p.7(Accessed:30.08.2025).
[288] Ibidem.p.10.

	Order of the Minister of Economic Affairs dated 16 April 2010 no. WJZ/100020347, containing amendments to ruls governing license applications for the performance of space activities and the registration of space objects WJZ/100020347	16 April 2010	
	Decree of 19 January 2015 expanding the scope of the Space Activities Act to include the control of unguided satellites	19 January 2015	
	Order by the Minister of Economic Affairs of 26 June 2015, no. WJZ/1055654, amending the Space Activities License Application and Registration Order, in connection with changes to the application for no. WJZ/15055654	26 June 2015	
Denmark	The Danish Outer Space Act (no. 409 of 11 May 2016)	11 May 2016	Complex space law
	The Danish Executive Order on requirements in connection with approval of activities in outer space, etc.	31 May 2016	
UK	The Outer Space Act (OSA)	1986[289]	Complex space law
	The Space Industry Act (SIA)	2018	
	Regulations: Space Industry Regulations 2021, Spaceflight Activities (Investigations of Spaceflight Accidents) Regulations 2021, the Space Industry (Appeals) Regulations 2021 and Regulators Licensing Rules[290]	2021	
Belgium	Law of 17 September 2005 on the Activities of Launching, Flight Operation or Guidance of Space Objects	17 September 2005	Complex space law
	Royal Decree Implementing certain provisions of the Law of 17 September 2005 on the activities of launching, flight operations and guidance of space objects.	15 March 2022	
Austria	Austrian Federal Law on the Authorization of Space Activities and the Establishment of National Registry	28 December 2011	Complex space law
	Regulation of the Federal Minister for Transport, Innovation and Technology in Implementation of the Federal law on the Authorization of Space Activities and the Establishment of a National Space Registry	26 February 2015	
Luxembourg	Law of July 2017 on the Exploration and Use of Space Resources	20 July 2017	Complex space law
	Law of 15 December 2020 on space activities amending: 1 the amended Law of July 1937 on insurance tax know as "Versicherungssteuergesetz:' 2; the amended Law of 4Decmber 1967 on income tax	15 December 2020	
France	French Space Operations Act n°2008-518	3 June 2008	Complex space law
	Decree No. 2009-643 of June 9, 2009 (Relating to the authorizations issued in application of law No. 2008-518 of June 3, 2008 relating to space operations)	9 June 2009	
	Decree No. 2009-640 of 9 June 2009 (Implementing the provisions provided for in Title	9June 2009	

[289] as amended by the Deregulation Act 2015.

[290] Civil Aviation Authority (CAA) (2025) *Legislation*. Available at: https://www.caa.co.uk/space/about-the-space-team/legislation/ (Accessed: 30.08. 2025).

	VII of Law No. 2008-518 of June 3, 2008 relating to space operations)		
	Decree No. 2009-1657 of 24 December 2009 relating to the Defence and National Security Council and the General Secretariat for Defence and National Security		
	Order of 31 March 2011 on the technical regulations in application of Decree No. 2009-643 of 9 June 2009 on authorizations issued in application of Law No. 2008-518 of 3 June 2008 on space operations[291]	31 March 2011	
	Order of 12 August 2011 establishing the list of information required to identify a space object in application of Title III of Decree No. 84-510 of 28 June 1984 on the Centre national d'études spatiales (French National Centre for Space Studies)[292]	12 August 2011	
	Decree no. 2013-654 of 19 July 2013 on monitoring the activity of primary operators of space-derived data[293]	19 July 2013	
	Order of 4 September 2013 on the prior declaration of activity by primary operators of space data	4 September 2013	
	Order of 3 September 2019 on the creation and organization of the space command[294]	3 September 2019	
	Order of 23 February 2022 on the composition of the three parts of the file mentioned in Article 1 of Decree No. 2009-643 of 9 June 2009 on authorizations issued in application of amended Act No. 2008-518 of 3 June 2008 on space operations[295]	23 February 2022	
	Order of 11 July 2022 amending CNES/P Order No. 2010-1 of 9 December 2010 regulating the operation of Guiana Space Centre facilities in application of Law No. 2008-518 of 3 June 2008 on space operations[296]	11 July 2022	
Portugal	Decree-Law no. 16/2-19, of 22 January, Legal regime of access to and exercise of space activities	22 January 2019	Complex space law
	Regulation no. 697/2019 of 5 September – Regulation on access to and exercise of space activities	5 September 2019	
	Rectification of Regulation no. 697/2019 relative to access to and exercise of space activites	29 November 2019	
	Decree-Law 16/2019, of 22 January 2019, as amended by Decree-Law 20/2024, of 2 February		

[291] *Arrêté du 31 mars 2011 relatif à la réglementation technique en application du décret n° 2009-643 du 9 juin 2009 relatif aux autorisations délivrées en application de la loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales.*

[292] *Arrêté du 12 août 2011 fixant la liste des informations nécessaires à l'identification d'un objet spatial en application du titre III du décret n° 84-510 du 28 juin 1984 relatif au Centre national d'études spatiales*

[293] *Décret n° 2013-654 du 19 juillet 2013 relatif à la surveillance de l'activité des exploitants primaires de données d'origine spatiale.*

[294] *Arrêté du 4 septembre 2013 relatif à la déclaration préalable d'activité effectuée par les exploitants primaires de données d'origine spatiale.*

[295] *Arrêté du 23 février 2022 relatif à la composition des trois parties du dossier mentionné à l'article 1er du décret n° 2009-643 du 9 juin 2009 relatif aux autorisations délivrées en application de la loi n° 2008-518 du 3 juin 2008 modifiée relative aux opérations spatiales.*

[296] *Arrêté du 11 juillet 2022 modifiant l'arrêté CNES/P N° 2010-1 du 9 décembre 2010 portant réglementation de l'exploitation des installations du Centre Spatial Guyanais en application de la loi n° 2008- 518 du 3 juin 2008 relative aux opérations spatiales.*

Azores	2024 (and Declaration of Amendment and Restatement 19/2024, of 22 March 2024)	2 February 2024	
	Azores Regional Space Act Decree 9/2019/A[297]	29 November 2019	
	Azores Space Regulation Regional Implementing Decree 6/2020/A	2020	
Greece	Law 4508/2017 on Authorization of space activities -Registration in the National Register of Space Objects amended by Law 4712/2020/146/A΄/29-07-2020	22 Deember 2017	
Slovenia	The Space Activities Act	16 March 2022	Complex space law
	Regulation implementing the Space Activities Act	22 September 2022	
Norway	Act on Launching Objects from Norwegian Territory into Outer Space, No.38	13 June 1969	Fragmented space law: Launch of space objects
Italy	Law No. 23, 25 January 1983: Norms for the implementation of the Convention on International Liability for Damage Caused by Space Objects signed in London, Moscow and Washington on 29 March 1972 (Official Gazette, General Series, No. 35, 5 February 1983)	25 January 1983	Complex space law
	Law No. 153, 12 July 2005: Accession of the Italian Republic to the Convention on Registration of Objects Launched into Outer Space (New York, 14 January 1975) and its implementation (Official Gazette, General Series, No. 177, 1 August 2005)	12 July 2005	
	Law Decree No. 128, 4 June 2003, Reorganisation of the Italian Space Agency (A.S.I.)	4 June 2003	
	Law No. 7, 11 January 2018: Measures for the coordination of space and aerospace policy and provisions concerning the organisation and operation of the Italian Space Agency (18G00025) (Official Gazette, General Series, No. 34, 10 February 2018)	11 January 2018	
	Space Economy Law (Law 89/2025)	13 June 2025	
Germany	Law governing the transfer of administrative functions in the sector of outer space activities	22 August 1998	Fragmented space law: transfer of administrative functions and transfer of responsibilities of space activities
	Law governing the transfer of responsibilities for space activities		
	Act to give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth RemoteSensing Data	23 November 2007	
Spain	ROYAL DECREE 278/1995, dated 24th February 1995, establishing in the Kingdom of Spain of the Registry foreseen in the Convention adopted by the United Nations General Assembly on 2nd November 1974	24 February 1995	Fragmented space law: Registration
	Spanish Space Agency operational, Act 17/2022 of September 5th[298]	5 September 2022	

[297] as amended by Regional Legislative Decree 24/2021/A.
[298] amending Act 14/2011 of June 1st, on Science, Technology,and Innovation.

Slovakia	Act on regulation of space activities and on amendment and supplementation of the Act of the National Council of the Slovak Republic No. 145/1995 Coll. on administrative fees, as amended	28 November 2024	Complex space law

Table.1.3. Overview of national legislation concerning the space sector[299] (Based on Source: https://astro.unoosa.org/astro/en/national-space-law-landing-page.html)

3.3. Functioning models of NSL

As previously emphasised, although space treaties do not mandate the enactment of national space legislation, numerous states have established such frameworks to optimize the implementation of their treaty obligations.[300] Consequently, national space laws have witnessed a notable expansion. As a result of this trend, a clear model of common elements and schemes has emerged across the analyzed legislation. The growing presence of space stakeholders and private entities has prompted legislators to frequently adapt space law to facilitate the development of indigenous space sectors. Furthermore, as it was already mentioned couple of times there is a noticeable tendency to incorporate non-binding legal norms, such as those referring to environmental issues, into national laws to ensure their binding effect upon the relevant addressees. Through the collaborative efforts of the United Nations, ILA, ESA, and numerous other working groups dedicated to national space legislation, a set of foundational principles, commonly referred to as Building Blocks (BB), have been established, constituting a globally recognized framework. For the purposes of this analysis, these Building Blocks were selected as representative elements based on the examination of National Space Legislation. It is imperative to emphasize that the most effective mechanism for enabling a state to both authorize and supervise non-governmental space activities resides in the establishment of a national space law, as governmental action is determined by the existence of appropriate regulations and legal frameworks.[301]

Several models of national space legislation have been already developed, the elements of which are presented in the table below:

[299] Based on the :United Nations Office for Outer Space Affairs (UNOOSA)National Space Law Database. Available at: https://astro.unoosa.org/astro/en/national-space-law-landing-page.html (Accessed:30.08.2025).
[300] Tapio and Soucek (2022).
[301] ESPI,(2009) Economic and Policy Aspects of Space Regulations in Europe Part I: The Case of National Space Legislation – Finding the Way Between Common and Coordinated Action (ESPI Report 21). Vienna: European Space Policy Institute (ESPI). Available at: https://www.espi.or.at/reports/economic-and-policy-aspects-of-space-regulations-in-europe-part-i-the-case-of-national-space-legislation-finding-the-way-between-common-and-coordinated-action /(Accessed:30.08.2025).

PROJECT 2001 & 2001 PLUS	SOFIA MODEL LAW	UN RESOLUTION
• Authorization • Supervision • Registration • Compensation, Regulation • Additional Regulation	• Scope of Application • Definitions • Authorization (conditions, Withdrawal, Suspension, Transfer and Amendment of Authorization) • Supervision • Registration • Environment (space debris) • Liability (Resource and Insurance) • Procedure and Sanctions	• Scope of Application • Authorization (conditions, transfer of ownership) • Supervision • Registration • Recourse

Table1. 4. components of functioning models for national space legislation

The recurring elements derived from international obligations, as illustrated in the table are: Authorization, Supervision, Registration and Liability. This follows from the international obligations contained in the treaties presented. Firstly, a comparative analysis of the regulatory frameworks governing these aspects will be conducted to identify the disparities and similarities in their implementation.

3.3.1. Project 2001 & Project 2001 PLUS

The first attempt to propose a harmonised model for national space legislation was the so-called "Project 2001- Legal Framework for the Commercial Use of Outer Space" and "Project 2001 PLUS- Global and European Challenges for Air and Space Law at the 21st Century"[302]. The main objective of the project was to study the consequences of privatisation as well as the increasing role of private actors and the results of international and increasingly regional cooperation affecting aviation and space law.[303] In cooperation between the German Aerospace Centre (DLR) and the Institute for Aerospace Law a number of Building Blocks dedicated to national space legislation have been proposed.[304] This was the first research initiative on such a large scale to bring the concept into general use in the context of work on the national space legislation. The relevant provisions included such elements as; 1) authorization and supervision

[302] Ibidem.
[303] Hobe, S. (2005) 'Global and European Challenges for Air and Space Law at the Edge of the 21st Century' (Paper ID: IAC-05-E.6.4.04), Proceedings of the 56th International Astronautical Congress (IAC), Fukuoka, Japan, 16-21 October.
[304] United Nations General Assembly. Committee on the Peaceful Uses of Outer Space. Legal Subcommittee (2013) Information on the activities of international intergovernmental and non-governmental organizations relating to space law. A/AC.105/C.2/2013/CRP.6, 52nd Session, 8-19 April. Available at: https://www.unoosa.org/pdf/limited/c2/AC105_C2_2013_CRP06E.pdf (Accessed:30.08.2025).

of space activities, 2) registration of space objects, 3) compensation, regulation and 4) additional regulation. At the international symposium, *'Global and European Challenges for Air and Space Law at the Edge of the 21st Century'* organized in 2005, which served as a summary of the project's results, the main area of discussion centred around the topic of national space legislation. The discussion highlighted the need for close harmonisation between national and international legal standards to the greatest extent possible.[305] During the symposium, special attention was paid to the harmonisation of space object registration practices (due to the difference in information provided to national registries versus the UN Register of Objects Launched into Outer Space) or liability issues to be considered in the near future.[306]

3.3.2. Sofia model law

Continuing the work on the Building Blocks of National Space Legislation, at the 75th conference of the International Law Association (ILA) held in Sofia, Bulgaria, from 26 to 30 August 2012 the so-called Sofia Guidelines for a Model Law on National Space Legislation was adopted by resolution No. 6/2012 in the framework of the activities of the ILA.[307] At that time, the requirements underpinning any future model law were identified, which included elements such as the obligation and details of the licensing and authorization procedure and related requirements, the duty of supervision and insurance for private entities in space activities. In formulating this guideline, the building blocks developed as part of Project 2001 Plus have been identified as key in the preparation of any type of space law. According to the document "*The following proposal of a Model Law should be seen as a guideline and source for further discussion. It attempts to bring together both doctrinal approaches and practical needs"*.[308] Within the guideline, examples of definitions and use of terms were presented such as: space activity, space object, operator, authorization, supervision and commercial space activity. However, this is not a *numerus clausus* and countries are free to expand the scope of definitions in their national legislation. The proposed articles were based on the fundamental principles of the space treaties such as article VI OST (authorization and supervision), VIII OST

[305] According to S. Freeland, ''Difficulties of implementing national space legislation exemplified by the Australian approach'', Proceedings of the symposium. See footnote 1. In: Hobe, S. and Neumann, J. (2005) Global and European challenges for space law at the edge of the 21st century. Report. Cologne: Institute of Air and Space Law, University of Cologne, p. 1. Available online 13 October.
[306] Ibidem.
[307] The Sofia Model Law is contained in: United Nations General Assembly. Committee on the Peaceful Uses of Outer Space. Legal Subcommittee (2013) Information on the activities of international intergovernmental and non-governmental organizations relating to space law: Secure World Foundation and the International Law Association. A/AC.105/C.2/103, 1 February. Available at: https://www.unoosa.org/oosa/oosadoc/data/documents/2013/aac.105c.2/aac.105c.2103_0.html (Accessed:30.08.2025).
[308] Ibidem, p. 2.

and RC (registration) as well as liability and related insurance based on article VI and VII Outer Space Treaty as well as Liability Convention. The conditions for obtaining authorization for space activities has been developed[309]. as well as the article regarding the withdrawal suspension or its amendment has been implemented. The aspects of protection of the environment and mitigation of space debris are among this model law. The questions of liability and right to recourse were clarified, with a proposal to establish a separate operator's liability and therefore obtaining compulsory insurance, which could be exempted under certain conditions proposed in the guidelines.[310] The final articles covered rules of procedure and sanctions.

3.3.3 UN GA Resolution

Resolution adopted by the General Assembly on 11 December 2013 on the Recommendations on national legislation relevant to the peaceful exploration and use of outer space, is another instrument centred around harmonising the framework of national space legislations. Recommendations related to the enactment of a regulatory framework for national space activities, taking into account needs and specific requirements (as in the Sofia Model Law) overlap with previous proposals. It does, however, clarify the Building Blocks in certain aspects. The respective Building Blocks refine the material scope of the proposed regulations by extending them to include "the launch of objects into and their return from outer space, the operation of a launch or re-entry site and the operation and control of space objects in orbit; other issues for consideration may include the design and manufacture of spacecraft, the application of space science and technology, and exploration activities and research". Furthermore, this model develops the question of national jurisdiction not only based on the UN treaties but also stating that "however, that if another State is exercising jurisdiction with respect to such activitie, the State should consider forbearing from duplicative requirements and avoid unnecessary burdens". Further, according to this model law it is essential to obtain

[309] According to Sofia ModelLaw; Article 4 — Conditions for authorization 1. Authorization shall be granted under the following conditions: (a) The operator is in a financial position to undertake space activities; (b) The operator has proven to be reliable and to have the required technical knowledge; (c) The space activity does not cause environmental damage to the Earth and outer space in accordance with article 7; (d) The space activity is undertaken in such a manner as to mitigate to the greatest possible extent any potential space debris in accordance with article 8; (e) The space activity is compatible with public safety standards; (f) The space activity does not run counter to national security interests; (g) The space activity does not run counter to international obligations and foreign policy interests of XY; (h) The operator has complied with ITU Regulations with regard to frequency allocations and orbital positions; (i) The operator complies with insurance requirements as determined in article 12.

[310] The authority may waive the obligation to insure when (a) The operator has sufficient equity capital to cover the amount of his/her liability; (b) The space activity is not a commercial space activity and is in the public interest. 4. The details of the content and conditions of the insurance shall be laid down in implementing a decree/regulation to that effect.

authorization from a competent national authority together with clear regulatory framework concerning procedures and conditions for granting modifying, suspending or revoking the authorization, provided that these conditions should be consistent with the international obligations of States and may reflect the national security and foreign policy interests of States[311]. According to the resolution, by implementing reporting requirements (in the form for example of on-site inspections or enforcement mechanism) the continuing supervision of space activities can be maintained. Paragraph 7 of the Resolution indicates Building Blocks concerning right to recourse, insurance requirements as well as indemnification procedures. The final element of this model law considered is transfer of ownership or control of space object in orbit, where it is recommended that "national regulations may provide for authorization requirements with regard to the transfer of ownership or obligations for the submission of information on the change in status of the operation of a space object in orbit."[312]

3.3.4. Space Resources Building Blocks

The latest published document relating to the concept of Building Blocks in space law was released in 2019 and is based on the work of The Hague International Space Resources Governance Working Group entitled "Building Blocks for the development of an international framework on space resource activities". This group of guidelines focus on a respective segment of space activities related to space resources, which, despite their international character, the authors indicated that the "Pending the adoption and the operationalization of the international framework, States, international organizations, and non-governmental entities are encouraged to consider and use the Building Blocks."[313] It is therefore worth paying some attention to them in the context of the national elements of space legislation. It is also important to note that the proposed Building Blocks affect the operation of non-governmental entities and private space operators. This is due to objective which explicitly states that: "The international framework should create an enabling environment for space resource activities that takes into account all interests and benefits all countries and humankind. To achieve that the international framework should [inter alia] Propose recommendations for the consideration of States for the application or development of domestic frameworks". The building blocks refer to the definition of space resources or space resource activities, which can be used as in a subsidiary manner by national

[311] UNGA Legal Subcommittee, A/AC.105/C.2/103 (2013). p.2.
[312] UNGA Legal Subcommittee, A/AC.105/C.2/103 (2013). p.3.
[313] The Hague International Space Resources Governance Working Group (2019) Building Blocks for the Development of an International Framework on Space Resource Activities. Leiden: Leiden University. Available at: https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht--en-ruimterecht/space-resources/bb-thissrwg--cover.pdf (Accessed:30.08.2025).

legislators. The document refer to the authorization and continuous supervision as well as to the jurisdiction and control of States over any space-made products used in space resource activities for which the States concerned are responsible. It is worth noting the indication of rights in the context of space resources such as Priority Rights or Resource Rights. In the context of national activities, the second right is relevant according to which: "The international framework should ensure that resource rights over raw mineral and volatile materials extracted from space resources, as well as products derived therefrom, can lawfully be acquired through domestic legislation, bilateral agreements and/or multilateral agreements."[314] The issue of avoidance and mitigation of potentially harmful impacts resulting from space resource activities, technical standards for, prior review of, and safety zones around space resource activities have been identified. The aspects on registration and liability have also been placed among Building Blocks for the development of an international framework on space resource activities.

As can be inferred from the above, these models are built on the same scheme extending each other in relevant areas. It should be borne in mind that, in the meantime, several more recommendations dedicated to individual aspects of space law have been developed, such as recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects on 17 December 2007, or Resolutions 59/115 of 10 December 2004 on the application of the concept of the "launching State". Nevertheless, for the purposes of this analysis, only models that are based on various elements of space law are examined. Since the 2013 Resolution, no further guidelines targeting a model for national space legislation have been developed. Nevertheless, some internal actions are being taken within the Organisation, such as the European Space Agency (ESA), which provides its member states with a platform for cooperation and information exchange on international and national space law. It also offers general advice and specific consultancy services to member states.[315]

A comprehensive examination of the majority of space legislation reveals that states adhere to these recommendations, thereby prioritizing the fulfilment of their international obligations. By adapting the above mentioned models to their specific needs, countries can establish legal frameworks that promote conducting responsible and sustainable space activities. Ultimately, the decision on how to regulate space activities lies within respective

[314] 8.2 The international framework should enable the mutual recognition between States of such resource rights. 8.3 The international framework should ensure that the utilization of space resources is carried out in accordance with the principle of non-appropriation under Article II OST.
[315] Tapio and Soucek (2022).

countries. Well-targeted strategies and national space programs can help ensure that domestic laws effectively support the development of the space sector and meet national priorities. Beyond the immediate benefits of legal stability and certainty, national space laws can also contribute to broader goals. For example, they can promote scientific research, foster economic growth, encourage investments and enhance international cooperation. By carefully considering these factors, countries can develop space legislation that serves the best interests of their citizens and contribute to the global community. To summarize the manner in which space activities are regulated is at the discretion of individual legislators, with the aim of ensuring that national provisions align with domestic market demands.

3.4. Overview of selected National Space Legislations

For the purpose of the analysis, the legislation of Luxembourg, the UK and France was selected. The characteristics of the space sectors of these countries are presented in Chapter 1 under their space strategies. The consideration of these countries in the dissertation is dictated by the rapid development of their indigenous space sectors over years, in the author's opinion, the regulation of the sector in a manner conducive to the development of the space sector and the challenges posed by current space stakeholders. France placed a satellite in Earth orbit in 1965, shortly after USSR and US. UK was the sixth country (following Japan and China) in the world to launch satellite by the own independent means in 1971.[316] The UK Legislation was also taken into account for several reasons why the UK legislature decided to revise the 1986 domestic law. In the case of Luxembourg –the *rationale* for including this legal regime in this dissertation involves the innovation of an implemented Law on the exploration and use of space resources, and then a comprehensive space law. French legislation was taken into account due to its comprehensive nature, which covers many segments of the space sector and therefore provides a very good basis for reference when designing space regulations. The inclusion of European legislation's examples is also dictated by considerations of European cultural connectivity.

The individual components proposed in the national space law models described in the previous section are developed and contrasted with other guidelines and also with the practice of the countries selected in the study. Moreover space legislation may serves to build a suitable environment for space stakeholders and the implementation of internationally recognised

[316] Yahoo News UK (2020) On This Day: France becomes the third country to send own rocket into space. 26 November. Available at: https://uk.news.yahoo.com/on-this-day--france-becomes-the-third-country-to-send-own-rocket-into-space-150235301.html (Accessed;30.08.2025).

standards can provide minimum safety standards. For these reasons, the selected Building Blocks are based on three indicators; 1) related to international obligations (as a fundamental aspect of compliance with them), 2) tailored to the needs of the national sector; 3) focused on implementation of standards derived from inter alia global practices. The first indicator includes Building Blocks such as: Scope of application, Definitions, Authorization and Supervision, Registration (together with the conditions for registration), Liability (including Right to Recourse and Insurance) and Environmental Protection. The second indicator includes elements tailored to the individual UK, Luxembourg and French space markets and the last concerns the best practice at the level of technical standards (in the form of soft-law instruments).

