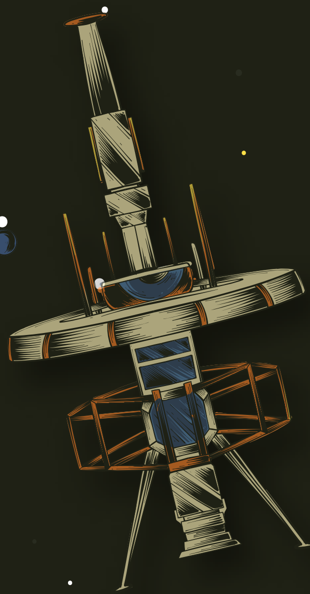
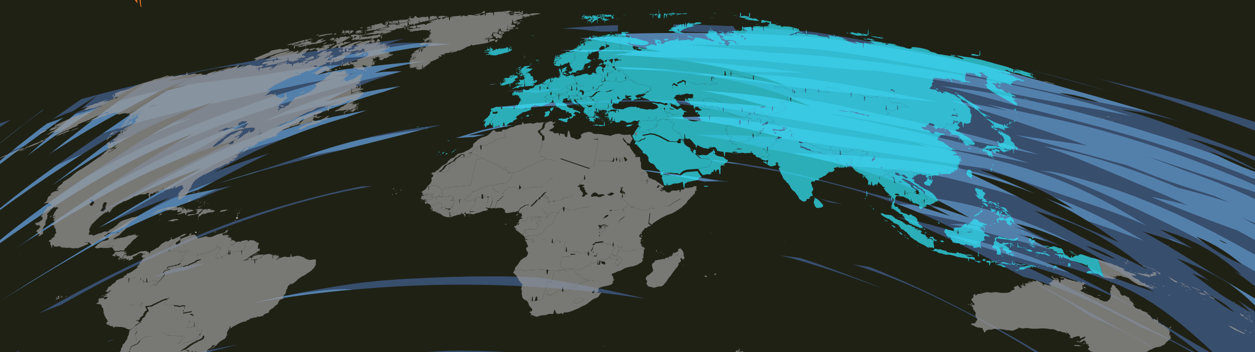
NATIONAL SPACE LAWS IN ASIA AND EUROPE



Edited by
Stefan Samse and **Olivia Schlouch**



KONRAD ADENAUER STIFTUNG

CLJ

NATIONAL SPACE LAWS IN ASIA AND EUROPE

KONRAD ADENAUER STIFTUNG

CLJ

ISBN:

Published by:

CLJ Malaysia Sdn. Bhd.
(formerly known as The Malaysian Current Law Journal Sdn Bhd)
Unit E1-G, Jalan Selaman 1,
Dataran Palma, 68000 Ampang,
Selangor Darul Ehsan, Malaysia.
Co No 197901006857 (51143 M)
Tel: 603-42705400 Fax: 603-42705401

Printed by:
Perniagaan E.B.K.
No. 20, Taman Mas Satu, Batu 9 Cheras,
43200, Kajang, Selangor, Malaysia.

TABLE OF CONTENTS

Note to the Reader

The accelerating expansion of space activities, driven by geopolitical ambitions, private companies, and technological advancement, has elevated the need for appropriate and clear legal frameworks at the national level. They serve as indispensable mechanisms for operationalizing the principles laid out in international space law, while also addressing the particular priorities, constraints, and aspirations of individual states.

National Space Laws in Europe and Asia is the product of a joint endeavor between the Konrad-Adenauer-Stiftung's Rule of Law Programme Asia (KAS RLPA) and the International Institute of Space Law (IISL). It emerges from a growing need for cooperation, in handling the changing field of space law and understanding how different countries are managing the increasingly complex area of space governance.

This volume does not only collect statutes or summarize policy positions. Instead, it seeks to interrogate the underlying legal architectures that states have constructed, or are actively shaping, in response to emerging space-related imperatives. Each chapter places domestic space law within a broader range of international obligations, national strategic interests, institutional capacity, and scientific and commercial momentum.

The selection of countries was guided by several criteria: a demonstrated involvement in space activities, the presence or development of legal instruments, and the maturity difference of their space legislation. The jurisdictions covered include:

Asia: Japan, South Korea, Indonesia, Singapore, India

Europe: The United Kingdom, Luxembourg, France, Italy, Germany

Some states have mature legal frameworks rooted in decades of engagement with space activities; others are in formative stages, actively drafting legislation or refining institutional roles. These transitional contexts are equally significant, as they offer a view into the deliberative processes and internal drivers that shape national lawmaking in this domain.

Each contribution explores the unique legal and policy contours of its respective country, including the extent of alignment with multilateral agreements such as the Outer Space Treaty, as well as the internal reasons (economic, political, strategic) guiding the design of national laws. This way, the book helps readers understand how national legal systems work not alone, but as part of a bigger global conversation about the rules and duties that govern space.

This publication is intended not only as a reference for scholars, practitioners, and government officials, but also as a foundation for ongoing analysis and dialogue.

We thank all the authors, contributors, and partners whose careful work and teamwork made this book possible. We hope this book adds value to the global conversation on creating a stable, fair, and legally clear order in space.

Stefan Samse
Director of the KAS Rule of Law Programme Asia
Konrad-Adenauer-Stiftung

Olivia Schlouch
Programme Manager, KAS Rule of Law Programme Asia
Konrad-Adenauer-Stiftung

Singapore, July 2025

Introduction: The Development of National Space Legislation in Asia

by Nayoung Youn
Senior Researcher, Korea Aerospace Research Institute

In recent decades, the Asian region has emerged as a dynamic and diverse contributor to global space activities. This evolution is increasingly reflected in the development of national legal frameworks intended to implement international obligations under the 1967 Outer Space Treaty (OST), particularly those arising from Article VI, which requires states to authorize and continuously supervise the activities of non-governmental entities in outer space. Although national space legislation remains unevenly distributed across the region, several Asian states, most notably Japan, India, China, the Republic of Korea, and Singapore have either enacted or are actively pursuing domestic legal instruments to govern their space activities.

Unlike Europe, where legal harmonization has been facilitated by institutional structures such as the European Union and the European Space Agency, Asia lacks a comparable regional legal framework. As a result, the legislative approaches taken by Asian states exhibit considerable divergence in terms of structure, content, and regulatory philosophy. These differences are shaped by a range of factors, including the maturity of national space programs, the degree of private sector involvement, geopolitical priorities, and administrative traditions.