In addition to the distinction of structural elements based on the above categorisation, special attention is given to the scope of national space legislation, which covers predominantly upstream activities for example launching, in-orbit operations and possibly manufacturing. The space legislation characterised in this dissertation does not include regulations on the main application areas of space activities, i.e. downstream (such as the earth observation, navigation, communications or military aspects). This is due to the fact that the downstream segment, depending of the area is often covered by separate regulations, e.g. telecommunications regulations. In this connection, an in-depth analysis of national space legislations is carried out on UK, Luxembourg and French examples (based on acts strictly related to space activities) the general characteristics of which are described below.

UK

The United Kingdom of Great Britain and Northern Ireland has ratified all international space treaties, except of Moon Agreement, and therefore, through the implementation of national space law, fulfilled the obligations imposed by those treaties. The country has a particularly long history when it comes to regulating space activities at the national level, since the very first piece of legislation regulating space activities is the Outer Space Act 1986 (OSA) as amended by the Deregulation Act 2015[317]. In view of the rapidly changing environment of space activities through more commercialized direction, the UK introduced the Space Industry Act (SIA) 2018 and its accompanying regulations such as Space Industry Regulations 2021, Spaceflight Activities (Investigations of Spaceflight Accidents) Regulations 2021, the Space

[317] Civil Aviation Authority (CAA) (2025).

Industry (Appeals) Regulations 2021 and Regulators Licensing Rules[318], to address the challenges posed by the space sector.

The fundamental document regulating space activities carried out by UK entities, until the 2018 SIA came into force in 2021, was the Outer Space Act 1986. However, with the implementation of the new regulations, the OSA currently only applies to UK entities carrying out space activities abroad (including the operation of a satellite in orbit from an overseas facility by a UK entity and the procurement of the overseas launch of a space object[319]). This is due the fact that SIA introduced regulations governing all spaceflight conducted in the UK - both space activities and suborbital flights[320]. In addition to these two acts, the UK space law regime is also underpinned by regulations, which are delegated documents of the SIA, relating to the Space Flight Accident Investigation Authority with the provision of investigations into such accidents, regulations regarding the decisions made by the Civil Aviation Authority (CAA) and the appeals they serve, together with the relevant procedure, and licensing rules (including the granting and renewal of spaceport, operator and range control licenses under the SIA).[321] Furthermore guidelinesalso coverson for ALARP[322]or environmental impact assessment.[323]

In the published Space Regulatory Review 2024 an overall assessment of the SIA is provided, including the effectiveness of the licensing regime introduced by the act and to identify any barriers or unintended consequences. Furthermore, the Space Regulatory Review aimed to fulfil three main functions:to ensure the appropriate development of the UK space sector and government priorities by identifying gaps and solutions indicated by space stakeholders (for planned activities and the need for regulation or deregulation). Where appropriate, in collaboration with independent regulators as well as the industry,and identification of next steps for improving the regulatory framework in order to implement recognized enhancements.[324]

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[318] Ibidem.

[319] UK Space Agency (2022) Guidance: Spaceflight legislation and guidance. Published 1 June. Available at: https://www.gov.uk/guidance/spaceflight-legislation-and-guidance (Accessed:30.08.2025).

[320] A suborbital flight is when a spacecraft goes high enough to reach space (usually past the 100 km Kármán line) but doesn't go fast enough to stay in orbit around Earth.

[321] Proelium Law LLP (2023) Space Law in the UK. Published 15 May. Available at: https://proeliumlaw.com/space-law-uk/ (Accessed:30.08.2025)

[322] Safety principle“as low as reasonably practicable”

[323] Proelium Law LLP (2023)

[324] Department for Science, Innovation and Technology, Department for Transport, Department for Business and Trade and Ministry of Defence (2024) Space Regulatory Review 2024: A targeted review of space regulations. Ref: 2024/007. Published 16 May. Available at: https://assets.publishing.service.gov.uk/media/6644d26fb7249a4c6e9d3597/space_regulatory_review_2024.pdf p. 19 (Accessed:30.08.2025).

According to Space Regulatory Review 2024 published by the HM Government Department for Science, Innovation and Technology.

> "The UK's trusted, modern space regulatory framework has recently enabled the first commercial demonstration of debris removal from orbit, and the first launch from UK soil. It has supported the delivery of connectivity anywhere on the globe, including in sparse deserts and open oceans, enabling anybody to connect from anywhere at any time. But in a world of constantly evolving technological advancements, we cannot afford to be complacent; we need to build on our regulatory capabilities and ensure that our framework remains agile and fit-for-purpose."[325]

The development of a comprehensive space law ecosystem within the UK indicates the significant advancements made by the UK space sector. This is evidenced not only by the legal system governing the most important (and actually the most demanding) issues related to space activities conducted by non-governmental entities at national level, but also by the market itself, which currently is undergoing significant development as evidenced by various calculations
It is estimated that between 2020 and 2021 the total revenue of the UK space industry was in the region of £17.5 billion.[326] The sector directly provided 48,800 jobs supporting an additional 78,000 across the supply chain. UK Space Agency expenditure increased by £274 million (from £373 million from 2018-2019 to £647 million from 2022-2023).[327]

France

The choice of French legislation for this dissertation is related to its special characteristics. Various documents regulate many space activities related aspects, and the law itself is being recently updated to address challenges arising from the growing commercialization of space activities, as well as the increasing impact of the geopolitical situation on defence and security aspects related to space infrastructure. The French legal system related to space activities is the most extensive in Europe and often serves as a model regulation for countries planning to introduce national space legislation into their legal systems. The main act regulating space

[325] Space regulatory Review 2024, p. 7
[326] An estimated 1590 organisations with space activities have been assessed. 162 of these generate income in excess of £5 million, with 14 organisations accounting for 81% of total space-related income. See in: national-space-strategy-and-the-role-of-the-uk-space-agency.pdf (Accessed:30.08.2025)
[327] National Audit Office (NAO) (2024) The National Space Strategy and the role of the UK Space Agency. Published 12 June. Available at: https://www.nao.org.uk/wp-con tent/uploads/2024/07/national-space-strategy-and-the-role-of-the-uk-space-agency.pdf (Accessed:30.08.2025).

activates is the French Space Operation Act implemented in 2008 (as amended) along with numerous regulations. In addition, the activities of Centre National D'études Spatiales (CNES) are regulated in the French regulations. The entire complex system of legislation on space activities consist of such acts like: Law No 2008-518 of 3 June 2008, relating to space operations (FSOA) as a foundation of national space legislation together with the Decree No 2024-625 of 28 June 2024, relating to space operations authorization, Order of 28 June 2024, relating to the composition of the three parts of the authorization file and Order of 28 June 2024, relating to technical regulations, Decrees No 2022-233 and No 2022-234 of 24 February 2022, relating to space data, defence considerations and the authorization and management of space operations; Decree No 2017-1619 of 27 November 2017, publishing the agreement between the Government of the French Republic and the European Space Agency on the Guiana Space Centre and associated services, Decree No 2009-643 of 9 June 2009, relating to authorizations issued as well as some provisions of French Intellectual Property Code[328] regarding the patentability aspects.[329] In view of the large amount of legislation that exist in France, related to space activities, special attention is paid to the FSOA and the recently introduced Decrees on authorization and on technical aspects, due to its new developments such as those relating to on orbit servicing. The Order of March 31, 2011,which introduced the technical standard was modified by the Order of June 28,2024. The same happened with the Order related to authorizations. France has ratified all international space treaties except the Moon Agreement and is also a signatory to the Artemis Accords.

Luxembourg

Luxembourg ratified Outer Space Treaty, Liability Convention, Registration Agreement on January 2021, and is working to become a party to the Rescue Agreement. The country is not a party to the Moon Agreement .[330] The legal system on Luxembourg's space activities is based on the law introduced in 2017 on the Exploration and Use of Space Resources which is *lex specialis* to the Law of 15 December 2020 on Space Activities. A law that is also relevant to the space sector is the Law on Electronic Media of 1991.Prior to the implementation of the space law, firstly on space resources and later on the general space law, the activities of

[328] Article L.611-1 and L.613-5 of the French Intellectual Property Code.
[329] Théard-Jallu, C., Le Péchon-Joubert, F., Cesari, L. and Destal, F. (2024) 'France', in Chambers Global Practice Guides: Space Law 2024. London: Chambers and Partners. Available at: https://practiceguides.chambers.com/practice-guides/space-law-2024/france.(Accessed:30.08.2025).
[330] Luxembourg Space Agency (LSA) (2025) Legal Framework. Available at: https://space-agency.public.lu/en/agency/legal-framework.html (Accessed:30.08.2025).

Luxembourg satellite operators were only regulated by two articles contained in the 1991 Electronic Media Act, as amended. Nevertheless, it should be emphasised that the original law related to the authorization of space telecommunications are relevant for some space projects as it was not abolished neither by any of these laws. Operators who use Luxembourg frequencies, in addition to the obligation to apply for a license under the 2020 or 2017 law, must obtain a license under the Electronic Media Act of 1991.[331] It is expressed in the Law of 2017 and 2020 that obtaining the authorization either for space activities or for a mission of exploration and use of space resources for commercial purposes " shall not exempt the operator from the need to obtain other approvals or authorizations required."[332]

The author's choice of this legislation is dictated primarily, by its innovative nature. According to the Jean-Louis Schiltz[333] statement:

> "This draft law is a very innovative piece of legislation. At the same time, it is strongly embedded in the international legal framework. Luxembourg is showing once more that innovation through law can be a key trigger for innovation through technology to really take off and to produce encouraging results.[…]"[334]

It is interesting to note that the Luxembourg space law is not an entirely new and separate legal regime, but modelled on the regulatory regime applicable to credit institutions, under the law of 5 April 1993 on the financial sector, especially when it comes to licensing conditions. [335] This is another reason behind the choice of this regulation in this dissertation due to the fact that it was inspired by the existing legal system operating in the field of finance. This approach to regulating space activities may also prove beneficial for countries seeking to establish a comprehensive space law regime. The necessity of drafting entirely novel regulations may be omitted, and inspiration may be derived from pre-existing legal frameworks.

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[331] Hoffmann, M. (2022) 'Luxembourg Completing its Space Legislation', in Proceedings of the International Institute of Space Law (IISL), Vol. 65, Issue 6. The Hague: Eleven International Publishing,p.523. Available at: https://www.elevenjournals.com/tijdschrift/iisl/2022/6/IISL_2022_065_006_001.pdf (Accessed:30.08.2025).

[332] Article 2 of the law on the exploration and use of space resources of 2017(Accessed:30.08.2025).

[333] He served as an advisor to the Luxembourg Government regarding the establishment of this legal framework. See more in: Luxembourg Government (2016) Luxembourg's New Space Law Guarantees Private Companies the Right to Resources Harvested in Outer Space in Accordance with International Law. Communiqué, 11 November. Available at: https://meco.gouvernement.lu/fr/actualites.gouvernement2024+fr+actualites+toutes_actualites+communiques+2016+11-novembre+11-presentation-spaceresources.html (Accessed:30.08.2025).

[334] Ibidem.

[335] Calmes, B. and Gladysz-Lehmann, B. (2023) Developing Space Law: Luxembourg Regulatory Framework. Published 14 September. Available at: https://www.ibanet.org/developing-space-law-luxembourg-regulatory-framework(Accessed:30.08.2025).

Furthermore, Luxembourg was the second country in the world (after USA) to introduce the legislation related to space resources. law relating to space resources is part of the government's plan to further develop the space industry, which Luxembourg has identified as a market with huge potential for its own economy.[336] The space sector's contribution to national GDP is among the highest in Europe[337] and the mechanisms implemented by Luxembourg (whether legal, financial or otherwise) to support the space sector are worthy of in-depth analysis, as is done further in this dissertation.

3.4.1. Scope of Application

Generally speaking, the scope of application of space law at the national level covers territorial and personal jurisdiction[338] thus determining the legal scope and application of these provisions. It is important that there is an effective link with the country enacting a specific law, visible in the nationality of the legal or natural person carrying out space activities in a specific territory or, in the case of space activities on the high seas, covering ships and aircraft of the relevant country.[339] The material scope of national space laws, mainly cover upstream activities such as launching, operating in orbit, and potentially manufacturing[340]. It doesn't include regulations for the downstream segment, like Earth Observation, navigation, communication. These areas typically have their own specific regulations, such as telecommunications laws. This tendency is reflected in many legislations not only in Europe but also in other countries outside the continent. Crucial in the context of the scope of regulation is the definition of, first and foremost, space activities (and other related activities if such is regulated in the act, as in the case of UK sub-orbital activities), which determines what the act actually regulates and what activities carried out by entities are subject to this law.

3.4.1.1. UK

Following the enactment of the Space Industry Act , the scope of the Outer Space Act 1968 has changed. Initially, the OSA regulated space activities (i.e. launching or commissioning a space

[336] PwC Luxembourg (2017) Luxembourg's new space resources law. Published 18 July. Available at: https://blog.pwc.lu/luxembourg-new-space-resources-law/ (Accessed:30.08.2025).
[337] Luxembourg Trade & Invest (n.d.) Space - Trade & Invest. Available at: https://luxembourgtradeandinvest.com/choose-luxembourg/discover-luxembourg-s-business-sectors/space(Accessed:30.08.2025).
[338] Michael, H. (2009) Article VI. In: Hobe, S., Schmidt-Tedd, B. and Schrogl, K. U. (eds.) *Cologne Commentary on Space Law Volume 1*. Cologne: Carl Heymanns Verlag,
[339] Committee on the Peaceful Uses of Outer Space, Legal Subcommittee (2013) Information on the activities of international intergovernmental and non-governmental organizations relating to space law: Draft model law on national space legislation and explanatory notes. 52nd session. Vienna, 8-19 April 2013.
[340] manufacturing regulations are contained, for example, in the Russian space law.

object; operating a space object; as well as any space activities[341]) carried out by UK citizens regardless of where the activity is carried out (i.e. whether carried on in the United Kingdom or elsewhere).

With the enactment of the SIA, this scope has changed and the OSA regulates the activities of UK nationals, Scottish companies and bodies registered under the laws of any part of the United Kingdom only outside the UK. Thus, the OSA limits its scope to UK nationals only[342]. This is in contrast to the Space Industry Act, which does not limit its scope to UK nationals only however applying to the activities carried within the United Kingdom territory. The scope of the Space Industry Act applies to space activities, sub-orbital activities and associated activities carried out in the UK. However, the nationality of entities conducting space activities is irrelevant. [343] The SIA extends the scope of the Act to sub-orbital and associated activities, for which definitions are provided in the next chapter.

Therefore OSA regulates space activities conducted by British entities abroad, including the operation of satellites in orbit from foreign facilities or the procurement of foreign space launches service.. SIA regulates activities carried out in the UK including launch (space or sub-orbital) and return; the procurement of a UK launch (space or sub-orbital), the operation of a satellite in orbit, the operation of a spaceport and the provision of range control services.[344] The SIA therefore expands the scope to include under the regulatory umbrella also sub-orbital activities collectively referred in the Act as "spaceflight activities". SIA also regulates associated activities which includes spaceports and range control activities.

3.4.1.2 France

The French law addresses personal and territorial jurisdiction over space activities in Article 2 of the French Space Operations Act According to the amended French law, three categories of entities must apply for authorization for space activities under French jurisdiction, namely: any operator, regardless of nationality, who intends to undertake the launch of a space object from national territory, from means of installations under French jurisdiction, or who intends to carry out the return of such an object to French territory, means or installations under national

[341] UK Outer Space Act, Section 1 and 2

[342] according to Outer Space Act 1986 Section 2.2. *"For this purpose "United Kingdom national" means an individual who is— (a) a British citizen, a British Dependent Territories citizen, a British National (Overseas), or a British Overseas citizen, (b) a person who under the M1British Nationality Act 1981 is a British subject, or (c) a British protected person within the meaning of that Act."* (Accessed:30.08.2025).

[343] Great Britain. (2018) Space Industry Act 2018. London: The Stationery Office. Section 1. Available at: https://www.legislation.gov.uk/ukpga/2018/5/section/1/2018-03-15(Accessed:30.08.2025).

[344] UK Space Agency (2022) Guidance: Spaceflight legislation and guidance. Published 1 June. Available at: https://www.gov.uk/guidance/spaceflight-legislation-and-guidance(Accessed:30.08.2025).

jurisdiction. Also, any French operator who wishes to carry out such operations on the territory of a foreign state either from French means or installations or from a space which is not under the state's sovereignty must apply for an authorization – the same applies to the return of such an object to means or installations under the foreign state's jurisdiction or to a space not under the state's sovereignty. The third category concerns any natural person of French nationality or legal entity established in France (whether or not it is an operator who intends to commission the launch of a space object) or a French operator who intends to assert control over such an object or group of objects in space. [345].

The material scope of the Act refers to the definitions of space operation, launch phase and control, which determine what activities fall under the Act. Space operations are defined as "any activity consisting of launching or attempting to launch an object into outer space or ensuring control of a space object or a group of coordinated space objects during their stay in outer space, including the Moon and other celestial bodies, as well as, where applicable, during the return to Earth", a launch phase refers to the point at which launch operations are already irreversible and which ends with the separation of the launcher from the object to be placed in space.[346] This phase may also include (if applicable) the recovery of reusable elements of the launcher. The period of time, beginning with the separation of the launcher from the object to be deployed in space ending with the final deorbit manoeuvres and passivation activities, loss of control of the space object by the operator or proximate return to Earth, or complete disintegration of the object in the atmosphere is the control phase.[347]

3.4.1.3. Luxembourg

The following analysis on Luxembourg space law is based on two legislations, already mentioned previously, namely the Law on the Exploration and Use of Space Resources and Law on Space Activities. The scope of the first one relates to the missions intended to the exploration and use of space resources for commercial purposes. According to the article 3 "The authorization shall be granted to an operator for a mission of exploration and use of space resources for commercial purposes upon written application to the ministers." Nevertheless the scope is limited to the possibility of obtaining an authorization for such activities only by a public company limited by shares (*société anonyme*) or a corporate partnership limited by

[345] As amended by Law No. 2023-703 of August 1, 2023 - art. 60.
[346] Subject to the provisions contained, where applicable, in a permit issued under the Act.
[347] Article 1 of the French Space operation Act. According to Article 1 paragraph 5 "When it concerns a group of coordinated space objects, the control phase begins at the separation of the launcher and the first object launched from the group of objects intended to be placed in outer space and ends upon the occurrence, for the last operational object of this group, of one of the events mentioned in this 5".

shares (*société en commandite par actions*) or a private limited liability company (*société à responsabilité limitée*) of Luxembourg law or a European Company (*société européenne*) having its registered office in Luxembourg.[348] The General Space Law applies to launching or attempting to launch space object (or more space objects) into outer space. It applies also to controlling space object (or more space objects) or using it in outer space (including the return to Earth) The general Space Law applies also to " any other activity taking place in outer space for which the Grand Duchy of Luxembourg is likely to be held internationally responsible").[349] The general law on space activities applies to space activities carried out from the territory of the Grand Duchy of Luxembourg or by means of installations (movable or movable under the control and jurisdiction of the country) carried out by an operator whatever the nationality. The law applies also to the natural persons of Luxembourg nationality or legal persons established under Luxembourg law in the territory of a foreign State or an area which is not a subject to the sovereignty of a State. The Law of 15 December 2020 on space activities does not apply to missions based on exploration and use of space resources, which are governed by the law of 2017. [350]

3.4.2. Definitions

One of the key definition that is relevant to the application of the national space law is the definition of space activities which have the influence of the subject and material scope of the application of space law at national level. As evidenced by the comparative analysis below, national space legislations present diverse perspectives on the definition of space activities. Nevertheless, a common approach is evident, where, as noted in the preceding section, primarily focusing on upstream activities.

Sofia model law provides exemplary definitions and usages for key terms such as "space activity", "space object", "operator", "authorization", "supervision", and "commercial space activity". Notably, certain definitions adopted within national space legislation exhibit overlap with those enshrined in international space treaties, as exemplified by the concepts of the launching state[351] and damage[352], which are defined in the Liability Convention. As evidenced

[348] Article 4 of the Law of July 20th 2017 on the Exploration and Use of Space Resources.
[349] Article 2 of the Law of 15 December 2020 on space activities amending:1 the amended Law of 9 July 1937 on insurance tax known as "Versicherungssteuergesetz";2 the amended Law of 4 December 1967 on income tax.
[350] Article 1 of the Law of 15 December 2020 on space activities amending:1 the amended Law of 9 July 1937 on insurance tax known as "Versicherungssteuergesetz";2 the amended Law of 4 December 1967 on income tax.
[351] According to Atricle I of LC: "(c) The term "launching State" means: (i) A State which launches or procures the launching of a space object; (ii) A State from whose territory or facility a space object is launched".
[352] According to Article I of LC: "For the purposes of this Convention: (a) The term "damage" means loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations".

by the analysis, the definitions of "space activity", "operator" and "space object" are recurrent elements within the majority of national space legislations. However, this constitutes a limited selection of defined terms, and the evolving needs of the relevant space sector must be duly considered. In alignment with the Sofia model, the term "space activityincludes the launch, operation, guidance, and re-entry of space objects into, in and from outer space and other activities essential for the launch, operation, guidance and re-entry of space objects into, in and from outer space". The term "operator" refers to a natural or legal person conductingspace activities. The definition of "space object" designates any object launched or intended for launch into outer space, including its components, as well as its launch vehicle and associated parts.