The trajectory of national space law in Asia may be broadly characterized in two phases. The first phase, beginning in the early 2000s, was led by technologically advanced spacefaring nations such as Japan (Basic Space Law, 2008), the Republic of Korea (Space Development Promotion Act, 2005 and Space Liability Act, 2008). Legislation during this period primarily focused on state-centric regulation, emphasizing government oversight, launch licensing, and compliance with international responsibility and liability norms. The second phase, emerging in the 2010s and continuing into the present, reflects a gradual but significant shift toward enabling private space activities, promoting commercialization, and addressing contemporary issues such as space sustainability, registration practices, and satellite frequency coordination. Notably, the rise of space start-ups and national ambitions for lunar exploration have catalysed legislative action.

While legislative progress remains asymmetrical, there is growing convergence around the need to establish transparent, predictable, and internationally compatible legal regimes. Countries such as Australia (Space (Launches and Returns) Act, 2018), Malaysia (Malaysian Space Board Act, 2022), Philippines (Philippine Space Act, 2019) have adopted legal frameworks that are relatively recent and tailored to emerging commercial ecosystems. Others, such as India, Indonesia, Thailand and Türkiye are actively developing their legal infrastructure in response to expanding national space ambitions and international cooperation opportunities.

Asia's engagement with international legal processes, particularly within the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), has also played a formative role in shaping domestic legislative efforts. However, in the absence of binding regional instruments or institutionalized legal coordination, individual states have largely relied on comparative legal analysis and international best practices to inform their regulatory choices.

The ensuing country chapters offer a comparative overview of the national legal regimes in five Asian states (Japan, South Korea, Indonesia, Singapore, and India), each reflecting a distinct legal response to the evolving demands of space governance. Japan has developed a comprehensive legal framework that supports private sector participation and addresses emerging issues like space resource utilization, marking its shift toward a more commercially and security-oriented posture. South Korea has steadily expanded its legal and institutional foundation, recently establishing the Korea AeroSpace Administration (KASA) to strengthen public-private coordination and enhance regulatory clarity. Indonesia illustrates how an emerging spacefaring nation can align international principles with domestic development goals, using space law to support socio-economic priorities such as environmental monitoring and disaster management. Singapore leverages its agile, business-friendly legal environment to foster commercial space innovation, with a pragmatic licensing regime grounded in international treaty obligations. India, while still in the process of finalizing its national space legislation, is advancing a clear policy direction to support private sector growth and ensure legal certainty in areas such as authorization and liability. Together, these case studies highlight the diversity and dynamism of national space lawmaking in Asia, as well as shared challenges like private sector integration, regulatory scope, and international alignment.

As the Asian space sector continues to expand in scale and complexity, the development and refinement of national space legislation will remain essential to ensuring responsible, sustainable, and cooperative space activities in the decades ahead.

JAPAN

Table of Contents

About the Author

Setsuko Aoki

Setsuko Aoki is currently a Professor, Chiba Institute of Technology, Chiba, Japan and Professor Emerita, Keio University, Tokyo, Japan. She was a Professor of Law, Keio University Law School, Tokyo, Japan until the end of March 2025. Her specialty is in international law including especially space law and arms control. She obtained Doctor of Civil Law (D.C.L.), Institute of Air and Space Law, Faculty of Law, McGill University, Canada (June, 1993) (dissertation title: Satellite-Based Multilateral Arms Control Verification Schemes and International Law); LL.M., Graduate School of Law, Keio University, Tokyo, Japan (March, 1985) and B.C.L., Faculty of Law, Keio University, Tokyo, Japan (March, 1983). Her academic membership includes: International Institute of Space Law (IISL) (vice president 2017- 2023); International Law Association (ILA) (member of Space Law Committee, since 2008) and International Academy of Astronautics (IAA) (since 2013). In the United Nations, she served as the Chair of the Legal Subcommittee of the UN Committee on the Peaceful Uses of Outer Space (COPUOS) (April 2020- March 2022). As for the functions at the Japanese Government related to space law and policy, she is a member of the Committee on National Space Policy, Cabinet Office (2012-2022 and since August 2024).

8-2 Shinsen, Shibuya-ku,
Tokyo, 150-0045 Japan
Tel: +81-3-3462-8809; +81-90-1051-3625 (mobile)
email: <aoki.setsuko@p.chibakoudai.jp> and <aosets@keio.jp>

Abstract

This chapter describes contents of Japanese space legislation. While Japan was a relatively old spacefaring nation, it was not successful for commercializing its space activity all through the 20th century. In order to remain a relevant spacefaring State, the Basic Space Act was made in 2008 as the basis of Japan's space policy and law, which was to be followed by the two national space acts adopted in 2016. Space Activities Act (SAA) provides the two authorization schemes, i.e. launch permission and licensing of spacecraft control, third-party liability (TPL) schemes and on-orbit transfer of spacecraft rules. Permission, licensing, and other obligations in the SAA are designed based on territorial principle. Satellite Remote Sensing Data Act (SRSDA) also made in 2016 is not to ensure the implementation of international space law different from SAA, but to strike a balance between protecting national and international security on one hand, and promoting remote sensing data businesses on the other hand. Among four nations that have an independent satellite remote sensing act, the characteristics of the SRSDA include the data distribution system that can be done only to a person who has obtained a certification from the Prime Minister and shutter control system that is explicitly provided in the Act. The latest act, Space Resources Business Promotion Act is an additional act to the SAA. The license of the exploration and development of space resources is a subset of the license to control a spacecraft as the definition of spacecraft is considerably broad. A person may own space resources in accordance with this Act while it includes the full observance with international law that is developing on space resources activities.

Keywords: Basic Space Act; Space Activities Act (of Japan); Satellite Remote Sensing Data Act; Space Resources Business Promotion Act (of Japan); JAXA; Committee on National Space Policy (CNSP),Cabinet Office; On-Orbit Servicing Guidelines; Collision Avoidance Guidelines.

1. INTRODUCTION: JAPAN'S SPACE ACTIVITIES AND LAW IN THE 20TH CENTURY

Chapter 2.3 describes the law-making process, contents (commentary), current issues and future plans of Japan's national space laws. As the degree of the development of space activities and national political situations largely determine the contents of national space legislation, the history of Japan's space activities is briefly touched upon in the introductory part below.

1.1. Strong Influence Of The United States Of America

No sooner had the allied occupation ended in 1952 than started Japan's aerospace research and development (R & D) mainly at the University of Tokyo. Following the first successful launch of a very small suborbital rocket in 1955[1] and the successful participation in the International Geophysical Year (IGY) by a newly developed sounding rocket in June 1958,[2] Japan launched a satellite by its 100 percent domestically developed solid-propellent space launch vehicle (SLV) in February 1970 as the fourth nation to achieve it.[3] However, that was the end of Japan's autonomy in space development.