3.4.2.1. UK

The scope of the OSA includes activities related to "a) launching or procuring the launch of a space object; (b) operating a space object; (c) any activity in outer space."[353] The definitions in the Outer Space Act 1986 refer to, inter alia, , 'outer space', i.e. includes the moon and other celestial bodies, as well as "space object", which is relevant to the Liability Convention definition and includes the component parts of a space object, its launch vehicle and the component parts of that.[354]

The 2018 Space Industry Act explicitly defines terms such as 'space activity' and 'sub-orbital activity'. According to SIA space activity means "a) launching or procuring the launch or the return to earth of a space object or of an aircraft carrying a space object, (b) operating a space object, or (c) any activity in outer space;"[355] Whereas "sub-orbital activity" means launching, procuring the launch of, operating or procuring the return to earth of— (a) a craft to which subsection (5) applies, or (b) an aircraft carrying such a craft, but does not include space activity.[356] The SIA significantly increases the grid of terms used for the purposes of regulation, also indicating definitions (e.g. "carier aircraft", "spacecraft",operator license", "spaceport" and "spaceport license", "range control services")

3.4.2.2. France

In addition to the definitions of "space operation", "launch phase" and "control phase" already indicated in the previous Building Block concerning the scope of application, the French law

[353] Outer Space Act 1986 Section 1(1).
[354] Outer Space Act 1986 Section 13(1).
[355] Space Industry Act Section 1(4).
[356] Space Industry Act Section 1(4).

also includes definitions of "space operator" (understood as any natural or legal person who conducts a space operation under their own responsibility and independently), the definition of "third party to a space operation" (defined as any natural or legal person other than those participating in the space operation or in the production of the space object or objects whose launch or control this operation is intended to ensure). The definition of a third party to a space operation *explicity* contains the exclusions from being treated as a third party of the space object operator, their subcontractors, contractors, and clients, as well as the contractors and subcontractors of their clients. The law also defines the concept of data originating from space and the primarily operator of data originating from space. The definition of data includes observation data, signal interception, or location data obtained from space originating from Earth, but also from a celestial body, a space object or space itself. The primary operator of data originating from space is considered to be any legal or natural person ensuring the programming of the acquisition system or the reception of data originating from space. Finally, the law defines the concept of damage as any harm to person, property, and in particular to public health or the environment caused directly by a space object within the framework of a space operation (excluding the consequences of the use of the signal emitted by this object for users).[357]

3.4.2.3. Luxembourg

The legislation regulating space resources does not introduce any definitions 9even the definition of space resources), unlike the 2020 General Regulation, which defines terms such as; space activity, Liability Convention[358], "damage"[359], "space object"[360], "operator" [361], "qualyfing holding" [362] and "Space treaty"[363]. Despite the lack of an official definition of space resources in the 2017 Act, explanations of the space resource definition are available "According to the Luxembourg legislator, space resources are now commonly defined as abiotic resources that are in situ in outer space and can be extracted. This notion includes, for example,

[357] Article 1of the Law of December 15th 2020 on space activities.
[358] "the Convention on International Liability for Damage Caused by Space Objects done in London, Moscow and Washington on 29 March 1972;"
[359] "any harm to persons, property, public health or the environment directly caused by a space object within the scope of a space activity, excluding the consequences of use of the signal emitted by that object for users;"
[360] "any object launched or intended to be launched into outer space, the component parts of such object and its launch vehicle and parts thereof;"
[361] "any person who, on his own behalf, carries out or undertakes any space activity, alone or jointly with others;"
[362] "the holding in an operator, either directly or indirectly, of at least 10% of the capital or voting rights, or any other possibility of exercising considerable influence over the management of that operator;'
[363] „ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, done in London, Moscow and Washington on 27 January 1967."

mineral resources and water, but not orbital positions or frequencies"[364]; this definition does not include "orbital positions or frequency spectrum" and unlike the 'resources' project does not refer to the "asteroids, comets, or celestial bodies themselves".[365]

In the context of the scope of the regulation, the most relevant is the definition of space activities, which, according to Article 1, includes: "any activity consisting in launching or attempting to launch one or more space objects into outer space or in controlling one or more space objects or in using them during a stay in outer space, including the return to Earth, as well as any other activity taking place in outer space for which the Grand Duchy of Luxembourg is likely to be held internationally responsible." The definition of a space object is identical to that contained in the Liability Convention and applies to objects launched into outer space or intended to be launched, while the definition of damage covers any damage to property, persons, public health, or the environment caused directly by a space object in the course of space activities. The effects of the use of the signal emitted by that object for users are excluded from the scope of the definition of damage contained in general space law.[366]

There are three common elements in the definitions of space activities presented, namely: (1) launching an object into outer space; (2) operation and other control of a space object in space; and (3) re-entry activities. Some countries are broadening the definition by adding the attempt to launch a space object (such as Luxembourg and France or procuring[367] the launch of space object (UK) which is in line with the definition derived from Liability Convention.[368] Another visible approach in national space legislations is extension of the definition to include any activity (or associated activity) in space as in the case of UK or Luxembourg.It is worth noting that in the legislation introduced by Slovenia, for the first time an environmental issue has appeared in the definition of space activities, when it comes to returning of space object to Earth "including the procedures for limiting the generation of space

[364] Grand Duchy of Luxembourg (2022) Contribution of the Grand Duchy of Luxembourg on the Mandate and Purpose of the Working Group on Legal Aspects of Space Resource Activities. Published 16 December. Available at: https://www.unoosa.org/documents/pdf/copuos/lsc/space-resources/LSC2023/StatesResponses/Luxembourg_-_20221216_WG_SR_LU_Contribution.pdf (Accessed: 30.08.2025).
[365] Hoffmann (2022).
[366] Article 2 of the Law of 15 December 2020 on space activities amending: 1 the amended Law of 9 July 1937 on insurance tax known as "Versicherungssteuergesetz"; 2 the amended Law of 4 December 1967 on income tax.
[367] While the launching of a space object or attempts to launch a space object are quite clear, the issue of procuring the launch of space object raises questions. Although a definition that includes launching, attempting to launch and procuring the launch is a definition derived from Liability Convention.
[368] Article I c) The term "launching State" means: (i) A State which launches or procures the launching of a space object; (ii) A State from whose territory or facility a space object is launched"

debris". Nevertheless, the details of this legislation are presented in a chapter focusing on the CEE region.

The European countries have largely adopted a consistent approach to defining space objects, focusing on objects launched or intended to be launched into outer space, along with their components and associated launch vehicles, being in line with the definition contained in Liability Convention. When it comes to space operator the definition is rather similar in most of the national space legislations analysed and it refers to natural or juridical person that carries out or undertakes to carry out space activities.

3.4.3. Authorization & Supervision

As highlighted at the beginning of this chapter, the issue of authorization and continuous supervision regarding the non-governmental entities has an international basis and derives *expresis verbis* from article VI of the Outer Space Treaty where:

> "[…] The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty.[…]"

*T*he article concerned, establishes a direct *nexus* between states and non-state actors engaged in space activities, thus encouraging the implementation of national space legislation. In addition to imposing state responsibility for all space activities, the provision explicitly mandates state authorization and continuous supervision of private space endeavours.[369] Through the exercise of authorization and continuous supervision, the state establishes *a de facto control* over private space activities. Consequently, a state incurs international liability for all space activities, whether public or private, conducted within its jurisdiction or under its control, including those it oversees through authorization and supervision.[370] This building block serves as a guarantee that the activities of non-governmental entities that carry out space activities under license and in accordance with security standards, are in line with the legal requirements as to minimise the risk of damages, caused by such activity. Thus, analysing the European countries that have introduced space legislation into their legal system, one can see a trend that follows this model.

Based on the Sofia model, it is a practice to entrust continuous supervision to the same authority that is responsible for issuing authorizations. Pursuant to the functional models

[369] Lee, R. (2005) *Liability Arising from Article VI of the Outer Space Treaty: States, Domestic Law and Private Operators'*, in Proceedings of the 48th Colloquium on the Law of Outer Space, pp. 216–218.
[370] Ibidem.

delineated above, entities responsible for authorizing space activities also exercises continuous supervision over them. In the majority of the countries examined, this principle prevails..

3.4.3.1. UK

Both OSA[371] and SIA[372] set out a fundamental principle that the person to whom those Acts applies may not carry out space activities without the appropriate license, issued by a competent authority. However, there are exceptions to the license requirement. In the case of OSA, these concern activities carried out „by a person acting as employee or agent of another; or (b) for activities in respect of which it is certified by Order in Council that arrangements have been made between the United Kingdom and another country to secure compliance with the international obligations of the United Kingdom."[373] Furthermore, according to OSA, subject to certain conditions, the Secretary of State may exempt from the license requirements subject to ensuring compliance with the UK's international obligations.[374] Exceptions are also indicated in the SIA[375] as well as in the relevant Regulation.[376]

[371] (1) A person to whom this Act applies shall not, subject to the following provisions, carry on an activity to which this Act applies except under the authority of a licence granted by the Secretary of State.
[372] (1) A person must not (subject to the following provisions)— (a) carry out spaceflight activities in the United Kingdom, or (b) operate a spaceport in the United Kingdom, except under the authority of a licence under this section.
[373] Outer Space Act 1986 Section 3(2).
[374] Outer Space Act 1986 Section 3(3) .
[375] "4 Exemptions from licence requirement (1) A person does not require an operator licence to carry out spaceflight activities in respect of which it is certified by Order in Council that arrangements have been made between the United Kingdom and another country to secure compliance with the international obligations of the United Kingdom. (2) Regulations may make provision for other activities or persons to be exempted, either by the regulations themselves or by the regulator, from the requirement to hold an operator licence, but only if the Secretary of State is satisfied that the requirement— (a) is not necessary to secure public safety, (b) is not necessary to secure the health and safety of individuals taking part in spaceflight activities in a role or capacity prescribed under section 17(1), and (c) is not necessary to secure compliance with the international obligations of the United Kingdom."
[376] "(4) Regulations may— (a) make provision about the procedure in connection with the granting of an exemption by or under the regulations (including provision for applications); (b) make provision about the terms of an exemption or the conditions to which an exemption is subject; (c) make provision about the revocation or renewal of an exemption; (d) make provision for the enforcement of terms or conditions of an exemption; (e) provide that section 36 (obligation to indemnify government etc) does not apply to a person to the extent that the person is carrying out activities exempted by or under the regulations; (f) specify the maximum amount of a person's liability under that section so far as the liability relates to the carrying out of such activities."

	Operation	OSA		SIA	
		Procurement of launch	In-orbit operations	Procurement of launch	In-orbit operations
A	UK entity procuring a UK launch for a satellite			X	
B	UK entity operating a satellite from the UK				X
C	UK entity procuring an overseas launch for a satellite	X			
D	UK entity operating a satellite from overseas		X		
E	Foreign entity procuring a UK launch for a satellite			X	
F	Foreign entity operating a satellite from the UK				X

Table 1.5. Issuance of license under OSA and SIA, (Source: Understanding the Space Industry Act[377])

The issuance of a license is connected to the fulfilment of the relevant conditions which in the case of OSA consist of ensuring that space activities do not jeopardise the safety of persons property and public health, compliance with international obligations and ensuring that activities do not harm UK national security.[378] In the case of SIA, the overriding requirement (relative to the others) is to securing public safety. The Regulator need to consider the aspects such as "(a) the interests of persons carried by spacecraft or carrier aircraft;(b) the requirements of persons carrying out spaceflight activities; (c) the interests of any other persons in relation to the use of land, sea and airspace; (d) the requirements of persons with interests in property carried by spacecraft; (e) any environmental objectives set by the Secretary of State; (f) the interests of national security; (g) any international obligations of the United Kingdom; (h) any space debris mitigation guidelines issued by an international organization in which the government of the United Kingdom is represented."[379] These requirements are of a general nature, as the detailed ones are contained in delegated legislation.

3.4.3.2. France

The entity entitled to issue the authorization for space activities under the term of the FSOA is the Ministry of Economy and CNES is responsible for verifying the authorization application. The Ministry of Economy is also responsible for the continuous supervision of space activities. As previously analysed, the entities required to apply for a space activity authorization are indicated in Article 2 of the FSOA. The authorization of space object launching or control operations and the transfer of control of a space object or group of space objects (both launching

[377] UK Government (2019) Understanding the Space Industry Act. Published 8 February. Available at: https://assets.publishing.service.gov.uk/media/5c5db847ed915d0425d6d4de/190208_Understanding_the_SIA_-_-Final_For_Publication-Legal_Cleared-_Initial_Publication.pdf (Accessed:30.08.2025).
[378] Outer Space Act 1986 Section 4(2).
[379] Space Industry Act 2018 Section 2(2).

and returning to Earth) is subject to the fulfilment of specific prerequisites, which include, *inter alia*, financial, professional factors of both the applicant and its shareholders Exemptions are provided for the performance of services rendered to the state in the interest and defence of the country. Licenses may constitute authorization for specific operations. They may not be granted if the operations threaten the interests of national defence or France's compliance with its international obligations. The Decree sets out the conditions for issuing licenses, the administrative authorities competent to issue licenses, and the relevant information and documents to be submitted with the application. The Decree also sets out the conditions under which the applicant is exempted from verification of compliance with the conditions indicated above (if the operation will be carried out from the territory of a foreign state or from installations and means under the jurisdiction of foreign state). [380] To sum up the law itself stipulates that the authorizations issued under the law may also be determined by requirements relating to the security of persons, property, the protection of public health and the environment, as well as the protection of national defence interests or France's compliance with its international obligations.[381]

3.4.3.3. Luxembourg

No operator can exercise any space activity without being previously authorised by the relevant Minister. The Minister exercise continuous supervision over the operators authorize to carry out space activities.The conditions for obtaining a license are similar in both pieces of legislation and relate to: providing evidence of the existence in Luxembourg of the registered office and central administration (including administrative and accounting structures) of the operator seeking a license; providing the identity of direct or indirect shareholders or members, whether natural or legal persons, to the regulatory authority[382]; providing a risk assessment of the planned space activities; confirmation that the operator's annual financial statements have been audited. According to the law on space activities

"(1) An operator to be authorised shall provide evidence of the existence in the Grand Duchy of Luxembourg of its registered office and its central administration, including the administrative and accounting structure. An operator to be authorised shall have a robust system

[380] Provided that 'its national or international obligations, legislation and practice provide sufficient guarantees with regard to the safety of persons and property, the protection of public health and the environment, and liability.'
[381] Article 4 FSOA .
[382] Article 6(2) law of December 15th 2020 on space activities „(2) Authorisation shall be subject to notification to the Minister of the identity of the shareholders or partners, whether direct or indirect, natural or legal persons, who have a qualifying holding, and of the amount of such holdings or, if the threshold provided for in Article 2, point 6, is not reached, of the identity of the twenty main shareholders or partners."

of financial, technical and legal procedures and methods by which space activity shall be planned and implemented. It shall also have a robust system of internal governance comprising in particular a clear organizational structure with well-defined, transparent and consistent lines of responsibilities, effective processes for the detection, management, control and reporting of risks to which it is or could be exposed, adequate internal control mechanisms, including sound administrative and accounting procedures as well as control and security mechanisms for its technical systems and applications."[383]

Further conditions include, *inter alia,* the members of the governing body, who must at all times be of sufficiently good repute and possess appropriate skills, knowledge and experience, or the requirement for two persons to be responsible for the management of the operator, together with their authority to determine the direction of space activities effectively as well as application fee which range from 5.000 to 500.000 euros depending on the amount of work involved in the application process and its complexity. [384] An important aspect is also the assessment of the risks associated with space activities (i.e. coverage of risks by operator's own funds, by an insurance policy with an insurance company that does not belong to the same group as the operator or by an appropriate guarantee issued by a credit institution that does not belong to the same group as the operator).[385]

According to the Space Activities Act of 2020 the transfer to a third party of the space activities authorized (or of real or personal rights, including guarantee rights, involving the transfer of actual control[386] over the space object) is possible under the certain conditions, in which the most important are the approval of the Minister and the fulfilment of the conditions for applying for authorization by the operator to whom such authorization is to be transferred. The transfer of a license to an operator not established in the Grand Duchy of Luxembourg is possible, but is subject to a special condition, namely the existence of a special agreement with the country of which the operator is a national or which bears international responsibility for the space activities of such an operator, guaranteeing the Grand Duchy of Luxembourg protection against any claims for compensation for loss or damage or for its international

[383] Article 6 law of December 15th 2020 on space activities .
[384] Article 9(1) , 9(2) and 5(4) of the Space Resources Act of 2017 and Article 6(1) and 13 law of December 15th 2020 on space activities.
[385] Article 6(4) law of December 15th 2020 on space activities.
[386] According to article 12(1) Space Law Activities Act of 2020 the actual control "shall be deemed to mean: the authority exercised over the activation of the means of control or telecommand and, where appropriate, the associated monitoring devices, required for the execution of the launch, flight operation or guidance activities of one or more space objects.".

responsibility. Law on the exploration and use of space resources regulate this issue through its article 5 which states that “The authorization is personal and non-assignable.” In both Acts, authorization can be withdrawn in three cases, i.e. if the conditions under which the authorization was granted are no longer met; the authorization was obtained illegally or on the basis of false statements; the operator does not use the authorization within thirty-six months of obtaining it, having ceased operations within the last six months.[387]

In the majority of European national space legislations, the authorization of space activities is delegated to a respective ministry. In countries that attempt to introduce the space sector regulation, a visible correlation is the stratification of competences regarding the broadly defined governance of the space sector between different ministries or entities dedicated to this sector. This is particularly evident when analysing the strategies of countries from Central and Eastern Europe, which, due to their historical heritage and various changes at the system level, have a noticeably different model regarding the space activities governance. It must be borne in mind that Governmental oversight of space activities is indispensable for fulfilling state obligations under international law as well as for safeguarding public safety, property, and the environment[388]. Licensing constitutes the foundational pillar of governmental regulation governing commercial space activities[389], therefore, the inclusion of a specific regulation to obtain it is crucial.

Prior to conducting space activities, the legislative regime may include the imposition on non-governmental space actors of the requirement to obtain the necessary governmental approval, depending on the jurisdiction.[390] This approval frequently takes the form of „licenses”, „permits”, „approvals” or „authorizations”. Often the approvals required for commercial entities may vary also depending on the space activity or specific space sub-sector.[391] Notwithstanding the aforementioned, the nature of the authorization itself remains a subject of inquiry, which in the majority of cases takes the form of a license. Pursuant to the Sofia Model Law, authorization for space activities can range from comprehensive general licenses to specific individual authorizations or licenses. As underscored by the UN Model ,

[387] Article 14 of the Law on the exploration and use of space resource and article 9(1) of the Law on Space Activities.
[388] Under current space law, environmental regulations are negligible. Existing provisions, such as those in the Outer Space Treaty, are general and don't provide a clear framework for protecting the space environment. A major concern is space debris, which poses a significant threat to the safety and security of space activities, undermining the core principles of sustainable development.
[389] Dempsey, P.S. (2014) 'National Legislation Governing Commercial Space Activities', Journal of Space Safety Engineering, 1(2), pp. 44–60.
[390] Sherbone (2022,p.33).
[391] Ibidem. p.34.

states may employ distinct procedures for the authorization and/or licensing of diverse types of space activities. The authorization mechanisms employed by countries seek to effectively manage the responsibilities for both its non-governmental and governmental space actors, thereby ensuring accountability to the international community.[392]

National legislation typically mandates a license for most space activities. The specific requirements for obtaining such a license are outlined in relevant laws and regulations. Despite diversification, certain common elements are evident across European space legislation. In most provisions, these relate to the operator having the necessary credibility, technical knowledge and financial capacity to carry out space activities and a risk assessment regarding its space activities. In addition, it is required to indicate that the space activity applied for does not conflict with the interests of national security and the fulfilment of the state's international obligations. It is often necessary to meet the International Tellecomunication Uninion's (ITU) requirements. The compulsory insurance as well as measures to prevent or reduce environmental pollution are necessary.

3.4.4. Registration

The registration of space objects encompasses both domestic and international dimensions.[393] According to article VIII of the Outer Space Treaty *"A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body […]."* In addition to the Outer Space Treaty, the cornerstone of space object registration lies within the Registration Convention.[394] The international dimension derive from the article III where *"The Secretary-General of the United Nations shall maintain a Register in which the information furnished in accordance with article IV shall be recorded."* Based on article II of the Convention on Registration *"When a space object is launched into earth orbit or beyond, the launching State shall register the space object by means of an entry in an appropriate registry which it shall maintain. Each launching State shall inform the Secretary-General of the United Nations of the establishment of such a registry."* The Convention delineates the specific information required to be submitted to the Secretary-General of the United Nations, which concerns " (*a) name of launching State or States, (b) an appropriate designator of the space object or its registration number; (c) date and territory or location of launch; (d) basic orbital*

[392] Ibidem. P.48.
[393] Lee, Y. (2006) 'Registration of space objects: ESA member states' practice', Space Policy, 22(1), pp. 42–51. Available at: https://www.sciencedirect.com/science/article/pii/S026596460500113X (Accessed:30.08.2025)
[394] Notably, the concept of registration was first addressed in the General Assembly's 1961 Resolution 1721 (XVI) before the Registration Convention enter into force.

parameters, including: (i) nodal period; (ii) inclination; (iii) apogee; (iv) perigee; (e) general function of the space object."[395] The Registration Convention introduce the certain practice concerning the jurisdiction control as well as registration requirement to be introduced by launching state in their domestic space laws.[396] An important document that should also be referred to is the Resolution adopted by the General Assembly regarding the recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects[397]. This Resolution outlines, inter alia, the scope for harmonizing the type of information submitted to the Secretary-General regarding the registration of space objects, with the objective of achieving standardized practices.[398] Furthermore, it presents recommendations for establishing the most comprehensive register of space objects and addresses aspects related to the transfer of supervision for a space object in orbit. The registration practices of individual countries are presented in a generalized manner below, as the specific elements constituting the information required for submission to the national registers are detailed within comprehensive regulations.

3.4.4.1. UK

The maintenance of a register of space objects in addition to the requirement under the Liability Convention, at national level is regulated by Section 7 of the OSA and Section 61 of the SIA. Space Industry Act refer to register of launches resulting, or intended to result in a craft or objects going beyond the stratosphere, or a ballon reaching the stratosphere carrying crew or passengers.[399]. The SIA primarily singles out elements such as: the date of the launch; the

[395] Further according to the given article "Each State of registry may, from time to time, provide the Secretary-General of the United Nations with additional information concerning a space object carried on its registry."
[396] Malinowska, K. (2017) *Space Insurance: International Legal Aspects*. Wolters Kluwer. P.23.
[397] A/RES/62/101 adopted in 2007 at the General Assembly 62nd session.
[398]According to the Resolution: "Also recommends, with regard to the harmonization of practices, that: (a) Consideration should be given to achieving uniformity in the type of information to be provided to the Secretary-General on the registration of space objects, and such information could include, inter alia: (i) The Committee on Space Research international designator, where appropriate; (ii) Coordinated Universal Time as the time reference for the date of launch; (iii) Kilometres, minutes and degrees as the standard units for basic orbital parameters; (iv) Any useful information relating to the function of the space object in addition to the general function requested by the Registration Convention; (b) Consideration should be given to the furnishing of additional appropriate information to the Secretary-General on the following areas: (i) The geostationary orbit location, where appropriate; (ii) Any change of status in operations (inter alia, when a space object is no longer functional); (iii) The approximate date of decay or re-entry, if States are capable of verifying that information; (iv) The date and physical conditions of moving a space object to a disposal orbit; (v) Web links to official information on sp ace objects; (c) States conducting space activities and international intergovernmental organizations that have declared their acceptance of the rights and obligations under the Registration Convention should, when they have designated focal points for their appropriate registries, provide the Office for Outer Space Affairs of the Secretariat with the contact details of those focal points;"
[399] Section 61(2) of the SIA.

spaceport from which the launch took place; the nature of each spacecraft or carrier aircraft launched; the purpose of the launch.[400]

However it need to be stressed out that the United Kingdom maintain two kind of national space registers i.e. UK Registry of Space Objects[401] and the Supplementary Registry of Space Objects.[402] This differentiation is due to the two pieces of legislation operating simultaneously in the UK space law system. Where licenses have been issued under the OSA or SIA[403] but the UK was either not the "launching state" for the given space object or in the event that it is determined jointly that another "launching" state should register the object in the UN register the objects are included in the Supplementary Space Objects Registry.[404] The register of objects for which the UK is the launching state is the UK Registry of Space Objects, maintained on the basis of sections 7 of the OSA and 61 of the SIA.[405] Those registries are maintained by UK Space Agency.

The following is an example of a recorded space object "OneWeb Launch 20 (OWLID00636-OWLID00655)" launched into space on 19 October,2024, which is listed in the UK Registry of Outer Space Objects. The information it contains relates to owner, date of launch, location of launch, designation[406], catalogue number[407], nodal period[408], inclination,[409] apogee[410], perigee[411], orbital position[412], general function, date of notification to UN and

[400] Section 61 (3) of the Space Industry Act.
[401] Based on Section 7 of the Outer Space Act 1986
[402] A registry of space objects where OSA licenses have been granted, but where the UK does not serve as the 'launching state' for those specific objects.
[403] As well as under the Outer Space Act 1986 (Gibraltar), Order 1996, the Outer Space Act 1986 (Cayman Islands) Order 1998. See in: https://www.caa.co.uk/publication/download/18917(Accessed:30.08.2025)
[404] UK Supplementary Registry of Outer Space Objects To comply with international obligations, section 61 of the Space Industry Act 2018 and section 7 of the Outer Space Act 1986 CAP 2208. Available at: https://www.caa.co.uk/publication/download/18917(Accessed:30.08.2025).
[405] UK Civil Aviation Authority (2025) Licences granted and registers of space objects. Last updated 23 May. Available at: https://www.caa.co.uk/space/about-us/licences-granted-and-registers-of-space-objects/
[406] This is the designation assigned by the Committee on Space Research (COSPAR) to each space object launched. This number remains constant and reflects the year of the launch and the sequence of launch within that year. The inclusion of a letter, for example, 'A' indicates that the object was the first satellite catalogued from that launch
[407] The North American Aerospace Defense Command (NORAD) catalogue number is made up of five digits. It is unique to each space object and allows for tracking by NORAD. This system has been used since the first satellite was launched in 1957.
[408] The time it takes a space object to travel once from ascending node to ascending node. The ascending node is the point at which an orbit crosses the ecliptic plane going north. The descending node is the point at which an orbit crosses the ecliptic plane going south.
[409] The angular distance of the orbital plane from the Earth's equator, stated in degrees.
[410] The point on the orbit where the space object is furthest from the Earth.
[411] The point on the orbit where the object is nearest to the Earth.
[412] The longitude position around the geostationary orbit. The space objects are all approximately fixed in the sky above the equator.

whether the object has been disposed or decayed. This information partly coincides with the requirements under the Liability Convention.