The bilateral space cooperation agreement with the United States of America (US) concluded in 1969 (hereinafter "1969 Agreement")[4] changed the course of Japan's space development. As the bilateral agreement allowed the Japanese government and companies to purchase US industry's unclassified technology relating to rockets and satellites, using the US liquid propellent rocket technology, the National Space Development Agency of Japan (NASDA) established in 1969[5] was able to launch a heavier satellite in a higher orbit than in the case should it use a solid propellent rocket Japan had developed on its own.

1 Institute of Space and Astronautical Science (ISAS) (n/d). History of Japanese Space Research, https://www.isas.jaxa.jp/e/japan_s_history/brief.shtml (last accessed 1 June 2025).

2 See, e.g., Itokawa, Hideo et al, (1963). "Survey of Japanese Space Program with Emphasis on Kappa and Lambda Observation Rocket", in: Seisan Kenkyu, 1963, vol15 no 7. Also found in NASA TT F-303 (1963),https://apps.dtic.mil/sti/tr/pdf/ADA395762.pdf (last accessed 18 June 2025).

3 See *supra* note 1.

4 Exchange of Notes Constituting an Agreement Concerning Co-Operation in Space Activities for Peaceful Purposes (with attachment), 31 July 1969, registered by the US 4 March 1970, No. 10342 [hereinafter "1969 Agreement"].

5 NASDA Act, *infra* note 16.

NASDA successfully developed a solid propellent SLV “N-1” in 1975.[6] While this might be a reasonable policy decision in terms of saving costs to develop a liquid fuel rocket engine from scratch, the 1969 Agreement placed Japan under the substantial influence of the US. For example, the Japanese government undertakes not to transfer any rockets and satellites as well as components, parts, accessories and attachments thereof manufactured by the use of US technology to the third country without the consent of the US.[7]

For the US, it was also a reasonable policy with a view to preventing the proliferation of the solid fuel rocket that could easily be converted into a ballistic missile, fostering Western States’ close cooperation and increasing commercial proceeds for its aerospace industry.[8] As the 1969 Agreement was satisfactory for both countries, two successive similar agreements were adopted in 1975[9] and 1980,[10] through which Japan developed N-II and H-I liquid fuel rockets.[11] However, Japan decided to develop its own liquid fuel rocket engine by around mid-1980s, and the next SLV, H-II (operational 1994-1999) was developed without the technology assistant agreement with the US. It is evaluated however, that it was not until 2001 when a truly ingenious domestic liquid fuel rocket, H-IIA was successfully launched. H-IIA conducted its 50th and final launch in June 2025.[12] No commercial launch was conducted by a Japan’s SLV in the 20th century.

6 Japan Aerospace Exploration Agency (JAXA) (n/d). “N-1”, https://www.jaxa.jp/projects/rockets/n1/ (in Japanese) (last accessed 18 June 2025).

7 1969 Agreement, *supra* note 4, para. (2)(b); US National Security Council (24 September 1975). National Security Memorandum 306, https://www.fordlibrarymuseum.gov/sites/default/files/pdf_documents/library/document/0310/nsdm306.pdf (last accessed 20 June 2025).

8 Aoki, Setsuko (2005). Japan’s Space Strategy (in Japanese). Tokyo: Keio University Press, at 335-337.

9 Exchange of Notes Constituting an Agreement Relating to the Furnishing of Satellite Launching and Associated Services, May 1975, registered by the US 11 March 1976, No.14641.

10 Exchange of Notes Constituting an Agreement Relating to Space Launch Assistance, 3 December 1980, registered by the US 1 March 1982, No.20830.

11 JAXA (n/d). “N-II”, https://www.jaxa.jp/projects/rockets/n2/(in Japanese) (last accessed 18 June 2025); JAXA (n/d).”H-I”, https://www.jaxa.jp/projects/rockets/h1/ (in Japanese) (last accessed 18 June 2025).

12 JAXA (n/d). “N-IIA”, https://www.jaxa.jp/projects/rockets/h2a/, (last accessed 18 June 2025); Ogasawara, Hiroshi (2024). “70 Years History of Japan’s Rockets”, https://spacemate.jp/_ct/17740641 (in Japanese) (last accessed 18 June 2025); Graham, William (28 June 2025). “Japan’s GOSAT-GW launches aboard final H-IIA rocket”, https://www.nasaspaceflight.com/2025/06/gosat-gw-launch/ (last accessed 29 June 2025).

After two decades of relatively smooth development and use of outer space, a big setback was brought about to Japan by the 1990 US – Japan Satellite Procurement Agreement (hereinafter "1990 Agreement")[13] concluded as a part of the solution of the escalating trade frictions between the two countries. The 1990 Agreement obligated the Japanese government to procure all non-R & D satellites, i.e. application satellites, through international open-bidding. As the US application satellites were of better quality than those made by Japanese companies, 12 among 15 government procured satellites (communication, broadcasting or weather satellites) were US made from 1991 to 2009.[14] Therefore, in order to assist Japanese satellite makers, the Japanese government focused on the development of R & D satellites that were outside the 1990 Agreement for about two decades while other spacefaring nations embarked on commercialization of outer space using application satellites.[15] No satellite images were sold in markets in the 20th century by the Japanese companies.

1.2. Long-Standing Non-Military Space Policy That Weakened Space Industry

As the other and more fundamental reason to discourage Japan's commercialization of outer space, mention has to be made of Japan's non-military space policy officially declared in 1969. This prevented Japan from forging a defense-industrial association to nurture its space industry, which eventually frustrated the take-off of commercialization of outer space. When the Act Concerning the National Space Development Agency of Japan (NASDA Act)[16] was discussed in the Diet to establish Japan's space agency as a special

13 US-Japan Agreement on Satellite Procurement, 15 June 1990, https://stage.tksc.jaxa.jp/spacelaw/world/1_05/05.E-4.pdf (last accessed 1 June 2025).

14 Kozuka, Soichiro and Sato, Masahiko (eds.) (2024). Introduction to Space Law for Entrepreneurs [3d. ed] (in Japanese).Tokyo: Yuhikaku, at 112-113. The link below includes a summary of the 1996 annual report by the United States Trade Representatives (USTR) on the national trade estimates with Japan, which includes the outcome of the 1990 Agreement. See the description under the heading of "satellites"; https://ustr.gov/archive/Document_Library/Reports_Publications/1996/1996_National_Trade_Estimate/1996_National_Trade_Estimate-Japan.html (last accessed 21 June 2025).

15 Aoki, Setsuko (2009). "Current Status and Recent Developments in Japan's National Space Law and its Relevance to Pacific Rim Space Law and Activities", in: Journal of Space Law, 2009, vol 35, at 368.

16 Act Concerning the National Space Development Agency of Japan, Act No.50, 23 June 1969, art.1 [hereinafter "NASDA Act"]. NASDA was reorganized into JAXA on 1 October 2003.

corporation, in addition to the provision to obligate NASDA to conduct its space R & D for exclusively peaceful purposes,[17] the Diet Resolutions of both the House of Representatives and the House of Councilors were appended to the NASDA Act[18] to declare that Japan's space activities must be kept within the limits of "exclusively for peaceful purposes" with the understanding that "peaceful" meant "non-military" based on the Diet debates.[19] This was a self-imposed restriction, not an obligation that Japan assumed as a Party to the Outer Space Treaty,[20] as the Treaty does not impose non-military use of outer space.[21] Rather, the prevailing interpretation of Article IV of the Outer Space Treaty was and has been that "all military uses are permitted and lawful as long as they remain 'non-aggressive' as per Article 2(4) of the UN Charter, which prohibits 'the threat or use of force'"[22] since the time of its adoption.

In the first half of the 1980s when increased satellite data were used among general citizenry, heated discussions were repeated in both Houses of the Diet whether the Self-Defense Forces (SDF) of Japan could be a lawful user of satellite communications or satellite images under the non-military space policy.[23] Facing the practical inconveniences, the Japanese government issued the "Governmental Unified View" in 1985 that re-defined "non-military" use of outer space. That View clarified that the SDF was able to use satellite data and services when they had been already widely available to private persons in Japan, because such space technology was understood as non-military.[24]

17 NASDA Act, *supra* note 16, art.1.

18 House of Representatives (9 May 1969). Minutes of Plenary Session, vol 35, at 1; House of Councilors (13 June 1969). Minutes of Special Committee on the Science and Technology Promotion Measures, vol 9, at 1.

19 See, e.g., House of Representatives (8 May 1969). Minutes of Special Committee on Science and Technology Promotion Measures, vol11, at 5; Aoki, *supra* note 15, at 367-368, 380-381.

20 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 27 January 1967, 18 UST 2410, 610 UNTS 205 [hereinafter "OST"].

21 *Id.*, art. IV. Articles I, III, and IX support such interpretation.

22 Vlasic, Ivan A (1991). "The Legal Aspects of Peaceful and Non-Peaceful Uses of Outer Space", in: Bhupendra Jasani (ed.). Peaceful and Non-Peaceful Uses of Space. New York: Taylor & Francis, at 40.

23 House of Representatives (5 February 1983). Minutes of the Standing Budget Committee vol 5, at 14; House of Representatives (5 February 1985). Minutes of the Standing Budget Committee, vol 4 at 4.

24 House of Representatives (6 February 1985). Minutes of the Standing Budget Committee vol 5 at 3.

In December 1998, however, a new challenge emerged when the Japanese government decided to own Information Gathering Satellites (IGS) to monitor the military activities of the Democratic People's Republic of Korea (DPRK) after its ballistic missile, Tepodong-1, flew over the mainland of Japan on 31 August 1998. While the true aim of the IGS could be said for military purposes, the program was distorted to meet the criteria of re-defined non-military concept made in 1985. Thus, the spatial resolution of the planned IGS had to be restricted to the best resolution available in the commercial markets of remote sensing data.[25] Likewise, the IGS was owned and operated by the newly established civilian Cabinet Satellite Intelligence Center (CSICE) placed under the Cabinet Intelligence and Research Office (CIRO) of the Cabinet Secretariat.[26] IGS constellations remain owned by the CSICE as of 2025 although the non-military space policy ended in 2008 when the Basic Space Act[27] was made into law.

In sum, Japan was a relatively old spacefaring nation, but failed to commercialize its space activity all through the 20th century while other spacefaring States started successful commercialization of space launch, sales of satellites and remote sensing satellite data around that time.

2. HISTORY OF THE LAW-MAKING PROCESS

2.1. National Space Laws Prior To The Basic Space Act

Although Japan was an original member of the Outer Space Treaty, it was not until 1983 when Japan acceded to the Rescue Agreement,[28] the Liability Convention[29] and the Registration Convention.[30] Noting the unique responsibility and liability regime on the UN space treaties, Space Activities Commission (SAC)[31] under the Prime Minister Office

25 Aoki, *supra* note 15, at 380-382.

26 *Id.*, at 380.

27 Basic Space Act, Act No. 43, 28 May 2008. English translation is available https://www.japaneselawtranslation.go.jp/en/laws/view/4194 (last accessed 15 June 2025) [hereinafter "BSA"].

28 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 22 April 1968, 19 UST 7570, 672 UNTS 119.

29 Convention on International Liability for Damage Caused by Space Objects, 29 March 1972, 24 UST, 2389, 961 UNTS 187 [hereinafter "Liability Convention"].

30 Convention on Registration of Objects Launched into Outer Space, 14 January 1975, 28 UST 695, 1023 UNTS 15.

studied in the mid-1970s whether Japan needed to enact an independent space activities act to implement the United Nations (UN) space treaties to accede to the three treaties. The SAC concluded it was not necessary because: 1) any non-governmental agencies did not have a SLV;[32] 2) telemetry, tracking, and control (TT&C) of space objects was conducted solely by NASDA that was tightly controlled by the Science and Technology Agency (STA) within the Prime Minister Office; and 3) no human space activities were planned in the foreseeable future.[33] Eventually, Japan acceded to the three treaties in 1983 without enacting a national space act. However, the oral agreement of the relevant ministers was made in the Cabinet Meeting held on 29 March 1983 that the national space act would swiftly be made when its necessity became clear in the future.[34]

The prerequisite that dispensed with a national space act had rapidly been disappearing in the last decade of the 20th century. A private communication satellite operator started to own and operate its TT&C facilities in 1989,[35] and the first private rocket manufacturer and launch provider, Rocket Systems Corporation (RSC) was founded in 1990.[36] Thus, these new events could have led to the making of a space activities act to establish licensing schemes to launch a rocket and operate a satellite as well as third-party liability (TPL) systems to protect innocent victims. As the Liability Convention provides absolute liability of a launching State for damage caused by its space object on the surface of the Earth or to aircraft in flight,[37] foreign States and its nationals are covered by that victim-oriented liability scheme in case of a launch accident as long as both the launching State and the

31 SAC was established under the Prime Minister Office in 1968 to decide Japan's space policy, which was inevitably lacking security aspects due to Japan's policy to keep non-military use of space. SAC was abolished and reorganized as National Committee on Space Policy (NCSP) under The Cabinet Office in 2012.

32 Other than NASDA, ISAS (previously a research institute of the University of Tokyo), a national research organization under the Ministry of Education had a solid propellent rocket.

33 Special Working Group on the United Nations Treaties on Outer Space of the SAC (22 June 1976). Report on the Basic Issues on the Necessary National Laws for the Accession to the UN Treaties on Outer Space (in Japanese), at 2-3. STA was abolished and its mandates were transferred to Ministry of Education, Culture, Sports, Science and Technology(MEXT) in 2001.