OneWeb Launch 20 (OWLID00636-OWLID00655)

Owner/Operator

Date of launch

Location of launch

Designation

Catalogue Number

Nodal period

Inclination

Apogee

Perigee

Orbital position

General Function

Notified to the UN

Disposed or decayed

Graphic 3. Registry of Outer Space Object -example of OneWeb Launch 20 (OWLID00636-OWLID00655) satellite registration

3.4.4.2. France

For the French system of space law, the detailed provision governing the registration of space objects are contained in the Order of 12 August 2011 establishing the list of information required to identify a space object in application of Title III of Decree No. 84-510 of 28 June 1984 on the Centre *N*ational *D*'études *S*patiales (French National Centre for Space Studies)[413]Nevertheless, according to Article 12 of the French Space Operation Act, it is he Centre National D'études Spatiales that is responsible on behalf of the State for conducting the registration of space objects on behalf of the State. According to Article 1 of the Order indicated, the information concerning a space object launched into space that is entered in the register kept by CNES includes the following: the designation of the space object; its general function, the name of the manufacturer as well as the history of ownership and any security interests, real or

[413] Arrêté du 12 août 2011 fixant la liste des informations nécessaires à l'identification d'un objet spatial en application du titre III du décret n° 84-510 du 28 juin 1984 relatif au Centre national d'études spatiales

personal, created over it. The information contained in the national registry covers also the date and place of launch, the parameters of the final orbit, including nodal period, inclination, apogee and perigee;the method of control in outer space an finally any anomalies encountered during orbiting or operation as a space vehicle.[414] With regard to Article 2 of the Order, the operator is obliged to transmit without delay changes to any information which has been entered into the register, in particular information which may affect the life of the object in orbit, its potential deorbit or the loss of control of the object by the operator.

3.4.4.3. Luxembourg

Luxembourg ratified the Registration Convention on 15 December 2020. [415] Therefore, provisions for a national-level space object registry were only included in the 2020 Act. The entity responsible for the creation of the National Space Object Register, under the Space Activities Act 2020, is the Minister responsible for Space Policy and Legislation. An operator who undertakes to launch a space object or to order such a launch is required to provide information to the Minister that allows the identification of the space object, its launch and the position it is to eventually occupy in space. Such information includes the inclination, apogee, perigee, nodal period, the launching date and territory or place, the general function of the space object and the main orbit parameters. The operator is obliged to inform the Minister of any change in the parameters of such an object, with particular reference to a situation which may lead to unintentional de-orbit. In addition, information about the registration mark or number placed on the space object should also be communicated to the Minister.[416]

The following is an example of a space object registered in the National Register of Space Objects of the Grand Duchy of Luxembourg.

[414] Article 1 of the Order.
[415] Calmes, Gładysz-Lehman and Schummer (2023).
[416] Article 15 of the Luxembourg Space Activities Act 2020.

MACSAT

COSPAR International Designator:	2023-155J
National Designation No.:	/
Owner / Operator Name:	OQ TECHNOLOGY S.àr.l.
Launch Date and Time:	09/10/2023, 03:36 CEST
Launch Location:	Centre Spatial Guyanais, French Guiana
Launch Vehicle Name:	VEGA
Nodal Period:	95.91 minutes
Inclination:	97.66 degrees
Apogee:	565 kilometers
Perigee:	561 kilometers
General Function of Object:	Telecommunications, Internet of Things (IoT)
Entry Date into National Registry:	23/01/2024

This is a formal date of the entry into the National Registry created following Article 15 of the Law on Space Activities. The information was already furnished by Luxembourg to UNOOSA in conformity with General Assembly resolution 1721 B (XVI)

Graphic 4. Luxembourg National Space Registry -example of MASCAT registration (Source: The Government of the Grand Duchy of Luxembourg, Ministry of Economy Luxembourg Registry of Space Objects.)

The Registration Convention guides what elements would need to be included in national space registers by referring to the requirements to be notified to the UN-level register. In the space legislation analysed, adherence to the guidelines arising from the RC is evident, where countries require similar information in their national registers. This rather narrow scope has been chosen to be implemented by countries such as Luxembourg, which applies explicitly only the requirements contained in the Registration Convention. Notwithstanding the aforementioned, in addition to the elements indicated in Article VI of the LC the practices of countries concerning national space registers varies due to the establishment of distinct models of national space registers. Nevertheless, it should be emphasised once again that the differences concern not only the scope of information provided to the national registry but also the structure of

register as in the case of United Kingdom which maintain two kinds of national space registers UK Registry of Space Objects[417] and the Supplementary Registry of Space Objects[418]
The competence of keeping and maintaining the Space Object Register in most of the legislations presented, is the same as the remit of authorising and supervising the space activities and it falls to the relevant ministry, which often delegate these competences to national agencies. Instances exist where countries, despite lacking comprehensive space legislation, have established registries, as in the case of Slovakia where a provisional Register of Space Objects of the Slovak Republic has been instituted within the Ministry of Education, Science, Research, and Sport of the Slovak Republic, specifically for the purpose of facilitating the launch of the first Slovak satellite, skCUBE.[419] . This registry has been replaced with the entry into force of the Space Activities Act.

As mentioned above, many countries allow the transfer of the license and its ownership. This issue of changing the supervision of the space object is indicated in the resolution A/RES/62/101, where the State of registry, in cooperation with the appropriate State[420]should provide the Secretary-General with supplementary information, regarding the date of the change in supervision, the identification of the new owner or operator as well as any modifications to the orbital position and change of the space object's function. Nevertheless, the existing space objects registration system involves far-reaching dilemmas which may relate, for instance, to the issue of space debris. Based on article VIII of Outer Space Treaty "State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object […]." The attribution of ownership for space debris, particularly small fragments detached from released space objects, is often challenging.[421] Given the substantial quantity of space debris, currently estimated at approximately 35,940 objects tracked by Space Surveillance Networks[422], determining their origin is a complex task. This, in turn, is significant in the case of developing new technologies such as Active Debris Removal. (ADR). The provisions of national space legislation are primarily rooted in the liability regime established by the Outer Space Treaty and Liability Convention, as well as the

[417] Based on Section 7 of the Outer Space Act 1986
[418] A registry of space objects where OSA licenses have been granted, but where the UK does not serve as the "launching state" for those specific objectives..
[419] Ministry of Education, Science, Research and Sport of the Slovak Republic For years 2020+ A conceptual framework of space activities in the Slovak Republic For years 2020+
[420] as stipulated in Article VI of the Outer Space Treaty
[421] S.M. Steele, Space Debris: A Basis for Actively Removing Objects Under an International Legal Order American Journal of Aerospace Engineering, 22 April 2022, Vol.8, No. 2 p. 52
[422] ESA, Space Debris by the Numbers, 22 December 2022, https://www.esa.int/Space_Safety/Space_Debris/Space_debris_by_the_numbers (Accessed: 30.08.2025).

registration obligations outlined in the Registration Convention. Adhering to the principles of good faith and international law, states should acknowledge their potential responsibility for the threat posed by space debris by recognizing ownership of these objects.[423] However, in practice, this can be a very difficult to rich.[424]

3.4.5. Liability

The foundation for the liability regime lies in the Outer Space Treaty and the Liability Convention, as previously discussed in the section on international law. Under international space law, it is the State that is responsible for damage caused by activities in space, whether carried out by governmental or non-governmental entities.

3.4.5.1. UK

Both the SIA and the OSA include indemnification liability to the government for any claims brought against the government for damage or loss caused by those space activities. This is due, among other things, to the obligations imposed by the treaties, in which the government has absolute liability for all space activities.[425]

According to Section 10(1) of the OSA "A person to whom this Act applies shall indemnify Her Majesty's government in the United Kingdom against any claims brought against the government in respect of damage or loss arising out of activities carried on by him to which this Act applies." The issue of insurance requirements for satellite operators has often been raised in the context of the 1968 Act, which requires all applicants to fully indemnify the government against any claims (related to losses or damages arising from activities) under civil liability.[426] According to an amendment introduced in 2015 to the OSA - there is a mandatory limitation of the operator's liability for compensation payments to the government, which in practice means that the UKSA, acting on behalf of the Secretary of State, is obliged to limit the operator's liability for compensation payments to the government when granting licenses under the OSA. An operator's limit of liability determining the compensation payable in respect of claims brought against the UK Government must be set out in all licenses issued under the OSA.[427]

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[423] Steele (2022, p.52),
[424] Hopej and Malinowska, (2023)
[425] UK Government (2019,p.19)
[426] Newman, C.J. (2019) 'The Space Industry Act 2018: Unlocking the UK Space Economy?', in Proceedings of the International Institute of Space Law (IISL), Vol. 62, No. 3, pp. 273–284. The Hague: Eleven International Publishing. p.28.
[427] UK Government (2019, p.20).

Liability for infringement or nuisance is excluded if space flight is carried out (in principle) in accordance with the SIA or the requirements and conditions imposed by this act (including licensing requirements). This legal procedure serves to protect the lawful operator from claims by third parties (who believe that their right to peaceful enjoyment of the land has been infringed). [428]In section 34 provisions regulate operator's compensation requirements for damage or injury to persons or property caused by a spacecraft or space object used by the operator for spaceflight, by anything falling from the object, and by any person on such a spacecraft. This applies on land or water in the UK or in territorial waters adjacent to the UK, or to aircraft flying over such land, sea, or water, or to persons or property on board such aircraft.[429] Strict liability means seeking compensation from the operator without the need for a third party to prove fault.[430] The liability provisions in the SIA are much more extended in comparison to OSA, due to the potential impact on UK society, of actions carried out from state territory. The inclusion of a strict liability[431] provision is therefore significant. The SIA also includes the power for the government to make regulations specifying those not entitled to strict liability claims.[432]

As already have been mentioned Operators acting in accordance with the Space Industry Act and the terms of the license will not have unlimited liability and therefore all licenses issued under the SIA and in respect of claims made under sections 35 and 36 contain a limitation on the operator's liability. Under the Law the obligation to indemnify the government etc. against claims (with some exceptions) is also regulated. [433] The limitation of operator's liability is contained under Section 12(2) which states that "An operator license may specify a limit on the

[428] UK Government (2019,p.19).
[429] Section 34 of Space Industry Act.
[430] UK Government (2019,p.20).
[431] (2) Where injury or damage is caused to persons or property on land or water in the United Kingdom or in the territorial sea adjacent to the United Kingdom, or to aircraft in flight over any such land, water or sea, or to persons or property on board any such aircraft— (a) by any craft or space object being used by a person ("the operator") for spaceflight activities, (b) by anything falling from such a craft or object, or (c) by any person in such a craft, damages in respect of the injury or damage are recoverable without proof of negligence or intention or other cause of action, as if the injury or damage had been caused by the wilful act, neglect, or default of the operator.
[432] UK Government (2019, p.19,20)
[433] "36Obligation to indemnify government etc against claims (1)A person carrying out spaceflight activities must indemnify— (a)Her Majesty's government in the United Kingdom, or (b)a person or body listed in subsection (2), against any claims brought against the government, or the person or body, in respect of damage or loss arising out of or in connection with those activities. (2)The listed persons and bodies are— (a)an appointed person; (b)the Health and Safety Executive; (c)the Health and Safety Executive for Northern Ireland; (d)the Office for Nuclear Regulation; (e)a body or person prescribed under section 21(2); (f)a public authority with whom arrangements are made under section 64. (3)Subsection (1)— (a)is subject to any limit specified under section 12(2) on the amount of a licensee's liability, except in prescribed cases or circumstances; (b)is subject to regulations under section 4(4)(e) or (f). (4)The obligation in subsection (1) does not apply— (a)to a person carrying out spaceflight activities as an employee or agent of a person who is authorised to carry them out by an operator licence, or (b)in relation to damage or loss resulting from anything done on instructions given by or on behalf of the regulator.

amount of the licensee's liability under section 36 in respect of the activities authorised by the license." Furthermore according to Section 34(5)[434]in respect of injury or damage arising from space flights performed by the licensee and sustained under specified circumstances or by specified persons, the license may specify a limit on the amount of liability under the relevant regulations. However, the legislation may also specify circumstances in which these limits will not apply.[435]

Section 37(2) indicates the entities (or persons) excluded from liability for taking or failing to take any relevant action or in the manner in which any relevant action is taken by the named entity or person (excluding gross negligence and willful misconduct).[436] The liability provisions are supplemented by delegated regulations such as Space Industry Regulations 2021 (Regulation 218,219,220, 221). SIA regulates insurance. The licensing regime found in the OSA requires the licensee to have liability insurance for the licensed activity (covering the procurement of the satellite launch and the operation of the satellite in orbit) before the license itself is issued.[437] This requirement applies to both SIA-issued and OSA-issued licensed activities, with the SIA referring to regulations which, among other things, also set out the obligation for launch operators involved in UK launches to obtain liability insurance.

[434] UK Government (2019, p.19-22)"
[435] UK Government (2019,p. 21)
[436] i.e. the Secretary of State; the regulator (if the regulator is not the Secretary of State); the CAA (if not an appointed person); the Health and Safety Executive; the Health and Safety Executive for Northern Ireland; the Office for Nuclear Regulation; a body or person prescribed under section 21(2); a public authority with whom arrangements are made under section 64. T.
[437] UK Government (2019, p.22)

3.4.5.2. France

According to Article 13 of the FSOA, the operator is solely liable for damage caused on the ground and in airspace and, in the case of damage caused outside the ground and airspace, the operator is so liable on a fault basis. Therefore, the provisions of the French Space Operation Act reflect what is contained in Article II and Article III of the Liability Convention. Only proof of the victim's fault can exclude or mitigate such liability. Furthermore, as soon as all the requirements set out in the license or authorization have been fulfilled or, at the latest, one year after the date on which these obligations should have been fulfilled - the State replaces the operator for damage occurring after this period (with the exception of wilful misconduct).An exception applies to activities carried out by the operator on behalf of the State in the interests of national defence and concerns the designation of the operator as solely responsible for damage caused to third parties as a result of its space activities, where the terms of such limitation should be included in the contract between the operator and the State. The French law also apportions liability in relation to persons participating in a space operation. If the payment of compensation to a third party is made by an insurance policy, a financial guarantee (referred to in Article 6) and, where applicable, a State guarantee, then the operator involved in the space operation or the manufacture of a damaging space object cannot claim against another operator involved in the same activities, unless the damage resulted from an intentional breach of the law. Where a participant in a space operation or in the manufacture of a space object has suffered damage as a result of those activities, the liability of another participant bound by its contract and the perpetrator of the damage shall be excluded, unless the contract provides otherwise in respect of damage during the production phase or in orbit, or in the case of wilful misconduct.

3.4.5.3. Luxembourg

According to Article 4of the Space Activities Act of 2020 as well as According to Article 16 of the Law of 2017 An operator who has been granted authorization for a space activity is fully liable for any damage caused during the mission, which includes all preparatory work and duties.The provisions are very similar in both acts

According to the law of 2020 The operator is responsible for implementing comprehensive systems, processes, procedures and mechanisms appropriate to the nature, scale and complexity of the risks associated with its business model and the proposed space activities. Furthermore as it was already indicated in the Registration section, The requirement to obtain a license is

based on the provision of among other thing, an assessment of the risk associated with space activities and the extent to which such risks are covered by the operator's financial resources or an appropriate insurance policy. The issue of liability is also relevant in the context of license revocation, where the regulatory authority is empowered to take all measures to ensure that space activities for which authorization has been revoked do not give rise to increased international liability for Luxembourg or pose a threat to property, the environment or the safety of persons.[438]

3.4.6. Environmental Protection

Environmental protection in outer space has gained importance over the last decade. The reason of this state of affairs is the growing congestion of orbits caused by the increase in inter alia commercialization of activities in outer space. As a result of growing space activity, currently, there are approximately 42,930 space objects tracked by the Space Surveillance Network, including 15,280 satellites, of which 12,500 are still functioning.[439] In 2024 alone, the total mass of space objects launched amounted to 1.9 million kilograms, and their number was approximately 2,802.[440] There are increasingly frequent cases in which property, health, and even human life are at risk. The reason for this is space debris, which does not burn up in the atmosphere and lands on Earth. Recent events related to the fall of space debris in Kenya and Poland only highlight the need for an appropriate approach to this issue, which, as it turns out, is a global threat. Such a concentration of space debris brings us closer to the risk of Kessler syndrome. The OECD has developed an experimental model for the occurrence of this syndrome in order to assess the economic impact of such an event on global value chains. This model indicates that global financial losses in the event of its occurrence would reach USD 191.3 billion, which is a disproportionate amount in relation to the funds allocated to the mitigation or prevention of space debris.[441] We are also increasingly seeing visible consequences on Earth . For this reason, statutory regulations concerning the space environment are becoming necessary not only to enforce space safety by operators, but also to implement mechanisms to prevent and minimize the creation of space debris.

[438] Article 9 (2) of law of December 15th 2020 on space activities.
[439] ESA Space Debris by the Numbers (2025).
[440] Space Foundation (2025) *The Space Report 2024 Q4*. Available at: https://www.spacefoundation.org/2025/01/21/the-space-report-2024-q4/ (Accessed 30.08.2025)
[441] *NetZeroSpace Initiative,* Recommendations For Enhanced Regulations and Public Policy with Regard to Space Debris Mitigation and Remediation, 2022

3.4.6.1. UK

The OSA, prior to the changes introduced by the Space Industry Act, did not regulate environmental issues. In 2018, through the SIA, a requirement was added (under terms of license) to the Act to carry out activities in such a way as to prevent outer space contamination or adverse changes to the Earth's environment.[442] The SIA contains broader provisions governing environmental aspects in Section 11, where the requirement for an assessment of environmental effects is indicated. According to Section 11(1) this condition applies only to a spaceport license and an operator license authorizing launches of spacecraft or carrier aircraft, who are required to apply for such assessment before obtaining a license (spaceport license or vehicle operator one).

By the assessment of environmental effects the SIA explains:

> "a) in relation to a spaceport license: an assessment of the effects that launches of spacecraft or carrier aircraft from the spaceport in question, or launches of spacecraft from carrier aircraft launched from the spaceport, are expected to have on the environment;
> (b) in relation to an operator license authorising launches of spacecraft or carrier aircraft: an assessment of the effects that those launches are expected to have on the environment."[443]

The Act also provides for the possibility of filing an assessment if certain conditions have been met (e.g. the environmental impact assessment was prepared in connection with a previous application and provided that there has been no change in relevant circumstances).[444]

3.4.6.2. France

In France a two-tier approach based on the French Space Operation Act and the Technical Regulations is visible. These Regulations are composed of launch systems and orbital system regulations. Space safety requirements and procedural rules are derived from an analysis of best practice and experience gained nationally. and globally[445]. In response to the development of

[442] Section 5(2)(e)(i) Outer Space Act
[443] Section 11(3) Space Industry Act
[444] Section 11(4) Space Industry Aact
[445] Lazare, B. (2013) 'The French Space Operations Act: Technical Regulations', Acta Astronautica, 92(2), pp. 209–212. Available at: https://www.researchgate.net/publication/260729060_The_French_Space_Operations_Act_Technical_Regulations (Accessed: 30.08.2025)

the *NewSpace* sector, the French Space Operations Act of 2008 was amended in August 2023. With regard to launchers, the new regulations focus on CNES's assurance of safety both in flight and on the ground, in particular during the return of rocket stages or orbital modules to the European spaceport in French Guiana. In addition, the Technical Regulations Update, which became effective on 1 July 2024, introduced other regulatory measures, including an opening to autonomous flight safety systems[446]

3.4.6.3. Luxembourg

The environmental provisions in the space legislation of Luxembourg, can be seen primarily in the 2020 Act. The first mention of the environment occurs in Article 2, under a definition that deals with damage caused to the environment directly by a space object within the scope of a space activity .[447] Article 2(2) deals with authorization issues and indicates several prerequisites that must be fulfilled in the event of withdrawal of such authorization. This is the case when the conditions of the authorization are no longer fulfilled, when false declarations are made in the authorization or if the operator does not use the authorization within 36 months of its granting. In the case of a withdrawal of the authorization, it is the responsibility of the Minister to take appropriate measures to prevent negative effects on, inter alia, the environment caused by such space activities, subject to withdrawn.

3.4.7. Development Support Clauses[448]

3.4.7.1. UK – sub-orbital flights

Regulations governing suborbital flights in the United States have been classified as space activities, making them one of the key elements of the American space law system. A similar approach has been adopted by the United Kingdom.[449] In the United Kingdom's national space legislation, suborbital flights are regulated by the Space Industry Act 2018 and the Air Navigation Order 2021. Suborbital flights are also regulated by the OSA 1986, but only apply to suborbital flights conducted outside the UK, unlike the SIA, which regulates activities conducted within the UK.

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[446] CNES (2024) Consultation on the evolution of requirements in terms of ground and flight safety for launches from Europe's Spaceport in French Guiana. Available at: https://cnes.fr/en/REI-NG-consultation (Accessed:30.08.2025)

[447] excluding the consequences of use of the signal emitted by that object for users.

[448] K.Hopej, K.Malinowska Economicimplicationsofnationalspacelegislations.Developmentsupport Clausesasaleverforindigenoussector Kaja Hopej, Katarzyna Malinowskab, 74th International Astronautical Congress (IAC), Baku, Azerbaijan, 2-6 October 2023. Astronautical Federation (IAF)

[449] B. Malinowski , PhD Dissertation Dylematy Regulacyjne Lotnictwa Suborbitalnego (Regulatory Dilemmas of Suborbital Aviation) Institute of Legal Science , Marie Curie-Skłodowska Univeristy.

Spaceports are also subject to British regulation, with specific types of licenses and related regulations included in the 2021 Act, along with a series of guidelines for applicants seeking a spaceport license.

The United Kingdom is among the countries, alongside the United States, New Zealand and the United Arab Emirates, that have introduced regulations on suborbital flights. Regulating suborbital flight activities can serve, inter alia, as a platform for the development of space flight components, providing a commercial research platform for many entities around the world. The use of suborbital flights in the national space economy also has advantages in terms of, for example, research objectives, by providing a high-quality microgravity environment without the need for much more demanding flights such as orbital flights.[450]

3.4.7.2.Luxembourg – space resources

The regulation of space resources from the perspective of international space law raises many questions and is certainly the subject of much discussion in the work on regulating national space legislation. Nevertheless, several countries have decided to take this step – on the European continent, only Luxembourg. Other countries regulating the space resources segment include the United States, Japan and the United Arab Emirates. A visible practice that can be observed in regulations concerning mining activities is the reference to compliance with the obligations of states under international treaties – mainly the OST.[451] Nevertheless, if the content of international obligations remains disputed, it is difficult to determine how the citizens of a given country could exercise any property rights over space resources in accordance with those obligations. A state's willingness to clarify such international obligations may affect the legal certainty that is important for entities involved in such pioneering space activities as space resources.[452] As Frans von Der Dunk notes, 'the better view is that the unequivocal prohibition of appropriation of celestial bodies as such does not give rise to a prohibition of commercial exploitation. Frans von Der Dunk argues that general freedom in relation to outer space can only be restricted by international consensus, as in the case of Antarctica or the high seas. He also points out that there is no explicit prohibition on the commercial use of outer space. The requirement contained in Article VI of the OST obliges states to authorise and continuously

[450] B. Malinowski About suborbital flights, rocket business and legal regulation, Ad Astra. Astropolitics and space law research program, 2022,
[451] M. de Zwart, S. Henderson, M. Neumann Space resource activities and the evolution of international space law In:Acta Astronautica Volume 211, October 2023, Pages 155-162
[452] P . De Man, Luxembourg Law on Space Resources Rests on Contentious Relationship with International Framework, Working Paper No. 189– July 2017.

supervise state activities under their jurisdiction. Therefore, fulfilment of this obligation means that such private activities are, in principle, lawful, except where specific conditions or prohibitions apply.[453] The law is increasingly being used as a tool of economic competition in the rapidly developing commercialisation of space.[454] According to the ESA Space Resources Strategy Report[455] "market revenues of 73-170B€ are expected from space resources from 2018-2045 supporting 845 thousand to 1.8 million full time employee years. Potential exploration cost savings (or equivalent cost of activities that would otherwise not have been undertaken) to end-users are estimated to be 54-135B€. Technology and knowledge spill overs are estimated to be of the order 2.5 B€ over 50 years, which might be considered conservative based on recent interactions with terrestrial industry. Additional benefits are predicted based on industrial clustering, development of new standards with contributions to social, strategic benefits, environmental benefits." For the first time in history, the Federal Communications Commission (FCC) in the United States has granted a license to a company engaged in commercial space mining. The license was awarded to an American start-up. [456] has received approval from the FCC to conduct a commercial mission related to deep space, which is planned for 2025. Permission for this mission was granted under Part 5 of the Commission's experimental license, which involves the creation of communications networks with the company's ground partners. Deep space has been defined by the International Telecommunication Union as space at a distance from Earth equal to or greater than 2 million kilometres.[457] As indicated in the above report and as a result of the precedent set by the example of an American start-up, there is a trend that indicates the possibility of future commercial activity in this segment.[458]

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[453] von der Dunk, F. (2015) 'The US Space Launch Competitiveness Act of 2015', JURIST, 30 November. Available at: https://www.jurist.org/commentary/2015/11/frans-vonderdunk-space-launch/ (Accessed:30.08. 2025).