34 Cabinet (29 March 1983). Oral Agreement of the Cabinet Meeting on the Accession to and Implementation of the Three of the UN treaties on Outer Space (in Japanese).

35 SKY Perfect JSAT (n/d). "YSCC: Yokohama Satellite Control Center", https://www.skyperfectjsat.space/jsat/facilities/ground/yscc/(in Japanese) (last accessed 21 June 2025).

36 Council for Science and Technology Policy (CSTP) (2001). "RSC'S Commercial Satellite Launch and its Challenges" (in Japanese), https://www8.cao.go.jp/cstp/tyousakai/cosmo/haihu02/siryou2-1.pdf (last accessed 21 June 2025)

37 Liability Convention, *supra* note 29, art. II.

victim State are the Parties to the Convention. However, the same level of protection was not explicitly provided in the NASDA Act to a potential victim (irrespective of nationality) in the territory of Japan. As a practical solution, NASDA purchased 20 billion-yen TPL insurance, (200 million US dollars, calculating as 100 yen about 1 US dollar, which was the approximate exchange rate of 1990s) pursuant to the administrative guidance of the STA that supervised NASDA.[38]

The government did not plan to make an independent space activities act even after RSC concluded two commercial launch services contracts with the US satellite manufacturers in 1996. This was because of the RSC's special relationship with NASDA and overall immaturity of privatization of space activities in Japan. RSC was established by the cooperation of 73 companies to manufacture and market commercial launch services of NASDA-developed SLVs,[39] for NASDA could not directly engage in commercial space activities due to its mandates restricted to R & D of rockets and satellites.[40] When RSC produced and owned NASDA-developed H-II rockets, RSC would become only a consignor of the launch, and the actual launch operation would be conducted by NASDA as only NASDA had a launch site and launch operation facilities. Further, there was no other consignors expected in addition to RSC at that time. In one word, RSC could be said as a special legal mechanism to commercialize NASDA rocket.

However, there was an issue to address, which was a TPL schemes that would effectively protect potential victims in the territory of Japan and exempt customers (satellite operators and makers) of a NASDA-developed-RSC-produced rocket from a possible TPL to enhance competitiveness of NASDA/RSC rockets in the international launch market. Besides, as an accountability of taxpayers, the allocation of liability between NASDA and RSC had to be clarified. The amendment of NASDA Act solved the issue.

38 In contrast, the solid propellent M-V rocket, owned by ISAS, was launched without any insurance.

39 Aoki, *supra* note 15, at 396-397; CSTP, *supra* note 36.

40 NASDA Act, *supra* note 16, art.1.

The summary of the newly added provisions of the NASDA Act[41] is as follows: If NASDA was a launch operator, it shall not launch any satellites without concluding an insurance contract by which it can compensate the damage. (By the amendment, NASDA's TPL insurance was not voluntarily, but obligatory.) [42] The amount of the insurance shall be decided by the competent minister of NASDA.[43] (The amount remained 20 billion yen.)

If NASDA was to conduct a consigned launch, with the permission of the competent Minister, NASDA may assume all liabilities if NASDA and the consignor (meaning RSC) are both liable for the compensation for damages to a third party.[44] In this case, while a consignor must purchase TPL insurance for and on behalf of NASDA,[45] damages beyond the insured amounts would be covered by NASDA. [46] This implies NASDA, a special corporation, was responsible for secured compensation on behalf of the government.[47] Also, no-fault liability was imposed for NASDA and a consignor caused to private victims.[48]

However, Japan's first attempt to privatize a launch provider was not successful. The launch failures of NASDA's H-II 5 (August 1998) and H-II 8 (November 1999) led to the cancellation of the contracts between RSC and the US customers, and eventually, the RSC was dissolved in 2006 without any successful commercial launch.

The TPL provisions in the amended NASDA Act in 1998 were intact and became Articles 21 (conclusion of insurance contracts on the launch of satellites) and 22 (special provisions on consigned launches) of the Act Concerning Japan Aerospace Exploration Agency (hereinafter "JAXA Act") ,[49] when NASDA and two other space organizations,

41 Amended Act Concerning NASDA, Act No. 87, 3 June 1998.

42 *Id.*, art. 24-2 (1).

43 *Id.*, art 24-2 (2).

44 *Id.*, art 24-3 (1).

45 *Id.*, art 24-3 (3).

46 *Id.*, art 24-3 (1).

47 *Id.*, arts 24-2 & 24-3.

48 Without this scheme, fault-based liability is incurred in a launch accident based on Civil Code (Act No. 89, 27 April 1896 as amended, at Book 3, Ch.5, art.709 *et seq*) and State Tort Liability Act (Act No. 125, 22 October 1957, art 1). Although article 2 of the State Tort Liability Act provides strict liability in case of "a defect in the placement or administration of a road, river, or other public structure", it is evaluated that a launch site is not likely to be included in a public structure.

49 Act Concerning Japan Aerospace Exploration Agency, Act No.161,12 December 2002 [hereinafter "JAXA Act"].

Institute of Space and Astronautical Science (ISAS) and National Aerospace Laboratory of Japan (NAL) were merged and transformed into Japan Aerospace Exploration Agency (JAXA) in October 2003.[50]

In July 2007, JAXA-developed H-IIA rocket was transferred to a private company, Mitsubishi Heavy Industry (MHI), and JAXA conducted the first consigned commercial launch next year.[51] Private companies including entrepreneurial ventures started developing small- to medium-size rockets in the first decade of the 21st century.[52] At that time, JAXA Act was considered a Japan's space activities act due to the TPL schemes,[53]

50 *Id.*, arts. 21-22. Appropriate amounts of insurance decided by the competent Ministers were 20 billion yen for H-IIA and 5 billion yen for M-5 that had been ISAS' rocket. ISAS launched their solid propellent rocket without insurance. Aoki, *supra* note 15, at 402.

51 It was a communication satellite Supberbird-7 of Japan's JSAT Corporation (currently, SKY Perfect JSAT). Aoki, *supra* note 15, p.369.

52 Aoki, *supra* note 15, p.369.

53 Both articles of the JAXA Act are cited below.

Article 21 (Conclusion of Insurance Contracts relating to the Launch of Satellites)

1. The Agency shall not launch any Satellites without entering into an insurance contract by which it can secure the amounts necessary to compensate for damage incurred by others as a result of the launch of the Satellites.
2. The amounts to be secured by the insurance contracts set forth in the preceding Paragraph shall be defined by the competent Ministers, taking into account the amount that the insurers are able to underwrite and other relevant matters, so that those amount may be appropriate from the viewpoint of protection of the victims.
3. In the event that the launch of Satellites is to be performed by the Agency as a result of the consignment (hereinafter in the immediately following Article referred to as the "Consigned Launch"), the insurance contract set forth in Paragraph 1 hereof may, notwithstanding the provision of said Paragraph, be entered into by a person or entity which has consigned the launch of such Satellites (hereinafter in the immediately following Article referred to as the "Consignor ") for and on behalf of the Agency.

Article 22. (Special Arrangements Relating to Consigned Launch)

4. In the event that the Agency enters into an agreement with a Consignor with respect to a Consigned Launch, the Agency may, upon obtaining authorizations of the competent Ministers, enter into the following special arrangements with respect to its liability for compensation for damage caused by the Consigned Launch to any persons or entities other than those related to the Consigned Launch:
    (1) If the Agency is held liable for compensation for damage caused by the Consigned Launch to any persons or entities other than those related to the Consigned Launch, and the parties related to the Consigned Launch are also liable for compensation for such damage, the Agency shall assume the entire liabilities of those parties related to the Consigned Launch for compensation for the damage; and
    (2) In the case of the preceding Item, if such damage is caused by a willful misconduct of any of the parties related to the Consigned Launch, the Agency shall have the right of claiming compensation from such parties for the expense already paid by the Agency for such damage.
5. For the purpose of the preceding Paragraph, the "parties related to the Consigned Launch" mean the Consignor and any person or entity designated by the Agency and the Consignor in the said special arrangements as the persons or entities which are related to the Consigned Launch.
6. When the Agency enters into the special arrangements set forth in Paragraph 1 hereof, notwithstanding the provisions of Paragraphs 1 and 3 of the immediately preceding Article, the insurance contracts set forth in Paragraph 1 of that Article shall be entered into by the Consignor for and on behalf of the Agency.

but the unreasonableness was gradually apparent when privatization of SLV started. This concerns the special status of the MHI as the sole consignor of JAXA. If a rocket fall accident happens, financial assistance regarding TPL and other benefits are given only to MHI, while it is true that only MHI was under the obligation to enter into a TPL contract for and on behalf of JAXA.[54] The situation that other private launch providers were outside the TPL schemes had to be corrected before their successful launch of a private rocket. A comprehensive TPL schemes was established by the enactment of Space Activities Act (2016),[55] which led the deletion of Articles of 21 and 22 of JAXA Act in November 2018.[56]

A private person who intended to launch a satellite by its rocket or become a satellite operator had to obtain a series of licenses based on Japan's relevant acts including especially the Radio Act,[57] Gun-Powder Control Act,[58] the High-Pressured Gas Safety Act,[59] Electricity Utility Act,[60] Telecommunications Business Act,[61] Broadcast Act,[62] and Foreign Exchange and Foreign Trade Act[63] until the latter half of the second decade of the 21st century. Today, while these acts have been continuously applicable to space activities, a private person who intends to launch or control a spacecraft does not have to have a knowledge of these acts, because the requirements relating to relevant provisions of these acts have been included in the application procedures of the Space Activities Act[64] and the Satellite Remote Sensing Data Act[65] , both promulgated in 2016.[66]

54 JAXA Act, *supra* note 49, arts. 21(3) and 22.

55 Act on Launching of Spacecraft, etc. and Control of Spacecraft, Act No. 76, Nov. 16, 2016 [hereinafter "SAA"].

56 Amended Act Concerning JAXA, Act No. 76,15 November 2018.

57 Radio Act, Act No.131, 2 May 1960 as amended.

58 Gun-Powder Control Act, Act No. 149, 4 May 1950 as amended.

59 High-Pressured Gas Safety Act, Act No.204, 7 June 1951 as amended.

60 Electricity Utility Act, Act No. 170, 11 July 1964 as amended.

61 Telecommunications Business Act, Act No. 86, 25 December 1984 as amended.

62 Broadcast Act, Act No. 132, 2 May1950 as amended.

63 Foreign Exchange and Foreign Trade Act, Act No. 228, 1 December 1949 as amended (the original name in 1949 was slightly different).

64 SAA, *supra* note 55.

65 Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data, Act No. 77, 16 November 2016 [hereinafter "SRSDA"].

66 See *supra* notes 55 and 65.

2.2. Basic Space Act As The Basis Of Japan's Space Activities

The Basic Space Act is the basis of today's space law and policy in Japan, but this is not a national law to authorize and supervise private space activities. To stop two-decades of stagnation in commercialization of space and leverage Japan's space capabilities for enhancing national and human security, the ruling Liberal Democratic Party (LDP) submitted a Basic Space Bill to the Diet in 2007.[67] This was left undiscussed in the House of Representatives throughout the Diet sessions in 2007 and withdrawn when the second and bi-partizan Basic Space Bill was submitted to the House of Representatives on 9 May 2008. The bi-partizan bill was swiftly voted for by an overwhelming majority at the two Houses and made into a full-fledged Act on 21 May 2008. Basic Space Act was promulgated on 28 May and became effective on 28 August 27 2008.[68]

The Basic Space Act declares a new space policy so that Japan could be a relevant spacefaring nation in the 21st century. The following points are of particular importance. First, the Act requires the government to take measures to: foster space industry;[69] improve safe and secure society using space-based assets;[70] protect space environment for the sustainable use of outer space;[71] and to make national space laws for the appropriate implementation of international space law.[72] This shows the determination to leverage space capabilities to enhance national interests and human security worldwide. The protection of space environment is particularly emphasized as one of the basic space policies in Japan.[73]

67 A bill can be submitted to Diet either by Diet members or by the Cabinet. Among Japanese space legislation, Basic Space Bill and Space Resources Bill (*infra* note 178) were drafted and submitted by Diet members.

68 More detailed drafting history is found, e.g., Aoki, *supra* note 15, at 382-38.

69 BSA, *supra* note 27, arts.4 &16.

70 *Id.*, arts. 3, 13-14.

71 *Id.*, arts. 7 & 20.

72 *Id.*, arts. 11& 35. Article 35 of the Basic Space Act provides that "[t]he Government shall carry out the enactment of legislation on necessary matters comprehensively, systematically and promptly, in order to implement treaties and other international agreements with regard to regulations on space activities as well as other Space Development and Use. (2) The enactment of legislation prescribed in the preceding paragraph shall be carried out in order to advance the national interests of Japan in international society and to contribute to the promotion of Space Development and Use by the private sector." (This is translated by the present author, and there is a slight difference from the government tentative translation.)