[454] As Alban Guyomarc'h indicates (in the article Property on Space Resources: The search for a terminology. A focus on the Moon and its Mineral Resources) "Space resources law is an emerging topic of the highly composite field of space law. It is characteristic of this new momentum of pluralism of the sources within the subject. Indeed, it lies at the (conflicting) interaction of international and national law. Yet if public international law is no longer the main forum for debate, it is because with the resumption of a certain global economic competition for New Space, law has been leveraged as tool of economic rivalry. National space laws have thus become, more than ever, a support for the national economic strategies of space-faring nations." See in: A. Guyomarc'h, Property on Space Resources: The Search For A Terminology A Focus on The Moon And Its Mineral Resources, Journal of Law, Market & Innovation Vol. 2- Issue 2/2023

[455] ESA, Space Resources Strategy [Unclassified]. Available at: https://sci.esa.int/documents/34161/35992/1567260390 250-ESA_Space_Resources_Strategy.pdf

[456] Startup AstroFog has received FCC approval to conduct the Odin commercial mission.

[457] According to ITU: „Space research missions targeted for objectives further than 2 × 106 km from the Earth are" See more: https://www.itu.int/dms_pub/itu-r/opb/hdb/R-HDB-43-2013-OAS-PDF-E.pdf p.1-2 (Accessed:30.08.2025).

[458] Cooper, K. (2024) 'Asteroid-mining company AstroForge gets 1st-ever FCC license for commercial deep-space mission', Space.com, 5 November. Available at: https://www.space.com/space-exploration/tech/asteroid-mining-company-astroforge-gets-1st-ever-fcc-license-for-commercial-deep-space-mission (Accessed:30.08.2025)

Luxembourg regulations concerning activities related to the extraction of space resource are governed, as already mentioned, by the Law of July 20th 2017 on the exploration and use of space resources, which has been analysed in detail in the above section. According to Article 1 of the aforementioned law, 'Space resources are capable of being owned.' By introducing this regulation, Luxembourg became the second country in the world and the first on the European continent to regulate this segment of space activity. The restriction on conducting space activities related to the extraction of space resources is specified in Article 4 and allows such activities to be conducted by a limited partnership, a public limited company, a limited liability company under Luxembourg law, or a European company with its registered office in Luxembourg.

3.4.7.3. France – in-orbit servicing

Development support clauses related to French space law can be found, exceptionally, for example in the latest technical regulations (i.e. in the Order of 28 June 2024 amending the Order of 31 March 2011 on the technical regulation pursuant to Decree No. 2009 -643 of 9 June 2009 concerning authorisations granted pursuant to Law No 2008 -518 of 3 June 2008 on space operations) due to the definitions of services related to space activities contained therein, which are currently in the development phase and go well beyond the scope of currently established and well developed space activities. Although there have already been missions using these technologies (for example Darpa mission[459] or a robotic servicing spacecraft of Northrop Grumman). these services are not yet a permanent feature of operators' space activities. On-orbit servicing (OOS, in french *Service en Orbite*) or in-orbit servicing (IOS) involve the repair or expansion, as well as the maintenance of a satellite, or part or all of its structure. The aim of current and future missions is to perform service tasks in an automated manner.[460] Research is currently underway on how to use OOS to improve existing constellations and enhance future space objects in this regard.[461]

Following technological developments, France has introduced several definitions relating to the technology, which demonstrates its effectiveness and responsiveness to the rapidly developing space market through legal instruments. In the regulation, the service of on-

[459] DARPA is developing cost-effective technologies for servicing satellites using robots. The programme aims to create industry-standard solutions that will enable robots to approach satellites and manoeuvre around them in a fully autonomous manner.
[460] DRL, Space Operations and Astronaut Training Portfolio (2025) *On orbit servicing technologie. OOS 2025-06-27_RB_SP_OOS_v01*
[461] Mayberry, J., Davis, J. and Penn, J. (2019) 'Game Changer: On Orbit Servicing', CSPS, 6 May. Available at: https://csps.aerospace.org/papers/game-changer-orbit-servicing (Accessed:30.08.2025).

orbit servicing is defined as “In-orbit service: a service carried out by a service vehicle and which requires a meeting and/or approach and/or contact phase with a target object such as: inspection, capture, docking, orbital transfer, repair, assembly, fluid transfer, undocking.” In connection with the definition of this service in the regulation, a number of related definitions have also appeared, such as “service vehicle operator” [462] service vehicle”[463] „target object” or the action of „capture”[464] which according to the regulation exist where the physical connection is established between two space objects[465] The environmental issue is a also a key regulation related to this type of space activity. According to the Article 47.1 “In the event that the in-orbit servicing operation requires compromising the integrity of the target object, the servicing vehicle operator shall collect any intentionally created debris larger than or equal to 1 mm in its largest dimension, in accordance with the other provisions of this chapter, so that it is not released into outer space.”

3.5. Conclusions

The legal frameworks for space activities are evolving to support the growth of national space sectors, with specific clauses designed to facilitate development in areas where countries aim to specialize. This is evident in diverse ways across different countries, reflecting their unique capacities and strategic objectives.

Luxembourg has strategically positioned itself within the leaders in space resources by establishing a pioneering legal framework. Following the US, Luxembourg became the second country globally, and the first in Europe, to legally recognize ownership of space resources through its 2017 law. This legislation explicitly states that "space resources are capable of being owned," thereby confirming the legality of commercial use and extraction under their jurisdiction. By providing legal certainty for private entities engaging in space mining, Luxembourg aims to stimulate significant economic growth and attract investment in this emerging and potentially prosperous segment of the space economy.

The United Kingdom has addressed the growing interest in suborbital flights by integrating them into its national space law. Recognizing suborbital activities as a key element of the space economy, similar to the US, the UK legislature has introduced legal instruments to provide certainty for operators of sub-orbital vehicles. This approach aims to unlock the benefits of suborbital flights. By explicitly regulating suborbital activities, the UK seeks to fill

[462] “entity conducting service activities in orbit”.
[463] “space object that carries out in-orbit service operations”.
[464] “action to establish a physical connection between two space objects”.
[465] Article 1 of the regulation.

regulatory gaps and create a clear legal environment that encourages investment and innovation in this specific domain of space exploration and commercialization. France, on the other hand, has regulated space activities, whose development and demand will be visible in the long term, thus proving that the law can keep pace with technological developments and adapt to them in a certain way. The analysis presented in Chapter 3 concerning quantitative research on registered space objects following the introduction of national space legislation may be one of the indicators shaping the space market.

Chapter 4. Evolution of space sector in Central and Eastern European Region and its NSL

4.1. Introduction

This chapter examines the evolution of the space sector in Central and Eastern European countries and how this has driven the need for national space legislation. It will explore space programs from the Iron Curtain era, detailing their unique characteristics, and then analyze the paradigm shift brought about by the European Space Agency Enlargement process in the CEE region. This transformation clearly demonstrates the direct impact on the introduction and development of national space laws, evidenced by recent legislation in Slovakia, Slovenia,Greece and Poland's draft Space Activities Law.

Since the establishment of the European Space Agency, the space market on the European continent has changed its direction, placing Europe as an important player on the international stage and developing the capabilities of individual countries in the field of space. Thanks to the activities of the ESA, the European space sector can boast of having the appropriate technological resources and tools that make up key space missions [466]. It also has autonomous capabilities for new generation launching capabilities.[467] Without participation in ESA space programmes, the country would not have independent access to large space projects and contracts, and the prospect of obtaining them encouraged countries to take action at national level.. Consequently, there are various support instruments for space sector stakeholders depending on the country, including various types of business incubators, such as European Space Agency Business Incubator Centers ESA BIC

[466] The Programmes such as EGNOS, Galileo and Copernicus.
[467] Fiott, D. (2020) The European space sector as an enabler of EU strategic autonomy. Belgium: Directorate-General for External Policies of the Union (European Parliament). Available at: https://www.europarl.europa.eu/RegData/etudes/IDAN/2020/653620/EXPO_IDA(2020)653620_EN.pdf (Accessed:30.08.2025).

. The Iron Curtain, which historically divided the Eastern and Western blocs, highlighted the differences between European regions, including in the field of space activities. The period of the Soviet Union's existence was the main period determining the space activities of most Central and Eastern European countries, especially those operating under the Interkosmos programme. Over the years, however, each country has developed its own specialisations in the management of space activities, financing mechanisms, expertise and political and economic support.[468] The gaps in the space sector in Central and Eastern Europe relate to the lack of awareness among local authorities about the potential of space and the prioritisation of the space sector. These differences also relate to the relatively low level of public and private investment in the space sector, as well as the low level of cooperation between institutions and industry.[469] Another important factor is the lack of space regulations at the national level, which, however, is slowly changing. From another perspective, the CEE region may increase its importance on a European scale because it is characterised by very high innovation potential and good, well-established international cooperation.

Nevertheless, the Central and Eastern European Region is characterised by high potential in terms of innovation and well-embedded international cooperation which gives it a good chance of increasing its importance at the European scale. For the purposes of this dissertation, the countries of Central and Eastern Europe are classified on the basis of the so-called Three Seas Initiative, which is a forum of 13 countries in Central and Eastern Europe whose territory is located between the Adriatic, Black and Baltic Seas. These countries include Slovenia, Slovakia, Romania, Poland, Lithuania, Latvia, Hungary, Greece, Estonia, Czech Republic, Croatia, Bulgaria and Austria. Most countries in the region lack adequate space sector regulations. This dissertation uses them as examples for nations seeking to regulate space activities. Due to limitations, the analysis focuses on select countries, representing the regional context i.e. Slovakia, Slovenia, Poland and Greece.

4.2. Space Programmes in CEE Region under the iron curtain

The Soviet Union significant influence on the Eastern Bloc countries also extended to their space activities, which were developed under the Soviet Programs. These programs included, for example, Intersputnik and particullary (from the point of view of CEE Region) Intercosmos

[468] European Space Policy Institute (2014) ESA Enlargement: What Interested Countries Can Do to Prepare Themselves for Ultimate Accession – With a Special Focus on the CEE Region. ESPI Report 47. Vienna, Austria: European Space Policy Institute. Available at: https://www.files.ethz.ch/isn/176962/ESPI_Report_47.pdf (Accessed:30.08.2025).
[469] Bukała A., Malinowska K.,and Szwajewski M. (2022).

which was developed from 1967 to the 1990s. Intercosmos was created in the year in which the Outer Space Treaty came into force, i.e. 1967 and was dedicated to cooperation between countries such as the USSR, Mongolia, Cuba, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland and Romania, as well as Vietnam, which joined later – in 1979. 23 satellites, 11 research rockets and several hundred meteorological rockets were launched under the joint research program. From each country that was involved in the program, cosmonauts with the ability to fly abroad Salyut station received an opportunity to do so. The contribution of each country was to build its own equipment and deliver it to the Soviet Union with its own coverage of its share without exchanging funds. It was the Soviet Union that dictated the rules of cooperation, which determined the activities of each participating country. [470]

The first "Intercosmos" satellites whose purpose was to study the solar radiation were equipped by three countries - the German Democratic Republic (GDR), USSR and The Czechoslovak Republic (CSR). Hungary, Romania Poland and Bulgaria participated in the auxiliary observations.[471] Obtained on the Kosmos348 satellites, the first results under the program "concerned the study of changes in the parameters of the upper atmosphere caused by geoactive corpuscles, energetic electrons and ions, as well as other manifestations of solar activity." Since then, 16 more satellites have been launched as part of the Intercosmos program, as well as several vertical rockets.[472]

The Intercosmos program developed such fields as meteorology, physics, biology, medicine, space telecommunications and monitoring of natural resources.[473] It included various forms of cooperation, ranging from launching space objects for both application and scientific purposes, joint observations, development of onboard and ground equipment, joint processing and analysis of space research results.[474] Through their activities in the Intercosmos program, the participating countries have developed various experience .

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[470] European Space Policy Institute (2007) Space in Central and Eastern Europe: Opportunities and Challenges for the European Space Endeavour. ESPI Report 5. Vienna, Austria: European Space Policy Institute. Available at: https://www.espi.or.at/wp-content/uploads/espidocs/Public%20ESPI%20Reports/espi_report_5.pdf (Accessed:30.08.2025)

[471]Czrnyszow, M. (1981) Interkosmos, Starry Paths of Friendship. Moscow: Novosti Press Agency Publishing House.

[472] Narimanov, G.S. (red.) (1976) Within the Interkosmos Program(W ramach programu Interkosmos). Moskwa: Mashinostroenie, p. 12.

[473] European Space Policy Institute (2007) Space in Central and Eastern Europe: Opportunities and Challenges for the European Space Endeavour. ESPI Report 5. Vienna, Austria: European Space Policy Institute. Available at: https://www.espi.or.at/wp-content/uploads/espidocs/Public%20ESPI%20Reports/espi_report_5.pdf (Accessed: 30.08.2025).

[474] Narimanov, G.S. (red.) (1976) Within the Interkosmos Program(W ramach programu Interkosmos). Moskwa: Mashinostroenie, p. 4.

Nevertheless, it should be noted that it was the countries of this region that were the first to send non-Soviet and non-American astronauts into space, namely Vladimir Remek of Czech-Slovak origin and Pole-Mirosław Hermaszewski in 1978. Among the astronauts from the region were: Georgi Ivanov and Aleksandr Aleksandrov from Bulgaria, from Hungary- Bertalan Faraks and Karoly Somonyi as well as Dimitru Prunariu from Romania.[475] Today, all six countries (i.e. Czech Republic, Slovakia, Poland, Bulgaria, Hungary and Romania) back then under the Iron Curtain are part of the European Space Agency as full members or in other forms of cooperation[476], contributing to the development and use of European competencies in space activities.

4.3. ESA enlargement process in CEE

In order to better understand the differences in the various national space sectors, it is necessary to take a deeper look at the various stages that guarantee full participation in the ESA community. The procedure of accession to the organization consists of specific requirements, the so-called 'Enlargement process' which is based on several levels (i.e. Cooperation Agreement, ECS Agreement, PECS Charter and finally, agreement regarding the Accession to ESA Convention). The initial formal stage, based on ESA Convention[477], consists of signing a Cooperation Agreement[478] between ESA and the country. In this phase, the State have very limited financial responsibilities. The European Cooperative State (ECS) Agreement which is the next step, includes a broader framework of partnership.[479] It guarantees, among other things, the possibility for a country's indigenous companies to participate in European Space Agency procurements. The state also gains access to all programmes run by ESA, with the exception of the 'Basic Technology Research Programme.' This agreement is concluded for five years and cancel all of the previous agreements. The final stage is the 'Plan for European Cooperating State' (PECS Charter[480]) which should be concluded within at least one year since the ECS

[475] Ibidem page 6-7
[476] Nikolova, M. (2021) 'Central and Eastern Europe's forgotten space pioneers', Emerging Europe, 14 August. Available at: https://emerging-europe.com/culture-travel-sport/central-and-eastern-europes-forgotten-space-pioneers/ (Accessed: 30.08.2025)
[477] Article XIV.1 of ESA Convention: 'The Agency may, upon decisions of the Council taken by unanimous votes of all Member States, cooperate with other international organisations and institutions and with Governments, organisations and institutions of non-member States, and conclude agreements with them to this effect.'
[478] Is also known as Framework Agreement.
[479] Article XIV.3 of ESA Convention: '3. Such cooperation may also take the form of according associate membership to nonmember States which undertake to contribute at least to the studies of future projects under Article V, 1 a (i). The detailed arrangements for each such associate membership shall be defined by the Council by a two-thirds majority of all Member States.'
[480] The Plan for European Cooperating States (PECS) is designed to prepare countries to join ESA as an Associate Member State and later as full members. At present a PECS Charter has been signed by 11 European countries,

signature. This five-year programme enables the development of the country's space industry as well as increasing awareness of ESA's activities. Under the programme, the bulk of the country's contribution is returned to the state in the form of contracts for industry in the framework of Competitive Calls for Outline Proposals.[481] The structure prepared in this way allows the states to become familiar with the activities of the agency and its programmes.

The first Central European state which have signed a Cooperation Agreement with ESA was Hungary in 1991. The country became the first European Cooperating State on 7 April 2003, by signing the ECS Agreement. Hungary joined the PECS Charter for the first time in 2003 and for the second time in 2008. The country became a Member State in 2015.[482] Poland signed a Cooperation Agreement with ESA three years later, in 1994. In 2007, the signing of the ECS Agreement opened the door to Polish participation in several research projects under the auspices of the Agency. On 2008 Poland joined the PECS Charter and finally, on 13 September 2012, became the 20th full member of the European Space Agency, listing its accession agreements to the Convention for the establishment of European Space Agency (ESA Convention)[483]. Czech Republic, signed a Cooperation Agreement in 1996 and became European Cooperating State in 2003. On 2004 the country signed the Plan for European Cooperating State Charter and accessed to the ESA Convention in 2008.[484] In the same year, the first Cooperation Agreement between the European Space Agency and Slovenia was signed. Two years later, in 2010 the Republic of Slovenia has entered into an ECS Agreement. Since 2016 Slovenia became a full member of ESA on January1,2025.[485] The cooperation Agreement between the Government of Republic of Croatia and the European Space Agency on space cooperation for peaceful purposes was concluded on 19 February 2018 and entered into force in July of the same year

Estonia, Czech Republic, Hungary, Romania and Poland have since ascended to full membership, two are now Associate Members (Slovenia and Latvia), and four are currently in PECS (Cyprus, Bulgaria, Lithuania and Slovakia).

[481] ESA, *Plan for European Cooperating States - General overview*. Available at: https://www.esa.int/About_Us/Plan_for_European_Cooperating_States/General_overview (Accessed:30.08.2025)

[482] ESA (2015), *Hungary accedes to ESA Convention* Available at: https://www.esa.int/About_Us/Corporate_news/Hungary_accedes_to_ESA_Convention2 (Accessed:30.08.2025).

[483] ESA (2012), *Poland accedes to ESA Convention.* Available at: https://www.esa.int/About_Us/Corporate_news/Poland_accedes_to_ESA_Convention (Accessed:30.08.2025).

[484] ESA (2008), *Czech Republic accedes to the ESA Convention* Available at: https://www.esa.int/About_Us/Plan_for_European_Cooperating_States/Czech_Republic_accedes_to_the_ESA_Convention (Accessed:30.08.2025)

[485] ESA (2016), *Slovenia signs Association Agreement.* Available at: https://www.esa.int/About_Us/Corporate_news/Slovenia_signs_Association_Agreement (Accessed:30.08.2025).

Due to the above, countries of CEE Region have formed partnerships with the ESA at different stages of development of their domestic space sector. The Agency's enlargement procedure was, and still is, intended to facilitate the accession process as well minimise the difficulties for aspire members. Therefore it is important not only to present the current situation in the context of the development of national space legislations but also to show the progress of the particular countries involved in the enlargement process. This is important as the vast majority of space contracts concluded by European entities relate to European Space Agency programmes. Through the execution of contracts commissioned by, among others, European Space Agency the European Space Sector acquires competences and develops technologies which are used to create commercial services and products. Access to such contracts is guaranteed by appropriate cooperation with the European Space Agency. Using the example of Poland mentioned earlier, at the time of accession to the ESA, less than 50 Polish entities were registered on the portal dedicated to ESA tenders[486], now there are more than 400 of them. This demonstrates not only the facilitated access to the space sector but also the involvement of national players. Slovenia was the first to introduce its space law from the countries within CEE Region, Slovak Republic has adopted its Space Act entered into force as of 1 February 2025 and Poland is at an advanced stage of approving a Space Law at national level. In the published space strategies which were already described in Chapter 1, one of the main goals is to regulate space activities through National Space Legislation. Such an approach is in the interest of countries, not only at the administration level but also in the context of space commercialization and in order of providing the right conditions for commercial operators to grow and develop. The creation of an appropriate legal environment should ensure proper coordination of space activities, their management and thereby increasing the efficiency of space actors and establishing the legal stability necessary for such a risky and long-term space activities.

4.4. Slovenia

In 2008, Slovenia signed its Cooperation Agreement with the European Space Agency, which was followed by the European Cooperating State Agreement two years later. Slovenia's relationship with the ESA deepened in 2016 when it became an Association Member, allowing it to directly participate in the agency's optional programs.[487]On the basis of this cooperation eleven companies from the country have signed agreements with ESA.[488] The Republic of

[486] ESA Star Programme
[487] ESA (2016) 'Slovenia signs Association Agreement. Available at: https://www.esa.int/About_Us/Corporate_news/Slovenia_signs_Association_Agreement (Accessed:30.08.2025)
[488] The Slovenia Times (2020) 'Parliament endorses amended association agreement with ESA'.Available at: https://sloveniatimes.com/parliament-endorses-amended-association-agreement-with-esa/ (Accessed:30.08.2025)

Slovenia improved its cooperation, by signing in 2020 the upgraded Association Agreement, with the goal of becoming a full member.[489] In this connection, Slovenia has been involved in i.e. Earth Observation programmes, general support technology programmes, human and robotic exploration and Prodex scientific programme.[490] The first native satellites (Nemo HD and TriSatand) were launched into space in 2020. The third satellite - TRISAT-R was launched into orbit in 2022. On 16 March 2022 National Space Legislation was adopted by National Assembly.[491] As of today, the Slovenian space sector includes around 90 entities.[492] In addition, a major milestone achieved by the Republic of Slovenia was the ratification of the membership agreement in 2024, leading to full membership of the European Space Agency from 1 January 2025.[493]

The Slovenian Space Activities Act (ZVDej)[494] came into force on April 9, 2022, thereby establishing a comprehensive legal framework governing space activities undertaken within the Republic of Slovenia and/or by Slovenian entities. The introduction of national space legislation followed the country's increased activity in space domain, including the launch of the aforementioned three satellites, i.e. Nemo HD, TriSatand, TRISAT-R and the increasingly visible growth of the domestic space sector. Slovenia is Party to four international space treaties[495] and, in spring 2022 became one of the first countries in Central and Eastern Europe to introduce a space law at national level. As the Slovenian space sector has been presented comprehensively in the chapter related to Space Strategies, this part of the dissertation is devoted to the legal aspects related to space activities in the Republic of Slovenia.

4.4.1. Scope of Application

According to Article 2 - the Space Activities Act "shall apply to space activities taking place in the territory of the Republic of Slovenia and to space objects enters in the Republic of Slovenia's register of objects launched into outer space […]." Furthermore according to section 2 of the article 2 "This Act shall also apply to space activities taking place outside the territory of the

[489] Republic of Slovenia, 'Slovenia will strengthen cooperation in the optional programmes of the European Space Agency (ESA). Available at: https://www.gov.si/en/news/2022-11-24-slovenia-will-strengthen-cooperation-in-the-optional-programmes-of-the-european-space-agency-esa/ (Accessed:30.08.2025)
[490] Ibidem.
[491] At its session held on 16 march 2022, the national assembly adopted the Space Activities Act (zvdej).
[492] ESA, ESA-STAR Registration, ESA Entities Directory. Available at: https://esastar-emr.sso.esa.int/PublicEntityDir/PublicEntityDir (Accessed:30.08.2025).
[493] The Slovenia Times (2025) 'Slovenia full member of European Space Agency', The Slovenia Times, 1 January. Available at: https://sloveniatimes.com/42092/slovenia-full-member-of-european-space-agency (Accessed:30.08.2025).
[494] Zakon o vesoljskih dejavnostih (ZVDej).
[495] Outer Space Treaty, Liability Convention, Registration Convention, Rescue Agreement.