73 BSA, *supra* note 27, art. 7.

Second, the Basic Space Act restructured the space policy-making bureau. To change the past practices that several ministries carried out slightly overlapping activities due to the lack of the whole-of-the-government space policies and plans,[74] the Strategic Headquarters for Space Development (hereinafter "Strategic Headquarters") was established in the Cabinet to make a comprehensive space policy.[75] The Prime Minister serves as the Director-General for the Strategic Headquarters,[76] while the Chief Cabinet Secretary and the Minister of State for Space Policy serving as Vice Director-General, and all other Ministers serving members. [77] For the first time, the position of the Minister of State for Space Policy was established, who was to assist the Prime Minister in designing Japan's space policies. The Strategic Headquarters adopted the Basic Space Plan five times (2009, 2012, 2015, 2020 and 2023) in accordance with the Basic Space Act.[78] The first two Plans aimed at promoting space applications as the basis of space industry rather than just focusing on R & D. From the third Plan, emphasis has been placed on enhancing space security.[79]

Third, Japan's long-time policy to interpret "peaceful" use meaning "non-military" use of outer space was given up by the Basic Space Act after about four decades. Finally, the complicated and sometimes distorted interpretation of "non-military" use of outer space was relinquished. Article 2 of this Act provides: "Space Development and Use shall be carried out in accordance with treaties and other international agreements with regard to Space Development and Use including the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and

74 Aoki, *supra* note 15, at 376-382.

75 BSA, *supra* note 27, art. 25. The Secretariat of the Strategic Headquarters was shifted from the Cabinet Secretariat to the Cabinet Office in July 2012, as determined in the Supplementary Provisions to the Basic Space Act (art. 2) in 2008.

76 BSA, *supra* note 27, art. 28.

77 *Id.*, arts. 29-30.

78 *Id.*, arts. 24. All five Basic Space Plans and their relevant documents are found: National Space Policy Secretariat (NSPS), https://www8.cao.go.jp/space/plan/keikaku.html (in Japanese) (last accessed 3 June 2025).

79 *Id.*

Other Celestial Bodies, in accordance with the pacifism of the Constitution of Japan." Quoting the formal name of the Outer Space Treaty, Article 2 implies that the prevailing interpretation of "peaceful" meaning "non-aggressive" uses of outer space would also be applicable to Japan's space activities. In line with the change of interpretation of the peaceful purposes of outer space, JAXA Act was amended so that JAXA would also be able to engage in "peaceful" space exploration and development in the sense of Article 2 of the Basic Space Act.[80]

Fourth, the Act requires the government to make national space act(s) to implement international space law and to promote private space activities of Japan for the national interests.[81] Adopted at both Houses' relevant committees requested that the national space act(s) should be enacted within two years from the entry into force of the Basic Space Act, and thus the Cabinet Secretariat made great efforts to keep the deadline.[82] However, actual formulation of national space acts took eight years due to the political instability brought about the historic change of government in September 2009 from the LDP to the Democratic Party and serious damages caused by the Great East Japan Earthquake occurred in March 2011. [83]

80 Amended Act Concerning JAXA, Act No. 76, 16 November 2016, art. 4.

81 BSA, *supra* note 27, art. 35.

82 House of Representatives (20 May 2008). Cabinet Standing Committee, Resolution on the Promotion of the Space Development and Use, para.6; House of Councilors (20 May 2008). Cabinet Standing Committee, Resolution on the Space Basic Bill, para.6. The text of the paragraph 6 of the both Resolutions is identical.

83 The working group to study Space Activities Act (established on 1 October 2008) in the Expert Committee on the Space Development Strategy in the Strategic Headquarters made the final report (5 March 2010) following the interim report (24 August 2009) and the collection of the public comments (2-23 October 2009). The Strategic Headquarters planned to draft a Space Activities Bill based on the final report, but it did not occur due to political instability and massive earthquakes hit Japan in 2011. The present author was a member of the both Expert Committee and its working group to study Space Activities Act and participated in the whole processes of the study. The planned licensing schemes reflected in the final report was detailed in Aoki, Setsuko (2012)."Japanese Space Activities Act in the Making", in: Zeitshcrift Für Luft-Und Weltraumrecht, 2012, vol 61, no1, at 111-128. The link <https://www8.cao.go.jp/space/archive1/kaisai.html> (in Japanese) (last accessed 23 June 2025) contains processes and outcome of the working group to study Space Activities Act.

3. COMMENTARY OF THE NATIONAL SPACE LAW: TWO NATIONAL SPACE ACTS MADE IN 2016

3.1. Legislative Processes Of The Two Acts

After the failure of the initial attempt to draft a Space Activities Bill in 2009-2010, the third Basic Space Plan adopted in January 2015 reactivated the plan to make national space acts provided in the 2008 Basic Space Act.[84] Timing was ripe, for the third Basic Space Plan was made under the strong leadership of Prime Minister Abe, who eventually became the longest-serving Prime Minister in Japan's parliamentary history. The third Basic Space Plan requested the expeditious drafting of the two national space acts to the government in order to submit the bills to the 2016 regular Diet session that was to start in January 2016.[85] The first was the Space Activities Bill to provide authorization and supervision of private space actors, and the second was the bill to manage data distribution of remote sensing satellites with a view to striking a fine balance between protecting national and international security and promoting private remote sensing data business.[86] The contents of the future acts were studied in the experts working group set up in the Committee on the National Space Policy (CNSP)[87] in cooperation with the relevant ministries including especially the Cabinet Office, Ministry of Foreign Affairs (MOFA), Ministry of Education, Culture, Sports, Science and Technology (MEXT), Ministry of Economy, Trade & Industry (METI) and Ministry of Internal Affairs and Communications (MIC).[88]

Following the approval of the Space Activities Bill and Satellite Remote Sensing Data Bill in the Cabinet Meeting on 4 March 2016, the two bills were introduced in the Cabinet Committee in the House of Representatives on 27 April 2016. They were not discussed in the Regular Session (150 days from 4 January 2016) due to the bills' relative low priority,

84 Strategic Headquarters for Space Development (9 January 2015). Basic Space Plan Third (in Japanese), https://www8.cao.go.jp/space/plan/plan2/plan2.pdf (last accessed 15 June 2025) [hereinafter "BSP3"].

85 *Id.*, at 24.

86 *Id.*

87 The Committee on the National Space Policy (CNSP) set up in accordance with Article 38 of the Act for the Establishment of the Cabinet Office (Act No. 89, 17 July 1999) was tasked with providing opinions and recommendations, as appropriate, to the Prime Minister and other relevant Ministers. As of 2025, CNSP consists of nine private experts. The present author has been a member of the CNSP since its establishment in July 2012 to July 2022 and since August 2024 to present.

88 BSP3, *supra* note 84, at 24-25.

but they were introduced and discussed in the Extraordinary Diet Session started on 26 September 2016. The substantial discussion was held on 26 October 2016 in the Cabinet Committee of the House of Representative and passed in the Plenary thereof on 28 October 2016. The same procedure was taken in the House of Councilors: the introduction of the bills (1 November), discussion at the Cabinet Committee of the House of Councilors (8 November) and the passing of the two bills in the Plenary thereof on 9 November 2016. On the same day, two bills became full-fledged acts. Space Activities Act[89] and Satellite Remote Sensing Data Act[90] were promulgated on 16 November 2016.