Republic of Slovenia on a vessel or aircraft registered in the Republic of Slovenia and concerning space activities carried out by citizens of the Republic of Slovenia and legal persons established in the Republic of Slovenia." Therefore, both territorial and personal jurisdiction fall within the standard models of national space legislation which were already mentioned in the previous models analysed. *Jurisdicito ratione loci* indicates space activities carried out on the territory of the Republic of Slovenia as well as outside its territory - on vessels or aircrafts registered in Slovenia. *Jurisdicitio ratione personae* covers Slovenian citizens carried out space activities and legal entities registered on the country's territory. In addition, Slovenian legislation indicates in Article 1 the place of registration, i.e. those objects that have been registered in the Slovenian Register of Space Objects.

The material scope of the national legislation, includes, according to the definition of space activities, activities relating to launch of space object into outer space, the operation and operational control of the space object in outer space, and the controlled termination of the space object's operation in outer space and/or its return to Earth, including the procedures for limiting the generation of space debris"[496] Notably, it is worth noting that this definition additionally includes the indication of controlled termination procedures for space operations to mitigate the creation of space debris, an issue which is further explored in the Building Block on environmental protection.

4.4.2.Definitions

Beyond the aforementioned definition of space activities, the Slovenian Space Act also includes standard definitions, such as space object which means "an object launched into outer space or an object intended to be launched into outer space, including the individual parts of this object that are either combined with or separated from the other components, or its launch vehicle and parts thereof" or space operator which "means a natural person or a legal person that conducts or intends to conduct a space activity." Less common definitions, include launch vehicle and space debris. The launch vehicle is considered by Slovenian law to be "a rocket-powered vehicle or other dedicated vehicle with which a space object is launched into outer space", while the definition of space debris refers to objects that remain in space after the end of space activities or as a result of space activities or objects that return to Earth in an uncontrolled

[496] Article 3 of the Slovenian Space Activities Act.

manner. The Act also defines low earth orbit[497] as well as geostationary orbit,[498] which are terms defined according to prevailing worldwide standards.

4.4.3. Authorization & Supervision

Space activities carried out on the territory of the Republic of Slovenia and/or by its citizens should be based on a license issued by the Minister responsible for technology within four months of the submission of a complete application[499] which includes the elements indicated in the Act[500] but also determined in the relevant Decree.

The main requirements for obtaining a license under the Act include the professional nature of the operator, who has adequate technical knowledge of space or related technologies, as well as adequate financial resources to carry out space activities. In addition, space activities should be carried out in accordance with internationally recognised standards, concerning the safety and technology of space activities. Furthermore, space activities shall not jeopardise national defence, public order, security of people and their property, national intelligence and security operations as well as protection against natural or other disasters. Space activities must also not adversely affect the environment and aviation as well as public health. Furthermore, the activities can't be carried out in contravention of treaties and international law that are binding for Republic of Slovenia. The requirements imposed by the Act concerned the compatibility of the use of available frequencies, in accordance with the applicable regulations on radio spectrum management[501]. Among the requirements for the conduct of space activities, there is also a reference as to the use of UN guidelines in relation to the mitigation of space debris.

The operator is required to demonstrate compliance with the above conditions and must provide an appropriate risk assessment. With some exceptions[502], on the basis of such a risk assessment, the ministry should request competent authorities for an opinion in the context of fulfilling the relevant conditions. Such opinions may be provided by the ministry responsible for defence[503], the ministry responsible for internal affairs[504], the Slovene Intelligence and

[497] "low Earth orbit" shall mean an orbit with an altitude between 160 km and 2,000 km.
[498] "geostationary orbit" shall mean an orbit with an altitude between 35,586 km and 35,989 km above the Equator.
[499] Article 4 section 2 of the Slovenian Space Activities Act .
[500] Article 5 of the Slovenian Space Activities Act .
[501] With the exception of launchers.
[502] In the case of insurance par. 3 article 6 and requirements identified In paragraph 4 of Article 6 of the Slovenian Space Activities Act.
[503] "regarding the condition that the space activity does not pose threat to national defence or to protection against natural and other disasters".
[504] "regarding the condition that the space activity does not pose threat to public order or to the safety of people and their property".

Security Agency[505], the ministry responsible for health[506] and the ministry responsible for the environment.[507] Additionally the opinion shall be issued by the ministry responsible of transport if there is a possible impact of space activities on aviation in the airspace of the Republic of Slovenia.[508] In reference to compliance with international law as well as UN Space Debris Mitigation Guidelines the ministry may obtain an opinion from the European Space Agency. [509].

An extension of typical space legislation, in this case is the aspect of designating an appropriate commission to verify a license application. Such a commission is appointed by the minister in charge of technology and consist of a chairperson and four members. The member of the commission should consist of two representatives of the ministry responsible for technology, one representative of the ministry in charge of science and one representative of the ministry associated with the space object operation. On the basis of documents providing compliance with the conditions for carrying out activities determined by law (and further specified by Decree) as well as risk assessment and opinions issued, the commission assess compliance with the conditions referred to in paragraph 1 of article 5. [510] The revocation of a license may take place in certain cases determined by law, such as failure to carry out launch within five years of obtaining a license due to circumstances attributable to the operator, providing incomplete or false information in an application for a license which would affect the decision to obtain a license, not having the required insurance or no longer fulfilling the conditions required for obtaining a license.[511]Where a space object has already been launched, the Ministry, by decision, may request the operator to transfer all space activities to another operator under the conditions indicated in Article 13[512] or to take appropriate steps to cease

[505] "regarding the condition that the space activity does not pose a threat to intelligenceand security operations outside the area of defence".
[506] "regarding the condition that the space activity does not negatively affect public health".
[507] "regarding the condition that the space activity does not negatively affect the environment".
[508] Par. 3 Article 8 of the Slovenian Space Activities Act.
[509] which may act in an advisory capacity to the NSL.
[510] Article 10 paragraph 1,2 and 4.
[511] Par.2 Article 12.
[512] "(1) The operation of the space object for which the licence referred to in Article 4 of this Act was issued shall be transferred to another operator that is a citizen of the Republic of Slovenia or a legal person established in the Republic of Slovenia only with the ministry's permission if the new operator meets the conditions referred to in points a) and c) of paragraph one of Article 5 of this Act and if the operator to which the operation of the space object is to be transferred has insurance pursuant to Article 6 of this Act. (2)If the operation of the space object is transferred to an operator that is a citizen of another state or a legal person established in another state, the ministry shall grant permission provided that the Republic of Slovenia has signed with that State an international agreement regarding the regulation of liability for damage. (3) The operation of the space object shall be transferred from the operator that is a citizen of another state or a legal person established in another state to another operator that is a citizen of the Republic of Slovenia or a legal person established in the Republic of Slovenia only with the ministry's permission if the conditions referred to in Article 5 of this Act are met and if the operator to which the operation of the space object is to be transferred has insurance pursuant to Article 6 of this Act."

space activities including procedures to mitigate the generation of space debris within technically feasible limits.[513]

4.4.5.Registration

According to paragraph 3 Article 14 of the Space Activities Act "The Republic of Slovenia shall be considered the state of registration if the space object is entered in its register*"*. The objects of registration in the national register of space objects are the launched space objects for which a license has been issued by the ministry as well as the space objects for which an international agreement has been concluded on the regulation of liability for damage.[514]Space Objects Register in the Republic of Slovenia is established and maintained by the ministry responsible for technology, who is also responsible for the communication of these data to UN Register of Objects launched into Outer Space as well as for the supervision of space activities. The register is public and the personal data contained in the register are collected for the purposes of identification and verification of space object's operators and space object's owners, their rights and obligations. Personal data contained in the register are therefore stored in a permanent way.[515]

The information that must be provided for the registration of space objects, includes the name of the space object and its type, the number of licenses to carry out space activities, the frequency allocation of the ITU (including details of the radio frequency allocation decision and extract from the Master International Frequency Register on completed international coordination) and the relevant designation of the space object by the Space Research Committee of the International Council of Scientific Unions, the basic parameters of the orbit (nodal periods, inclination, apogee, perigee) as well as the date, the territory and location of the launch with the launch vehicle, the purpose of the space object, the status of space object and several other aspects related to the identification of space object's ownership.[516] Any changes to the Data, or any amendments, must be notified to the Ministry in writing, within eight days. The Ministry is responsible for promptly notifying the UN Secretary-General of any entry in the

[513] However based on the Act "(3) Before revoking the licence, the ministry may set a time limit for the operator to remedy the irregularities referred to in paragraph one of this Article. Before the expiration of the time limit, the operator may request the extension of the time limit on justified grounds; in this case, the cumulative time limits for the remedy and for the extension shall not exceed one year."

[514] Paragraph 4 of article 14 of the Slovenian Space Activities Act.

[515] Article 14 paragraph 1 and 8 of the Slovenian Space Activities Act.

[516] "h) the full name and address of permanent or temporary residence or the company name and address of the space object owner and the tax number;i)the full name and address of permanent or temporary residence or the company name and address of the operator and the tax number;"

register and of any change or amendment to the data entered in accordance with the Liability Convention.

4.4.6.Liability

Article 14 of the Space Activities Act imposes strict liability on the operator for any damage caused by its space object on Earth, on a vessel or to an aircraft in flight. On fault basis – the operator should be liable for damage caused by a space object in space. The Space Activities Act therefore replicates the provisions contained in the Liability Convention. The law also provides for a right of reimbursement against the operator in the event that the Republic of Slovenia pays for damage caused by its space object, but such a right should be limited to the amount of the insurance. However, this exemption shall not apply if the operator has caused damage by gross negligence or intentionally, if the operator's conduct is contrary to this Act or if the damage is due to non-compliance with the conditions for issuing a license as set out in the Act.

According to the law, the operator is required to take out insurance of at least EUR 60,000,000 covering any damage caused by space activities to persons or property, per damage even for the duration of space activities. Exceptions to this are where the license application shows that:

a) "the space object does not have its own means of propulsion, has a mass of less than 150 kg, is not part of a constellation, is to be launched into an unoccupied low Earth orbit slot and is constructed from materials that ensure that the object will burn up when it re-enters the atmosphere or

b) the space object does not have its own means of propulsion, has a mass of less than 150 kg, is to be launched into orbits above the low Earth orbit, and will remain in orbits that do not encroach upon the geostationary orbit or orbits with an altitude between 19,882 and 20,482 km"

In addition, the operator is exempt from obtaining insurance if the space object is launched into space by a legal entity whose existing insurance covers both the state's liability for any damage caused by all space activities and its liability for damage, in the minimum amount of EUR 60,000,000.

Furthermore to the complete exclusion of obtaining insurance, the Act also introduces certain limitations on its terms, i.e. covering damages caused by space activities for the period of time covering the launch of a space object and for one year after the launch of a space object. This is the case when the space object has a mass of less than 150 kg, is not self-propelled, is

part of a constellation of at most five satellites and is to be launched to a free position at LEO, constructed of materials ensuring burn-up during deorbit; for an object having the same conditions, except it is not a part of a constellation and; for a space object having its own propulsion but mass of less than 150 kg and is to be launched into an orbit above LEO while remaining in an orbit that does not violate GEO or an orbit with an altitude between 19 882 and 20 482 km.[517]

4.4.7.Environmental Protection

It should be noted that the Slovenian Act introduces some novelties in the approach to regulating this aspect in national space legislation. First of all by indicating in the definition of space activities by "including the procedures for limiting the generation of space debris". The scope of space activities indicated in this way does not raise doubts about the substance of environmental protection in conducting space activities. Another element demonstrating the special place given to environmental protection in the Act is *explicity* the reference to the UN Space Debris Mitigation Guidelines in the case of requirements for obtaining a space activity license. Also important in this regard is the provision to obtain the opinion of the ministry responsible for the environment in relation to the condition that the space activity does not negatively affect the environment. Among the operator's obligations indicated under Article 15 is the obligation to notify the ministry of any accidents or emergency that poses a risk to the, *inter alia*, environment.

In conclusion, the Space Activities Act comprehensively addresses key aspects of space activities, including the licensing process, the registration of space objects, operator responsibilities and liability for damages. Furthermore, it reflects fundamental obligations stemming from international space law and establishes administrative procedures, financial security measures, and even penal provisions. The act also provides necessary definitions and a mechanism for clarifying the scope of its application in relation to space activities.

4.5. Slovakia

Slovakia is a party to four international space treaties, namely the Outer Space Treaty, Rescue Agreement, Liability Convention and Registration Convention. The implemented Act on Space Activities is primarily aimed at fulfilling the international obligations resulting from the above-mentioned treaties, not only for state organisations, but also for stakeholders of academia, the

[517] Article 6 paragraph 4 of the Slovenian Space Activities Act.

industrial sphere, scientific and research organisations or the private sector. The law primarily regulates the issuing of licenses, they change or termination, the conditions of supervision of space activities as well as the registration process of space objects. It aims not only to implement the international obligations incumbent on the Republic of Slovenia in connection with space activities, but also to provide clear rules for the development on space activities, which may translate into a positive impact on entities operating in sectors directly or indirectly related to space sector. Thanks to clear provisions on liability for damage caused by space objects, the risks for Slovakia in terms of compensation have been reduced and the legal regulations implemented, which provide a certain degree of stability, are aimed at attracting potential investors.[518]The following section presents a detailed analysis of the Building Blocks of the regulation governing space activities in Slovakia, which entered into force on 1 January 2025

4.5.1. Scope of Application

Act No. 378 of 28 November 2024 on the regulation of space activities and on the amendment to Act of the National Council of the Slovak Republic No. 15/1995 Coll. on administrative fees, as amended governs conducting of regulated space activities, the establishment of a National Registry of Space Objects as well as the competences of government authorities in the field of space activities.[519] The Article 1 has primarily the function of summarising the subject matter of the Act. It is irrelevant whether the space activity is carried out by a legal entity established in Slovak Republic or by its citizen. The Explanatory Memorandum points out the relevance of the state in which the space object is registered and which state is responsible for it - from the point of view of international regulations. [520]

4.5.2. Definitions

The definitions indicated in the Act are align with the model national space legislation and include definitions such as space activity, space object or operator. According to the Slovak Act on Space Activities, space activities regulated by it, cover both the commissioning of a space object, including associated preparatory and control work and the launch and control of the space object, including its return to Earth.[521] The indication of preparatory and control work in

[518] Explanatory memorandum (Dôvodová správa)
[519] Article 1 ACT No. 378 of 28 November 2024 on the regulation of space activities and on the amendment to Act of the National Council of the Slovak Republic No. 145/1995 Coll. on administrative fees, as amended ("Slovakian Regulation of Space Activities")
[520] Explanatory Memorandum.
[521] Section 2 paragraph 1 Slovakian Regulation of Space Activities.

relation to the launching of an object is of relevant importance from the point of view of qualifying an activity as an space activity subject to the regime of this Act, for example in the context of liability, as is discussed below. According to the law the space object means "a man-made object intended to be launched or launched into outer space, including its components, as well as the vehicle of the space object and its parts". The definition of launching state is transposed explicitly from the Liability Convention . Operator is defined as a person who conducts or intends to conduct regulated space activities under an authorization to conduct regulated space activities. The Slovak legislator has indicated under the term space debris "non-functional and non-purposeful space object or part thereof located in outer space". Of particular significance is the decision within Slovak law (a relatively uncommon provision in national legislation to date for example in Australia, Denmark and Kazkhstan law) to define outer space by adopting the spatialist[522] concept, by establishing a boundary at an altitude of 100 kilometers. According to the law "Outer space means the space exceeding 100 km above sea level".[523]

4.5.3. Authorization & Supervision

Undertaking regulated space activities in accordance with the Act requires an authorization, which is issued, in the case of the Slovak Republic, by the Ministry of Transport. The requirements for space activities that can be subject of such authorization are similar to those in other national space legislations. These requirements include ensuring that space activities do not pose an imminent threat to the defence or security of the Slovak Republic, public order, the safety of persons, property or public health". In addition, space activities must be consistent with the state's international obligations and foreign policy interest. The applicant for authorization shall be a professional possessing adequate knowledge and expertise in the field of space activities and shall fulfil the technical prerequisites for conducting space activities. Further according to Section 3, space activities must not lead to the launching of weapons, weapons testing or the construction of a military bae in outer space. Furthermore, the applicant has integrity and can ensure that is able to provide the termination of the space activity. Compliance with the Radio Regulations of the ITU as well as liability insurance policy is also mandatory. The financial capability is of relevant importance as well as the measures taken to mitigate the generation of space debris and that the "regulated space activity will not cause unreasonable pollution of outer space or adverse changes to the Earth's environment and its

[522] This approach: focuses on a fixed boundary, such as the Kármán line at 100 kilometres.
[523] Section 2 of the Slovakian Regulation of Space Activities.

atmosphere".[524] The law contains certain exemptions regarding the space activities carried out in the interest of the defence and security of the Republic of Slovakia. This exclusion may, when applying for authorization, include the conditions set out in the Act, with the exception of the requirements for ITU regulations and compulsory insurance, as well as the obligations arising from the registration of a space object set out in Section 10(1) a-e.[525] In relations to what the application itself should contain, the law indicates very specific requirements. The following table indicates the elements that should be included in an application for a space activities authorization:

Condition	Requirement details	Description
Contents of the application	Applicant identification	natural person: name, surname, date of birth, permanent address, nationality natural person entrepreneur: business name, (name/surname if different), organization, identification number if assigned), place of business legal person: name, legal form, registered office address, organization identification number (if assigned), name, surname, address of statutory body/members
	Applicant Contact& Criminal Record Data	Contact details as well as data for criminal record extract
	Basic Activity Description	Description of the regulated space activity
	Other relevant information	Any other information, which may influence authorization decision
Application Accompaniments	Detailed Activity Description	e.g. business plan or project plan, including space object description, technical specification, purpose; identification of cooperating states (if applicable); list and quantity of nuclear or radioactive material (according to Atomic Act); data to be collected/processed and recipients ; expected lifetime of space object.
	Manufacturer identification	
	Contingency Plan	Plan for loss or control, communication/data failure, other operational events
	Activity Termination Description	Detailed description of ending the space activity
	Relevant Statements	Statement that activity poses no threat to Slovak Republic's defence and security, public order, safety, property or public health. Statement that activity complies with Slovak Republic international obligations and foreign policy interests Statement that activity will not involve launching weapons, weapons testing or military base construction

[524] Section 3 Slovakian Regulation of Space Activities.
[525] Section 3 par. 4

	Space Debris Mitigation measures	Description of measures to limit space debris, pollution and adverse environmental effects
	Financial Capability	Description, including profit and loss, cash flow forecast (with 24 month risk analysis) criteria for financial capabilitie are specified (for example through no bankruptcy or tax arrears)
	Administrative fee	Proof of payment administrative fee
	Space Activities Information	Information of the Applicant's regulated space activities
	Personnel Information	Identification and proof of technical education, knowledge, expertise as well as qualification for personnel involved in the activity.
Submission before the launch (submitted no later than 30 days before launch)	Launch Contract information	Contract with launch facility operator (parties, location, schedule)
	Test Report	Report veryfing space object's technical capability
	Cooperation Agreement	Information on agreements with other states (if applicable)
	Liability Insurance	Information on the insurance policy, coverage, and insurer liability, or risk analysis (if insurance is not required per Section 11(3))
	Radio Equipment Competence	Certificate of competence for radio equipment operation (if required)
	Frequency Authorization	Individual authorization for frequency use

Table 1.6. Key Components of a Space Activities Authorization Application under Slovakian Law.

The Ministry of Transport provides official templates for applications concerning authorizations. The application is then sent to the relevant ministries for their opinion, where the lack of agreement from relevant authority should, according to the law, be binding on the Ministry of Transport. The application is submitted for review to the following ministries: the Ministry of Foreign and European Affairs of Slovak Republic, the Ministry of Defence, the Ministry of Education, Research, Development and Youth of the Slovak Republic and the Nuclear Regulatory Authority of the Slovak Republic (in situations where space activities involve nuclear or other radioactive material).[526]

Any change to the terms of the license as well as the termination of space activities should be notified to the Ministry by the operator within 7 days. The Ministry of Transport can modify an authorization for space activities upon the operator's request (e.g. for the extension of the period of validity[527], a change of the professionally competent person[528], a change of

[526] According to the Section 5 "The authorisation shall include a) the identification of the operator, b) a description of the regulated space activity, c) conditions, obligations or restrictions on the conduct of the regulated space activity as determined by the Ministry of Transport, in particular in the field of defence or security of the Slovak Republic, space debris or the provision of data pursuant to Section 15, d) the period of validity of the authorisation.
[527] „the Ministry of Transport shall extend the period of validity of the authorisation if the operator demonstrates that the launched space object is still fit for purpose, the application to be made not later than 45 days before the expiry of validity of the authorisation,"
[528]Pursuant to Section 3(2) of the Slovakian Regulation of Space Activities.

operator[529]). The Ministry is also entitled to revoke the authorization under certain conditions such as non-compliance or false information provided in the application for an authorization. The Ministry may also impose obligations for the activity's continuation or termination during revocation and, if necessary, transfer it to another operator, specifying a validity period [530] . The Act indicates a closed catalogue of authorization expiries, such as: expiration of its period of validity, revocation of the authorization, expiration of a specific period of validity[531], dissolution of the operator (in case of legal person) and upon death of the operator (or being declared death).[532]

In the context of supervising space activities, it is necessary to underline that according to the law, supervision is entrusted to both the Ministry of Transport and the Ministry of Defence, with subject to that the competences of other authorities under specific regulations should not be affected. In relation to the Ministry of Defence's, its supervision applying to "immovable property in which the regulated space activity is carried out or the controlled facility is located belongs to the administration of the Ministry of Defence, or is State property under the administration or use of a State-budget funded organisation, a contributory organisation or a State enterprise of which the Ministry of Defence is the founder or settlor". Supervision is based on administrative and on-site inspections, along with reviewing oral and written statements from the operator and their personnel (or representatives), and by analyzing submitted documents and data.

4.5.4. Registration

The Minister of Transport is also responsible for the register of space objects in the Slovak Republic. According to the Act, this register should contain all space objects for which Slovakia is recognised as a launching state in accordance with international space treaties and for which the relevant authorization has been issued. The jurisdiction of the Slovak Republic covers the

[529]Section 4 of the Slovakian Regulation of Space Activities.

[530] According to Section 7 paragraph 3 "(3) The Ministry of Transport may, in the decision on the revocation of the authorisation, impose obligations on the operator to ensure the temporary continuation or safe termination of the conduct of the regulated space activity until the date of loss of validity of the authorisation; if the operator fails to comply with these obligations, the Ministry of Transport shall decide to entrust the conduct of the regulated space activity to another operator, if the other operator agrees to this. In the decision on the revocation of the authorisation and in the decision to entrust the conduct of the regulated space activity to another operator, the Ministry of Transport may specify a specific period of validity of the authorisation if it is not possible to ensure the temporary continuation or safe termination of the performance of the regulated space activity by the date of loss of validity of the authorisation"

[531] "specified in the decision entrusting the conduct of the regulated space activity pursuant to Section 7(3), if specified by the Ministry of Transport,"

[532] Section 8 of the Slovakian Regulation of Space Activities.

space object entered in the register remaining in orbit (including its crew).[533] The situation where the launching state is a country other than Slovakia is also regulated, and the person participating in space activities for which a license has been issued in accordance with the Slovak Space Activities Act is obliged to send the relevant information on the launch of a space object, together with a copy of the cooperation agreement on the launch of such object, no later than on the day of the launch to the Ministry of Transport.[534] Among the information that should be included in the registry are: launching State name, the call sign of the radio station located on board the space object[535], the territory location date and time of the launch, the basic orbital parameters, general function of space object and other data specified by the Ministry of Transport. The operator is obliged to register the space object at least 30 days before the planned launch.

As for the obligation to notify the registration of the space object in the UN Register, this duty is incumbent to the Ministry of Transport, nevertheless upon written request of the Ministry, the Ministry of Foreign and European Affairs of the Slovak Republic shall, notify the Secretary-General of the United Nations of the data referred above and any changes.[536]

4.5.5. Liability

Applicant for the authorization is required to have a third-party liability insurance policy with an insurance indemnity limit of no less than EUR 60,000,000 per insured event. This is related to covering the risk of liability for damages. In addition, the third-party liability insurance policy, in accordance with paragraph 2 of Section 11, must include an obligation on the insurer to pay compensation to the Ministry of Transport where damage is caused in connection with the operation of the space object. The exemption from the obligation to take out an insurance policy applies to space object with a mass less than 100 kg, built with materials that guarantee the object's combustion on re-entry into the atmosphere. However, it should be noted that this exemption will not apply if the damage risk analysis shows that there is a high risk of causing the damage.

In this connection, the obligations of the insurer with whom the operator has taken out the policy referred to above are *explicity* regulated in the Act. This is the case where the compensation of damage is made by the Slovak Republik (in accordance with an internation

[533] Section 9 of the Slovakian Regulation of Space Activities.
[534] Paragraph 3 Section 9 of the Slovakian Regulation of Space Activities.
[535] "assigned by the Regulatory Authority for Electronic Communications and Postal Services under the Radio Regulations of the International Telecommunication Union"
[536] Section 10 of the Slovakian Regulation of Space Activities.

agreement biding for to Republic of Slovakia).The insurer is obliged to compensate the Ministry of Transport for damages caused by the operator's space object up to the amount of the indemnity which the Slovak Republic has paid to the injured party (however, no more than the limit of indemnity stated in the policy). Nevertheless, in the case of intentional damage – the operator is obliged to pay the total sum which the Republic has paid to the injured party in connection with the damage caused by space object.[537]

4.5.6. Environmental Protection

The protection of the space environment in the Slovak Space Activities Act has been covered quite extensively in comparison with the standard space regulations models. Firstly, the regulation includes a definition of space debris which are defined as "a non-functional and non-purposeful space object or part thereof located in outer space", which facilitates their partial identification and classification and thus determines more precise aspects of its protection.

The protection of the space environment itself has been strengthened through authorization requirements, i.e. the demonstration of appropriate measures to minimise the generation of space debris or unwarranted pollution od space and the introduction of adverse changes to the Earth's environment and its atmosphere (along the lines of Article IX of the OST). According to Section 5 the authorization shall therefore include, *inter alia,* "conditions, obligations or restrictions on the conduct of the regulated space activity as determined by the Ministry of Transport, in particular in the field of defence or security of the Slovak Republic, space debris or the provision of data pursuant to Section 15". In addition, Article 17 contains provision about the operator's obligation to take and comply with appropriate measures to reduce the production of space debris, depending on the technical condition of the space object concerned, referring to international guidelines on the reduction of space debris.

The Space Activities Act precisely regulates the possibility of penalties in relations to specific premises. These can range from EUR 5,000 to EUR 10,000 and from 10,000 to EUR 50,000. The first range of penalties relates to the situation where data for the space object register or any related changes are not provided. This also applies to information that may significantly affect the validity off the authorization or its possible modification, as well as failure to notify circumstances that prevent the operational control of a space object (or a change or termination of operations) and failure to agree to the supervision or correction of delicenses identified during the inspection.[538]

[537] Section 11 of the Slovakian Regulation of Space Activities.
[538] Section 13 of the Slovakian Regulation of Space Activities.

The second range of penalties amount includes carrying out space activities without an authorization, violations of its conditions, obligations or restrictions, failure to comply with obligations to ensure the temporary continuation or safe termination of activities (determined by a decision to withdraw the permit), making a change of operator in breach of the requirements indicated in the Act, or failure to promptly report an accident or incident that poses a risk to the safety of people, environment or the maintenance of public order and national security, without takin appropriate measures to mitigate the risk.[539]

4.6. Poland

Republic of Poland became a full member of the European Space Agency in 2012. Since then, with the implementation of the Polish Industry Incentive Scheme (PLIIS) programme dedicated specifically to the Polish entities, there has been a dynamic progress in fact, nascent Polish space sector. In total, over the five years of the programme around five hundred applications have been submitted to PLIIS, from which over two hundred were accepted.[540] Currently the Polish space stakeholders consists of around 400 stakeholders including academia, industry and other economic entities.[541] After accession to the ESA, another milestone for the Polish space sector was the establishment of the National Space Agency under the Act of 26 September 2014 on the Polish Space Agency[542]. The scope of the Act covers in particular the agency's activities, its bodies, seat as well as the Agency's subordination, which in 2020 was changed with the amendment of the Act[543] from the Prime Minister to the Minister responsible for Economic Affairs.[544] With the establishment of the National Agency, the framework of the national space ecosystem began to take shape. Although efforts to regulate space activities date back to 2012 since the accession of the country to the ESA, the first draft of the law appeared five years later, in July 2017.[545] The draft law was rather narrow in nature and its content mainly corresponded to the fulfilment of the international obligations imposed on Poland as a party of the space

[539] Section 13 Paragraph 2 of the Slovakian Regulation of Space Activities.
[540] Polish Space Agency (2022), *2012-2022: Poland – 10 years in the European Space Agency.*Available at:https://polsa.gov.pl/en/news/2012-2022-poland-10-years-in-the-european-space-agency/ (Accessed:30.08.2025).
[541] ESA, *ESA-STAR Registration, ESA Entities Directory* .Available at: https://esastar-emr.sso.esa.int/PublicEntityDir/PublicEntityDir (Accessed:30.08.2025).
[542] Act of 26 September 2014 on the Polish Space Agency. Journal of Laws from 2020 item 1957.
[543] 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).
[544] Article 3,5,8 of the Act of 26 September 2014 on the Polish Space Agency, Act of 13 June 2019 amending the act on the Polish Space Agency and the act on government administration departments.
[545] Draft of July 10, 2017 on Space Activities and the National Register of Space Object. Available at: https://legislacja.rcl.gov.pl/docs//2/12300856/12449052/12449053/dokument300886.pdf (Accessed:30.08.2025).

treaties[546]. The scope of its regulation included the provisions for performing space activities and for keeping the National Register of Space Objects. In addition to the aspects required by international law, an attempt was also made to define the terms as 'space activities'[547], 'space object'[548], 'operator'[549], 'damage'[550] and 'launching state' [551]. The draft act has raised the issue of civil liability, insurance for damages and also the penalties for, inter alia, carrying out space activities without the required authorization.

The next draft was formulated in 2020 and its scope was slightly broader, in addition to basic obligations such as authorization and supervision of space activities, maintenance of a national register of space objects or liability issues the draft included inter alia a definition of space debris or a reference to sustainable development in the space sector.[552] In the meantime, the most important document of a strategic nature concerning the space sector in Poland has been published - the Polish Space Strategy, which was adopted by the Council of Ministers on 26 January 2017[553]. The Strategy set out 3 main objectives and 5 specific one for Poland in the area of outer space[554]. As already indicated in Chapter One in the section related to national space strategies, the Strategic Objectives of Polish Space Strategy to 2030 cover three aspects such as a competitive national market and a 3% turnover of this market[555], issues of satellite data used by public administrations and the involvement of indigenous space companies[556] as

[546] International obligations include issues of authorization, supervision of space activities, maintenance of a national register of space objects or the introduction of a liability regime.
[547] "space activities" means the launching of a space object into space, the exploitation of a space object, and the bringing of a space object to Earth".
[548] "space object means an object that will be or has been launched into space, its components, as well as its launch vehicle and its parts".
[549] "operator shall mean a natural person, a legal person, or an organisational entity without legal personality which intends to carry out or carries out space activities".
[550] "damage shall mean damage within the meaning of the Convention on International Liability for Space Damage, drawn up in Moscow, London and Washington on 29 March 1972 (Journal of Laws of 1973, item 154), i.e.: loss of life, injury or other threat to the health of foreign natural persons or loss of, damage to property or assets of countries other than the Republic of Poland or foreign natural or legal persons or assets of international intergovernmental organisations".
[551] "launching state shall mean a State within the meaning of Article I(a) of the Convention on the Registration of Launched Objects in Outer Space, opened for signature in New York on 14 January 1975 (OJ 1979, item 22).'
[552] Polish Draft Act on Space Activities of June 10, 2020. Work on the basis of the 2020 project have been resumed as part of the Working Group for the Development of the Draft Act on Space Activities established in January 2022 within the Ministry of Development and Technology, in which the author of this article actively participated.
[553] Journal of Laws from 2017, item 203.
[554] Kłoda M.T., Noga T. (2021) 'Evaluation of the implementation of the indicators of the Polish Space Strategy, Polish Space Professionals Association'[Online] Available at: https://www.pspa.pl/images/documents/Ocena_realizacji_wskaznikow_Polskiej_Strategii_Kosmicznej.pdf (Accessed:30.08.2025).
[555]According to the Polish Space Strategy:"The Polish space sector will compete effectively on the European market and its turnover will amount to at least 3% of the total turnover of this market (in proportion to Poland's economic potential)."
[556] According to the Polish Space Strategy: "The Polish public administration will use satellite data for faster and more efficient implementation of its tasks, and domestic companies will be able to fully satisfy the internal demand for such services and export them to other markets".

well as proper accession to satellite infrastructure for Polish economy and public institutions[557]. The specific objectives are related to increasing the competitiveness of the Polish space sector, the development of satellite applications, the growth of capabilities in the area of defence and security, the creation of appropriate conditions for the development of the domestic space sector and the appropriate building of human resources for the sector.[558]In January 2022 within the Ministry of Development and Technology the Working Group for the Drafting of the Space Act has been constituted. Work has resumed on the draft act, the regulations of which are expected to enter into force in the coming years.[559]

The dynamic development of the sector observed in recent years, the number of start-ups created, the increasing awareness of society, the recent opening of an ESA Business Incubator Center as well as the planned increased contribution to ESA create new opportunities for stakeholders in the space sector. The introduction of a space law is therefore not only intended to meet the international obligations imposed by treaties, but also to support the domestic sector by providing inter alia the legal certainty.

The long-awaited Polish draft law on Space Activities appeared on the website of the Government Legislation Centre on 14 May 2025, together with an accompanying draft Regulation on Insurance and the National Space Objects Register.[560]

The 28-page draft law regulates the principles of space activities (including the conditions and procedure for its granting , refusal, revocation and its transfer to another entity), the principles of liability for damage caused by a space object , the principles and procedure for control of space activities, the manner of maintaining the National Register of Space Objects (KROK) and the principles of liability for violations of the Act (including the manner of imposing fines). In addition, the Act regulates how incidents related to space activities are to be clarified (including the manner in which the Commission dedicated to space activities operates) as well as how to deal with finding an item suspected of being space debris. The last two elements are rare in national space legislation, and their appearance is likely to be a consequence of events that took place on 19 February 2025, namely the observed fragmentation of Falcon 9 rocket debris over

[557] According to the Polish Space Strategy: "The Polish economy and public institutions will have access to satellite infrastructure to meet their needs, especially in the field of security and defence."
[558] Ibidem.
[559] Work on the basis of the 2020 project have been resumed as part of the Working Group for the Development of the Draft Act on Space Activities established in January 2021 within the Ministry of Development and Technology, in which the author of this article actively participated.
[560] Minister of Development and Technology (2025) Draft law on space activities. Available at: https://legislacja.rcl.gov.pl/projekt/12397750/katalog/13127702#13127702 (Accessed:30.08.2025)

Poland, four of which landed on Polish territory (in Komorniki, Wiry, Śliwno and Szamotuły near Poznań).

4.6.1. Scope of Application

The scope of the Act applies to space activities conducted on the territory of the Republic of Poland, on board a maritime vessel or aircraft registered in Poland and on the territory of a foreign state or in an area not subject to the sovereignty of any state[561] by an operator, i.e. a legal person or an organizational unit not being a legal person, to which a separate act grants legal capacity defined as an operator, holding a permit for space activities.[562] Both territorial and personal jurisdiction limited to the prerequisites of being a legal person or an organizational unit without legal personality (with legal capacity conferred by a separate law) under the condition of holding a space activity authorization is apparent here. It is important to exclude, on the basis of Article 4, space objects using the airspace of the Republic of Poland, to which the provisions of the Aviation Law[563] apply, but only to the extent of securing the airspace and obtaining a permit to perform the flight. As has already been emphasized many times in this dissertation, the most important thing in order to identify the application of the Act is the definition of space activities. In the draft Polish space law, space activities are not indicated among the definitions (as it is the case in standard legislation), nevertheless the notion of space activities is devoted to the entire Article 6. According to it, space activities should be understood as, firstly, launching or attempting to launch a space object into space, controlling a space object in space and exploiting it, as well as the removal of a space object from space, including its deorbit. Article 6(2) also contains an exclusion of what should not be considered space activities - i.e. the exploitation or control of a space object in the framework of an amateur radio communication service within the meaning of the Electronic Communications Law[564]. Such a precise indication of what is and what is not space activity within the meaning of the draft in question, definitely facilitates verification by the addressees, but also by the entity exercising supervision and control, which activities are subject to the regime of the Space Activity Act. It follows from the Polish draft of the Space Act that the legal regime covers activities carried out in space, which actually only covers a fraction of the activities related to the space sector.

[561] Article 3 of the Polish draft law on Space Activities.
[562] Article 8 of the Polish draft law on Space Activities.
[563] Article 4 of the Polish draft law on Space Activities.
[564] According to Article 2(60) of the Electronic Communications Law of 12 July 2024 (Journal of Laws, item 1221)an amateur radio communication service should be understood as ‘a radio communication service for the establishment of mutual communications, technical research and individual training performed for non-profit purposes by authorised persons exclusively for their own needs’.

4.6.2. Definitions

Among the terms defined in the Polish draft, there are standard ones such as a space object (understood as a movable thing which is capable of functioning autonomously in space, whose launch into space is planned or which has been launched into space, being in an active or inactive state, or a vehicle carrying its components), the launching State (within the meaning of the Liability Convention) and the launching of a space object into space (within the meaning of the Liability Convention and the Registration Convention) or the operator as already indicated above in the section on personal jurisdiction. For the purposes of the definition of a space object, the concepts of launch vehicle and launch of a space object into space have been clarified, and for the purposes of the definition of space activities, the removal of a space object from space have been indicated. Importantly in an environmental context, space debris has also been defined. A launch vehicle was defined as a rocket vehicle with a payload, capable of reaching space while the removal of a space object from space was defined as the activities performed by a space object that is already in Earth orbit (based on an algorithm or with the help of an operator) to deorbit or insert a space object beyond the protected area of geostationary orbit.

As mentioned in previous chapter, a consensus on the definition of outer space in the international arena has not been reached, and two directions i.e. spacialist and functionalist are evident in the international discussion. In the draft Polish Space Act, the legislator opted for a spacialist approach, defining the space boundary as the space located above 100 km above sea level - similar to what Slovakia has recently done and what has been functioning for years in the legislations of Kazahstan Australia or Denmark.

In addition, in connection with the concept of sustainable development in space, the Polish legislator has defined in detail the concept of space debris, which will be discussed in detail in the Building Block on environmental protection.

4.6.3. Autohrisation and Supervision

The competence regarding the issuance of space activity authoriaztion in the draft act is entrusted to the President of the Polish Space Agency. Such a permit has the nature of an administrative decision and is granted, to the extent that space activity is defined, at the request of the operator. Such authorization may concern more than one space object. An operator applying for a space activity authorization, according to the draft, must fulfil a total of three prerequisites, i.e. it must employ and use the services of persons having the relevant education, knowledge or experience necessary to carry out space activities, have the financial capacity

necessary to carry out space activities in an uninterrupted manner and ensure the performance of space activities in a manner specified in Article 7 of the draft.

The Article 7 indicates an extensive set of conditions to which space activities are subject. It must not jeopardise the defence and security interests of the state, it must ensure that risks to human health or life and property are reduced to a minimum, and it must take into account the need for long-term sustainable use of space in terms of eliminating or reducing to a minimum the negative impact of space activities on the environment of both Earth and space, including the prevention of space debris and for peaceful purposes. The prerequisite for meeting the standards listed in the closed catalogue in paragraph 4 of Article 7 of the proposed law is described in detail manner. The spacecraft must comply with standards relating to the stability of the fuel and oxidisers and the reliability of the engines, the mechanical strength and resistance to space conditions, the stability of the energy sources and their optimum consumption, the communication of the spacecraft with the control station, the precision of the control and navigation systems as well as the equipment with thermal control systems or the possession of appropriate emergency systems.[565] Nevertheless, in the opinion of the author of this dissertation, such a selection of requirements relating to the diversity of space operations (especially those carried out as part of R&D) may be irrelevant in relation to some projects that may not fit into the requirements, but still meet safety conditions. It is common practice in national space legislation to refer to 'internationally applicable standards', which gives a certain degree of freedom in verifying the requirements to be met by the operator, but also the possibility to apply standards adopted by organizations dealing with space activities, i.e. the ESA, in which countries actively participate. The authorization shall be granted by administrative decision of the President of the Agency in four of the following scopes: (1) the launching of a space object into space; (2) the exploitation of a given space object in space; (3) the control of a given space object in space; (4) the removal of a given space object in space. The authorization may concern more than one of the above scopes and more than one space object.[566]

The Act indicates in detail what elements an application for a space activity permit should contain. The elements of such an application are set out in the table below:

An important element, which may have a great impact on the assessment of the application, in the draft law is the description of the planned space activity, containing a range of information ranging from payload information, description of the tehchnology used in the space facility or description of procedures for elimination or reduction of the risk of space

[565] Article 7 of the Polish draft law on Space Activities.
[566] Article 9 of the Polish draft law on Space Activities.

debris. The application must be submitted not later than six months prior to the intended date of commencement of the space activities covered by the application. This is the deadline (counted from the date of filing a complete application) for granting or refusing the permit by the President of the Polish Space Agency.[567] Nevertheless, the draft stipulates that before granting the authorization, the President of the Polish Space Agency is obliged to consult, in the case of the impact of the activity on national security and defence - the Minister of National Defence and the minister in charge of public administration, and in the case of the impact of launching or removing a space object from space on the safety of air operations conducted in Polish space - also the minister in charge of transport.[568]

A higher level authority in relation to the President of the Polish Space Agency is the minister in charge of the economy with regard to the granting, refusal, amendment, withdrawal and transfer to another entity of a permit to carry out space activities, control of space activities, pursuit of a claim from the operator on behalf of the State Treasury (in the case of repair of damage caused by a space facility by the Republic of Poland) and proceedings on fines.[569]

Within the framework of the proposed provisions on the space authorization, the draft also includes grounds for its refusal, revocation as well as transfer and amendment. The provisions on the issuance of the permit shall apply *mutatis mutandis* to the modification of the permit.[570] The refusal to issue the permit takes place in the event that the operator does not meet the requirements imposed by the Act, in the event that a final decision prohibiting the conduct of business activity was issued against him, or in the event that one of the authorities consulted by the President of the Space Agency issued a negative decision within the scope ascribed to him pursuant to art. 12 sec. 1. The decision is withdrawn in the event that the infringements of the permit conditions or rules specified in the Act are of a gross nature, in particular posing a threat to public safety, life and health, as well as in the event of the operator's failure to remove the infringements found during the inspection within the specified deadline.[571]

The last aspect of the permit indicated in the Act is the possibility of its transfer to another entity. The conditions for such a transfer are that the "transferee of the permit" and the operator agree to such a transfer, the transferee meets the conditions that the operator had to meet when applying for the permit, and "the transferee of the permit gives a written undertaking

[567] Article 9 of the Polish draft law on Space Activities.
[568] The lack of opinion within one month is equivalent to the agreement. Article12 of the Polish draft law on Space Activities
[569] Art. 5 of the Polish draft law on Space Activities.
[570] Art. 17(3) of the Polish draft law on Space Activities.
[571] Art.39 (7) and (8) of the Polish draft law on Space Activities.

to carry out space activities in the manner and under the conditions specified in the permit being transferred". The transfer of the authorization shall take place at the request of the entity taking over the authorization which, upon the transfer, shall assume all the obligations and rights associated with the transfer of the authorization.[572] In connection with such a transfer, the President of the Polish Space Agency, may also impose additional obligations to ensure the security and continuity of space activities covered by the authorization.[573] Significant in the context of the international nature of space activities is the transfer of the authorization to a foreign entity, to which the authorization may be transferred on condition that an international agreement on liability for damage caused by a space object is in force with the state of establishment of the entity acquiring the authorization. However, the provision needs to be clarified whether other aspects may also fall within the scope of such an international agreement.[574] The bill also regulates the fees for an application for granting, modifying or transferring a permit.

The supervision of space activities is exercised by the President of the Polish Space Agency with regard to compliance of the performance of activities with the authorization as well as with the provisions of the Act. This control shall also include the detection of conducting activities without a permit. The President of the Polish Space Agency is also the competent authority for the inspection of such activities. The entities subject to control are: the operator, the entity cooperating in the performance of the activity (indicated in the authorization pursuant to Article 15(1)(6)) and the entity with respect to which there is a justified suspicion that it conducts space activities without authorization.[575]

4.6.4. Liability

Liability for damage caused by space objects is designed in Articles 24-28 and liability insurance in Articles 29,30 and 31 and the draft insurance regulation. Liability for damage caused by a space object is borne by the operator and, if the activity is carried out in cooperation with other entities, the liability is joint and several. Article 25(1) and Article 26 reflect the provisions of the Liability Convention - Liability for damage caused on the surface of the Earth or to an aircraft is absolute (including damage caused in the result of *force majeure*) while damage caused by a space object outside the Earth's surface or to an aircraft during flight -

[572] Art. 19 of the Polish draft law on Space Activities.
[573] Art. 19(7) of the Polish draft law on Space Activities.
[574] Art.20 of the Polish draft law on Space Activities.
[575] Art. 3 of the Polish draft law on Space Activities.

liability is incurred on a general basis. In view of the Republic of Poland's obligations under the Liability Convention, as the state responsible for causing the damage and obliged to pay compensation. The funds for its coverage come from the special purpose reserve of the state budget earmarked for financing State Treasury liabilities. Nevertheless, in the case of compensation for damage, the State Treasury has a right torecourse to the operator (nevertheless only up to the amount of the guarantee sum under the liability insurance contract) unless the benefit has been paid directly by the insurer. The case of claiming full reimbursement by the State Treasury occurs when the damage was caused by gross negligence of the operator or wilful misconduct. Pursuant to Art. 29(3), "Natural and legal persons and organisational units without legal personality which are granted legal capacity by a separate act may claim compensation from the State Treasury for damage caused to them by a space object of another ascending state to the extent that the Republic of Poland has obtained compensation for such damage from the ascending state."

A further obligation imposed on the operator is the requirement to have third-party liability insurance for damage caused by the space object or to demonstrate that a contract to this effect has been concluded in its favour. [576] The insurance contract shall also cover the liability of the State Treasury and persons participating in the performance of space activities, including the manufacturers of the space facility. Such a provision makes it possible to cover a large group of space stakeholders involved in space activities, which in turn has a beneficial effect on the sense of security and minimizes the risks that are associated with liquidity in the event of such damage. Exempted from the obligation to have insurance, however, are scientific or educational activities as well as those carried out in the essential interest of national security and defence. The detailed scope of the compulsory third party liability insurance of an operator performing space activities (Third Party Liability Insurance) and the minimum guarantee amount of the Third Party Liability Insurance is specified in the draft of the Regulation on Third Party Liability Insurance of an Operator Performing Space Activities. According to § 2.

"The Third Party Liability Insurance covers damage caused by a space object during the insurance period.' Nevertheless, the Civil Liability Insurance does not cover damage caused by the wilful fault of the injured party, caused by an act or omission of the insured after the date of expiry or withdrawal of the permit to carry out space activities, with the proviso that the damage is a consequence of events occurring before that date. Also excluded from the insurance

[576] Article 30 (1) The obligation to insure civil liability shall arise at the latest on the day preceding the day of commencement of the activity covered by the authorisation. (2) The obligation to take out civil liability insurance shall cease upon termination of the space activities covered by the authorisation.

coverage are damages consisting in the payment of contractual penalties or caused to persons participating in the performance of space activities covered by the permit.[577] The minimum guarantee sum of the third party insurance is no higher than the PLN equivalent of EUR 60 million[578] in respect of one event, the consequences of which are covered by the third party insurance agreement.

4.6.5. Registration

"A space object launched into orbit around the Earth or beyond, for which the Republic of Poland is the launching State, shall be subject to entry in the National Space Objects Register,'. The Register is kept by the President of the Polish Space Agency, in a tele informatic system, and is public. It contains information such as the name of the operator and the address of its registered office in the Republic of Poland, as well as the KRS number in the case of an entrepreneur; the date of issuance and designation of the authorization, the name of the space object, the date and place of its launch together with the name of the launch vehicle, the basic orbital parameters (period of circulation, inclination, apogee and perigee), the general purpose of the space object, the name of the launching country, information on the object's activity status, the date of receipt of the application and entry into the Register, as well as the registration number assigned by the President of the Agency. The entry in the Register is made on the basis of the operator's application. The President of the Agency has a deadline of 7 days from the receipt of the notification for the entry of the facility in the Register, in case the notification is incomplete the operator has 14 days from the receipt of the request to complete the notification.

Any changes in the application must be delivered by the operator to the President of the Polish Space Agency. It is the responsibility of the President of the Agency to request from the Minister in charge of foreign affairs to provide the Secretary General of the United Nations with information on a space object, on the basis and to the extent specified in Article IV of the Convention on the Registration of Objects Launched into Space. The detailed scope of the information contained in the Register and the manner in which it is to be maintained is set out in the Regulation on the National Space Object Register (NROK).

According to the draft Ordinance, the Register is to consist of four parts 1- concerning declaration data, II- Space object information, III- Space object launch information, IV- Space

[577] § 2. Paragraphs 1, and 2 points 1-4 of the Regulation on compulsory third-party liability insurance of the operator performing space activities.
[578] This amount is determined using the average euro exchange rate announced by the National Bank of Poland, for the first time in the year in which the third-party liability insurance contract was concluded, in accordance with § 4. of the Regulation on compulsory third-party liability insurance of the operator performing space activities.

object activity status information. The following table indicates the elements to be included in each part:

	Part of the Registry	Data relevant to each part
1	**Declaration data**	• Sequential entry number • Date the notification was received, • Date of entry,
2	**Space object information** **- general**	• Name of the space object • General purpose of the space object • Name of the operator, and address of the operator's domicile in the Republic of Poland, if the operator is an entrepreneur KRS number and tax identification number (or other identification number in case of a foreign person) • Date and designation of the space authorization • Space object registration number
3	**Space object launching information**	• Name of the launching State • Circulation period • Inclination • Apogee • Perigee • Geostationary orbit position, defined as the planned or actual location of the space object in geostationary orbit in degrees east of the equator from the Prime Meridian, with a negative number of degrees east of longitude to be provided for a given number of degrees west of longitude [579]
4	**Space object activity status information**	• Information on whether the space object is active • Date of de-orbit or insertion of the space object beyond the protected area of geostationary orbit • Date of complete cessation of operational functions of the space object.

Table 1.7 Projected data for Inclusion in Each Part of the National Space Registry in Poland

According to the Regulation, the information on the date of an event included in the Register shall also include the hour, minute and second of the occurrence of the event according to the UTC international coordinated universal time (where possible).[580]

4.6.6. Environmental Protection

The protection of both the space environment and the Earth's environment is reflected in the Polish bill in several places and in different forms. Firstly, by including a definition of space debris as 'objects of anthropogenic origin, including their components or fragments, in orbit or re-entering the atmosphere, which have lost the ability to perform their intended function' and

[579] Paragraph 3. 1. Section 3, point 9 of the Ordinance of the Minister for Development and Technology a on the National Space Objects Register.
[580] Ibidem, Paragraph 4.

also under the definition of ‘removal of a space object from space’ for its deorbit or insertion of a space object outside the protected area of geostationary orbit. Among the rationales for carrying out space activities, Article 7(3) takes into account the need for long-term sustainable use of outer space for peaceful purposes and to eliminate or reduce to a minimum any negative impact of space activities on the space environment or on the Earth's environment, including by preventing the generation of space debris. Environmental aspects shall also be included in the description of the planned space activities, submitted together with the application for the authorization of space activities, by indicating "the elimination or reduction of the risk of the generation of space debris, including space debris decay or in-orbit collision, including after the space object has passed into a non-active state, taking into account international recommendations or practices in this regard, the contribution to the long-term sustainable use of outer space for peaceful purposes, elimination or reduction of adverse effects on the Earth's environment and in outer space, safety, in particular in case of radioactive material and the transition of a space object to an inactive state or its deorbit".[581]

4.6.7. Other Provisions

The reaction to the events of February 2025, i.e. the fall of space debris on Polish territory, was reflected in the draft Polish space activity act published two months later.. In the context of these occurrences, the proposed law contains provisions for dealing with the finding of an item suspected to be space debris. According to Article 55

> "1.Whoever finds an item suspected to be space junk shall immediately inform the Police.
>
> 2.The Police shall immediately inform the President of the Agency of the fact that an item referred to in paragraph 1 has been found.
>
> 3.The thing referred to in paragraph 1 may not be moved from the place where it was found without the consent of the Police."

The draft regulates the fines imposed by the President of the Space Agency on an entity which performs space activities without a permit, performs them contrary to the permit or in violation of the Act, fails to report changes in data, fails to make a notification, fails to provide conditions for conducting inspections within the relevant scope indicated in the Act and which fails to remove violations found as a result of the inspection.

[581] Art.10(3) point 1 of the Polish draft of Space Activities.

4.7. Greece

In order to maintain balance between the analysis of the post-communist countries and the rest of Central and Eastern European Region, national space legislation of Greece was included in the author's analysis due to its heritage and the relatively long period of time the law has been in force compared to other legislations analysed. Greece is a State Party to four international space treaties, namely the Outer Space Treaty, the Rescue Agreement, the Liability Convention and the Registration Convention. The establishment of the Hellenic Space Centre was a milestone for Greece towards active participation in the global space ecosystem, thus demonstrating its commitment to effective space governance.

4.7.1. Scope of Application

Space law in Greece was introduced by Law No. 4508/2017, entitled "Licensing of space activities – registration in the national register of space objects – establishment of the Hellenic Space Agency and other provisions"[582] (Law No. 4508). It comprehensively covers space activities, regulating aspects such as "the conditions and procedure for granting authorisations, liability for damage caused by space objects, as well as the supervision of space activities and the establishment and maintenance of a National Register for the registration and entry of space objects".[583] The law also sets out provisions for the establishment of the Hellenic Space Agency.

This space law applies to space activities carried out within the country as well as to activities carried out outside Greece. Where space activities involve movable property, facilities or personnel subject to Greek jurisdiction or belonging to Greece, the law also applies. Furthermore, this law covers space activities regardless of location if they are carried out by legal entities based in Greece or by natural persons of Greek nationality, provided that this is subject for in an international agreement or treaty. Another important element is the responsibility of the Greek state imposed by international space law as the "launching state" – in this case, the law applies to activities carried out on territory of Greece (or in the case of activities involving the use of Greek state facilities, movable or immovable property, as well as its personnel) by natural or legal persons, whether domestic or foreign. As regards the material scope of the law. In each case, Greece is considered responsible in accordance with international space treaties.

The Minister for Digital Policy, Telecommunications and Information is responsible for deciding on the registration of a space object for Greece if other states meet the conditions to

[582] Government Gazette A 200/22.12.2017.
[583] Article 1(1) Law no 4508.

be considered launching states (in accordance with the Registration Convention). Space activities involving objects that are already entered in the space object register of another country and for which that country bears international liability for damage under international law are not subject to registration under the law. Nevertheless, the entity using them is required to provide the relevant information to the Ministry of Digital Policy, Telecommunications and Information.[584]

4.7.2. Definitions

The legal act contains definitions such as “space object”, “space activity operator”, or “operator” and “effective control”.[585] This law also includes definitions of, among other things, “manufacturer”, “launching state”, “damage” and “transfer of licensed space activities”. Most importantly, as has been emphasised several times in this dissertation, space activities are defined. Space activities, according to the law means “activities related to the launch, flight, control and return of space objects”. The equally important related definition of an entity conducting space activities is as follows: "a natural or legal person who conducts or undertakes to conduct space activities, ensuring, alone or jointly with other entities, effective control over a space object under a special agreement or authorisation. If a space object cannot be controlled after being placed in orbit, the operator is considered to be the person who issues the command to place the space object in orbit." In turn, in relation to the definition of an entity conducting space activities, the aspect of “effective control “over a space object is of significant importance, which is understood as the activation of control and command or remote control and command measures and appropriate surveillance measures necessary to carry out activities related to the launch, flight and control of one or more space objects.[586]

4.7.3. Authorisation and Supervision

Pursuant to Article 3, a licence to conduct space activities is issued by the Minister of Digital Policy, Telecommunications and Information in the form of a decision. It is issued at the request of the entity, the licence is personal in nature and applies to specific space activities. Once again, the legislator emphasises the importance of international space law by stipulating that space

[584] Article 1(2) Law no. 4508.
[585] „activation of control and command or remote control and command measures, as well as appropriate surveillance measures necessary to carry out activities related to the launch, flight and control of one or more space objects;”
[586] Article 2 Law no. 4508.

activities must be conducted in accordance with the principles of international law, international agreements and agreements and treaties to which Greece is a party. The conditions for issuing a licence (for a definite or indefinite period) include the entity having the necessary credibility, capacity and experience in conducting space activities, ensuring that these activities do not pose a threat to public order, the safety of persons and property, public health and national security. In the environmental context, it is important to ensure that space activities do not pollute outer space or celestial bodies and, therefore, to take appropriate measures to manage and reduce space debris. The rest of the requirements specified in the Act concern: compliance with ITU requirements regarding orbital positions and radio frequencies, compliance with the insurance requirements referred to in the Act, and ensuring appropriate measures to safely complete a space mission. Nevertheless, the Minister for Digital Policy, Telecommunications and Information may, by decision, specify additional special conditions for the granting of a licence, e.g. in the case of the protection of the strategic, geopolitical and financial interests of the Greek state. Applications for authorisation are considered on a case-by-case basis, and therefore additional conditions may be imposed on each decision.[587] The licence may be revoked or suspended if at least one of the following conditions is met: "if one of the general or specific conditions of the licence is not complied with, in the event of a breach of the licensing regulations, for reasons of public order, safety and health." [588]The transfer of an operating licence is permitted with the consent of the Minister, where the provisions on the granting of a licence apply accordingly.

4.7.4. Liability

Greek law requires entities to take out insurance coverage of EUR 60,000,000 to cover liability for damages. However, this amount may be adjusted depending on the value, size or other parameters of the space object. A total exemption from insurance or a lower amount may be determined by the minister in cases where space activities are carried out in the public interest, i.e. if the activities serve national security and defence, education, science or research. An exemption from the requirement to have insurance is indicated in cases where the entity is the Greek state.[589]

[587] The Minister for Digital Policy, Telecommunications and Information may request technical assistance from third parties, such as Greek, European and international organisations and services, experts, special advisers and researchers.
[588] Article 9.1. Law no. 4508.
[589] Article 11(1) Law no. 4508.

4.7.5. Registration

The issue of registering space objects (which Greece launches independently or jointly with another launching state, unless registration is carried out by another state or international organisation) at the national level is regulated by Article 17. The National Register of Space Objects is maintained by the Ministry of Digital Policy, Telecommunications and Information. The information required for the registration of a space object includes the information listed in the space object registration form in the UN registry, the information specified in Article IV of the Registration Convention, and a unique registration and identification number assigned by decision of the Minister of Digital Policy, Telecommunications and Information. Confidential information entered in the register includes, among other things: information about the manufacturer and operator of the space object, as well as the owner of the space object, its main components and instruments located inside the space object, and the company responsible for launching the space object.[590]

4.7.6. Environmental Protection

Environmental protection regulations in Greece cover not only the requirements related to applying for a space activity licence but also the period after the launch of a space object or during its operation. The law requires periodic reports on the actual impact of space activities on the Earth's environment or outer space. According to national space legislation of Greece, “Compliance with the requirements of the law on environmental impact and the relevant conditions for granting a licence may be presumed on the basis of compliance with the relevant standards.” Before the competent ministers take a decision, the applicable national, international and European standards must be complied with and the relevant good practices must be applied. The requirements and content of technical reports are determined by joint decision of the ministers responsible for digital policy, telecommunications, information, the environment and energy. Under the law, the Hellenic Space Agency was established as a public limited company operating in the public interest in accordance with the principles of private enterprise, under the supervision of the Minister for Digital Policy, Telecommunications and Information.

[590] Article 17 Law no. 4508.

4.8. Conclusions

CEE countries have a unique chance to focus on a niche in the global space sector by implementation of novel regulatory frameworks. Instead of simply adopting existing model laws, in addition, they can proactively develop legislation for specialized areas like space environmental protection, particularly prevention of space debris. This forward-thinking approach would not only incentivize investment and foster innovation but also ensure sustainable practices from the outset, positioning CEE countries as leaders in this crucial and evolving aspect of space activity.

Chapter 5. Final conclusions and postulates

The space sector has undergone a visible transformation, shifting from the government-dominated *Old Space* model to the growing commercial *New Space* era. This escalating commercialization has fundamentally reshaped the space landscape, propelling the global space economy with projections reaching $1.8 trillion by 2038. Nevertheless the evolving space ecosystem, increasingly shaped by private actors and advanced technologies, demands an adequate regulatory solutions.

The *Corpus Iuris Spatialis*, present unique characteristics in international law due to their complex negotiation processes, the significant legal status afforded to international organizations, and states' unprecedented acceptance of absolute liability for space activities. This framework, established during the Cold War period, effectively governed a state-dominated space environment. Nevertheess, the *New Space* Era has exposed critical needs in this traditional framework. The absolute state liability for private commercial activities creates a disproportionate burden, hindering equitable risk distribution. Furthermore, existing treaties inadequately address liability for damage to the space environment and lack robust prevention mechanisms, which is crucial given the growing concerns about space debris and orbital congestion. The "once launching state, always a launching state" principle also creates legal uncertainty for emerging activities in outer space such as space debris removal or the increasingly complex international relations in the chain of space activities.

National space legislation plays a crucial role in the stabilisation and development of the space sector, mainly through the implementation of international obligations under the *Corpus Iuris Spatialis*. The functions of economic law, which interact with the space law, may

include the authorization and ongoing supervision of space activities, the maintenance of national registers of space objects and the regulation of liability for damages.

For national space legislation to fulfil more than a control or steering function, a broader examination of the elements of the space economy is necessary. Current national legislation focuses mainly on upstream (i.e. launch, orbital operations and deorbitation activities), with less regulation of production processes or the use of downstream data and services. However, it should be borne in mind that these regulations should also take into account their potential impact on segments not directly covered by the Act, i.e. satellite services (downstream) and non-space activities which, however, are affected by the space sector. In achieving this objective it is necessary to properly formulate regional and national space strategies and programmes, which are key to guiding the development of the sector. These often include promoting initiatives, fostering international cooperation, investing in human capital through research and education, supporting industrial research and development (R&D) activities and establishing long-term funding mechanisms for commercial projects. The growing emphasis on robust space legislation within these strategies, particularly in Central and Eastern European countries, underlines its role in encouraging sector development and responsible behaviour.

The key to effective rulemaking is thorough consultation with all space stakeholders - from scientists to industry, investors to end users. In this way, regulations can be optimally adapted to the needs and dynamics of the evolving space ecosystem. Continuous dialogue between the public and private sectors contributes to ensuring that the proposed regulations accurately reflect the actual needs of the market.

As already mentioned national space laws primarily serve to implement international commitments under the *Corpus Iuris Spatialis*, ensuring state accountability for space activities. This includes frameworks for authorization, continuous supervision, national registration of space objects, and liability for damages. By integrating these principles, national legislation fosters responsible and sustainable space operations, contributing to both domestic and international safety through the enforcement of best practices, such as collision avoidance and debris mitigation. The specific regulatory approach, while adhering to international norms, remains at the discretion of individual nations, tailored to their market demands and national priorities.

Effective national space legislation is built upon a threefold foundation: adherence to international obligations, responsiveness to national sector needs, and incorporation of global best practices, particularly in technical standards. This results in "Building Blocks" that define scope, establish authorization and registration procedures, set liability frameworks, and

integrate country-specific development clauses. This tailored approach allows nations to support an environment conducive to their domestic space industry while upholding international safety and sustainability standards.

Beyond fulfilment of international obligations, national space legislation plays an important role by incorporating clauses to support the development of the sector. These clauses, aim to foster indigenous space sectors by providing mechanisms like adjusted insurance requirements (i.e. Slovenia), space resource ownership (as seen in the Luxembourg), and regulating emerging activities such as suborbital flights (e.g., in the UK). These provisions, tailored to each nation's unique industrial capacity and geographical considerations, are crucial for creating a legal environment that incentivizes investment, facilitates innovation, and enables domestic industries to compete effectively in the global space ecosystem.

Each of the analyzed countries of Central and Eastern Europe, i.e. Slovenia, Slovakia Greece and Poland has enacted or will possible enact in the case of Poland, specific provisions to mitigate the environmental impact of space activities, therefore extending the general principles of international space law. This demonstrates commitment and a visibly effective approach to the problem of environmental protection in outer space , which is a global challenge.

Slovenian legislation is particularly innovative in its approach, primarily due to the explicit inclusion of procedures to limit the creation of space debris in the definition of "space activities." As a result, environmental protection is not treated as an additional requirement, but as an integral part of what constitutes a space mission in accordance with the law, thanks to a precise definition. The law further reinforces this commitment by explicitly referring to UN Guidelines on Space Debris Mitigation as a condition for obtaining a license. The requirement for the ministry responsible for the environment to issue an opinion on the potential negative impact of a mission is crucial, giving environmental authorities direct oversight. Finally, the obligation to report incidents posing a threat to the environment to the ministry reinforces a sense of responsibility among operators. The adoption of a clear and understandable definition of space activities by Slovenia, which includes the issue of space debris, contributes to better identification of threats and, consequently, to a more effective approach to space environmental protection.

Slovakia's approach is similarly comprehensive and stands out for its definition of space debris as "non-functional and useless space objects or their parts," which provides a clear legal basis for their regulation. The law also connects environmental protection directly to the licensing process, requiring operators to demonstrate measures to minimize space debris and

pollution. In addition, the Slovak law introduces a robust system of penalties, with fines ranging from €5,000 to €50,000. This approach represents an effective financial instrument for ensuring compliance with the regulations and shows that Slovakia is serious about enforcing environmental regulations by operators.

Poland's space law, which is currently in the drafting stage, also places great emphasis on environmental protection, incorporating it into definitions and rationales relating to space activities. It defines the concept of "space debris" and "removal of space objects" providing a clear legal framework. The draft law recognizing the long-term sustainable use of outer space as a key basis for justifying space activities, emphasizing the need to eliminate or minimize any negative impact on both the space and terrestrial environments. It requires operators to include descriptions of their plans for space debris mitigation and deorbiting aspects in their license applications, thus underlying the importance of preventive and mitigation measures.

The Greek regulatory framework for space activities mandates comprehensive environmental protection throughout a mission's lifecycle, from licensing through to post-launch and operational phases. This legislation requires periodic reporting and environmental impact assessments to monitor the effects of space activities on both the terrestrial and outer space environment Compliance is based on complying to national, international, and European standards and established good practices.

Slovak, Slovenian, Greek regulations, as well as the draft Polish law, present a modern and comprehensive approach to national space legislation in terms of environmental protection in view of sustainable development of outer space concept. These countries not only fulfill their international obligations in this way, but also introduce additional legal mechanisms to address the environmental challenges associated with space activities. Their actions consist primarily of incorporating environmental protection into legal definitions, making explicit reference to international guidelines, involving environmental protection authorities, and establishing clear sanctions. This creates a well-established, clear, and enforceable legal framework.

This trend suggests that future national space regulations will increasingly move toward a model in which environmental protection is not a secondary issue but a fundamental pillar of responsible space exploration.

Based on the conclusions presented in the relevant chapters of this dissertation, it can be stated that the research hypotheses presented in the introduction to this work are as follows:

With regard to Research problem No. 1: What is the impact of existing space law on the space sector?

Determining the true impact of space legislation on the space sector is a difficult challenge that requires a comprehensive analysis of various indicators, where the legal regulations represent a single element within the complex, emerging ecosystem of space activities in the new realm of new space era. Nevertheless, the functions of law and the interdependence of law and the economy presented in this dissertation demonstrate the need to create certainty among space sector stakeholders as to the legality of their activities. To this end, the law plays an important role and must be appropriately adapted and flexible enough in order to keep pace with the development of space activities, which has recently been intensifying.

With regard to Research problem No. 2: How does space law shape the landscape of the space sector?

National space regulations aims to ensure stability despite the inherently advanced and extremely demanding conditions of space activities. They often aim to support the national space sector through various clauses designed to assist entrepreneurs, scientists and institutions undertaking or already engaged in such activities. Based on an analysis of the space economies in Luxembourg, France and the United Kingdom, it can be concluded that attempts are being made to regulate space in such a way as to increase the importance of the development of national space sectors. By creating legal stability and predictability, these countries are using their regulations to support strategic segments of the space industry. Luxembourg stands out as one of the pioneer to stimulate the space resources segment. This legal framework aims to provide certainty to private companies, attract investment and develope in the field of space resource extraction. The United Kingdom has focused on another emerging segment: suborbital flights. By incorporating regulations on suborbital activities into its national law, the UK is creating a clear legal environment to encourage investment and innovation in this specific area. France is taking a proactive approach by creating regulations for space activities that are expected to develop fully in the long term, demonstrating that the law can effectively adapt to and keep pace with technological progress.

With regard to Research Problem No. 3: What might be the impact of a potential space law on the space ecosystems of the CEE countries?

The emergence of space legislation at the national level demonstrates the evolution of the space sector in Central and Eastern Europe. Among the rapid advancements in space technologies and their inherent risks and challenges, Central and Eastern European (CEE) countries are uniquely positioned to become pioneers in specialized segments, including environmental protection connected with space activities. The evolving and currently incomplete regulatory landscape for protecting the space environment, particularly concerning issues like space debris, creates a distinct opportunity for emerging space sectors to establish novel regulatory regimes from their inception. This approach can both foster innovation and ensure operations adhere to sustainable development principles and it can also demonstrate an approach based on mitigation and prevention rather than alleviating the consequences.

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Appendix to doctoral dissertation No. 1 – Summary in English

The dissertation entitled “Development of National Space Legislations of CEE Countries and their implications on space sectors” examines the evolution of space law, tracing its connection to economic policy and its role in a rapidly changing global space ecosystem, with particular focus devoted to national space legislations. The first chapter establishes a theoretical framework by exploring the two main functions of law in the economy: its steering function, which directs and stimulates economic growth, and its stabilizing function, which provides the legal certainty needed for investment. This framework is then applied to the space industry, analyzing how national policies and the transition from *Old Space* (government-oriented space exploration) to *New Space* (commercial and private sector involvement) shape the current space ecosystem. The second chapter delves into the analysis of the formation of international space law, reviewing the five foundational treaties that form the *Corpus Iuris Spatialis*. It evaluates the continued relevance of these Cold War-era agreements in the modern, commercialized space environment. The analysis also extends to the European context, examining the new EU Space Strategy for Security and Defence and the potential for new EU-level regulations despite the legal complexities of the Lisbon Treaty. The third chapter shifts to a comparative analysis of national space laws, using the UK, France, and Luxembourg as key examples. It identifies common legislative elements such as definitions, licensing, liability, and environmental protection while highlighting how each country tailors its regulations to foster specific domestic space industry sectors. The fourth chapter then focuses on the Central and Eastern European (CEE) region development, tracing the space programmes of the selected countries and their integration into the European Space Agency (ESA). This section highlights the new national space laws emerging in countries like Slovakia, Slovenia, and Poland as a direct result of these changes. To ensure a balanced analysis, Greece's space legislation is examined as a long-standing point of comparison. The final chapter synthesizes these findings to a practical framework for national space legislation. It identifies specific legal clauses that are crucial for promoting a robust space ecosystem and offers examples of solutions for governments aiming to develop and support their domestic space sectors.