3.2. Contents/Commentary Of The Space Activities Act Of Japan

This subsection describes the contents of the Space Activities Act (SAA). Article 1 of the SAA provides the purposes of the Act: i) to adequately implement the UN treaties on outer space and other international agreements to which Japan is a Party (observance of international law); ii) to ensure public safety and protect people affected by damages from the launch, intentional reentry and the operation of spacecraft; and iii) to contribute to the improvement of the lives of the citizens and the development of the economy and society.[91] The first and foremost purpose is fulfilling Japan's obligation to ensure its "national activities in outer space" conducted either by a governmental agency or non-governmental entities would be in conformity with international law.[92] Then, the second purpose is the public safety and the protection of innocent victims, which will be ensured by making appropriate authorization and supervision schemes and an adequate obligatory TPL schemes. Not directly related to international space law, majority of national space laws include "insurance requirements and indemnification procedures, as appropriate" as reflected in the UN General Assembly (GA) Resolution on "Recommendations on national legislation relevant to the peaceful exploration and

89 SAA, *supra* note 55.

90 SRSDA, *supra* note 65.

91 SAA, *supra* note 55, art. 1.

92 OST, *supra* note 20, arts. III & VI.

use of outer space" [hereinafter "UNGA national space legislation recommendations].[93] Japan's Act is in line with standard types of space legislation. The third purpose is the goal of Japan's space activities, which is reflected in the basic principles of Basic Space Act as the basis of Japan's space policy.

It took two years until SSA came into effect on November 15, 2018, because detailed regulations, guidelines and manuals for the two types of authorization schemes of the SAA had to be made in the National Space Policy Secretariat (NSPS), Cabinet Office.[94] English translation of regulations, review standards, guidelines, application manuals of the SAA are found in the homepage of NSPS, Cabinet Office under the area of "Information and Applying for a Permission Related to the Launching of Spacecraft, etc. and License Related to the Control of Spacecraft".[95]

3.2.1. Permission Schemes Of The "Launch Of The Spacecraft, Etc."

A private person (irrespective of nationality) who intends to launch a "spacecraft, etc." using a launch site located in Japan or onboard a ship or aircraft with Japanese nationality shall obtain permission from the Prime Minister for each instance of the launching.[96] (Original Japanese "Eisei, etc." could be translated in "satellite, etc." or "spacecraft, etc.". As the Ministry of Justice selected "spacecraft, etc." when it made a tentative English translation, the Japanese law chapter of this book also uses "spacecraft, etc.". Please note that it can be replaced with "satellite, etc.".) "Spacecraft, etc." means "spacecraft and a vehicle for launching the spacecraft",[97] and "spacecraft" is defined as "an artificial object which is used by putting it into Earth orbit or beyond, or placed on celestial body other than the Earth".[98] Simply put, in a frequently found case, "spacecraft, etc." means a SLV and a satellite.

93 UNGA Res 68/74, 11 December 2013, para.7 [hereinafter "UNGA national space legislation recommendations].

94 Regulations and Guidelines concerning SAA which have been translated in English are found: https://www8.cao.go.jp/space/english/activity/application.html (last accessed 15 June 2025).

95 NSPS, https://www8.cao.go.jp/space/english/activity/application.html (last accessed 15 June 2025).

96 SAA, *supra* note 55, art. 4 (1).

97 *Id.*, art. 2 (iii)

98 *Id.*, art. 2 (ii).

As a characteristics of Japan's permission schemes, territorial principle is applied in principle. Thus, no permission is needed if a Japanese national intends to launch its rocket (loaded with a satellite) from a foreign territory. Likewise, no launch permission is required for the launch of an SLV without a spacecraft nor the launch of a suborbital vehicle. They are outside the permission scheme of the SAA. Although human space flight other than the suborbital human flight is not explicitly excluded from the SAA, the tacit understanding during the time of the drafting of the SAA was that it was substantially prohibited without the technology neither in the hands of the government nor private entities in Japan. It was agreed that the SAA would be amended once a private person acquires human suborbital and/or orbital flight technology.[99]

When an applicant satisfies the following four criteria, a launch permission is granted by the Prime Minister. Those criteria are: i) a safe launch vehicle, ii) safe launch site, iii) safe flight plan, and iv) the confirmation that the purpose and methods of the planned use of the spacecraft to be launched observe international and national law (a part of the payload review).[100] For the first criterion, the "launch vehicle safety standard" shall be satisfied, [101] which is detailed in the Regulation for Enforcement of the Act on Launching of Spacecraft, etc. and Control of Spacecraft (hereinafter "Enforcement Regulation of the SAA") that has a status of a Cabinet Office Order.[102] If a new SLV is developed, a thorough review of the launch vehicle safety standard is needed.[103] For an established SLV that has shown a successful launch record, submitting a "type certification" to the Cabinet Office dispenses a review, thus enabling the expeditious issuance of a permission. Either the applicant of the launch permission or the owner of the established SLV may obtain

99 Space Legislation Subcommittee, CNSP (23 June 2015). Minutes of the 4th Meeting held on June 23, 2015, https://www8.cao.go.jp/space/comittee/27-housei/housei-dai4/gijiroku.pdf (in Japanese) (last accessed 12 June 2025). The present author was the vice-chair of this space legislation subcommittee.

100 SAA, *supra* note 55, art. 6.

101 *Id.*, art. 6(i).

102 Regulation for Enforcement of the Act on Launching of Spacecraft, etc. and Control of Spacecraft, Cabinet Office Order No. 50, 15 November 2017 as amended, art.7 [hereinafter "Enforcement Regulation of the SAA"].

103 New rockets, KAIROS 1 and KAIROS 2 (launched in March and December in 2024) owned by Space One (established in 2017) were thoroughly reviewed. Both launches were not successful.

the "type certification" from the Prime Minister.[104] In case such an established SLV is certified by a foreign government, an applicant may obtain a "foreign certification" in accordance with the Enforcement Regulation of the SAA.[105]

As to the second criterion, or the safe launch site, an applicant shall meet the "type-specific site safety standard", which differs depending on the size and capability of a SLV.[106] In Japan, each established SLV is usually launched from the same launch site as exemplified H-IIA or H-III is launched from the Tanegashima Space Center. Thus, it is convenient for an applicant who already owns a type certification or foreign certification to also obtain the certificate that a launch site planned to be used complies with conditions to launch the said SLV. Such certification is called "compliance certification" for a launch site, and an applicant who already has a type certification or foreign certification is entitled to apply for it.[107] If a compliance certification is also granted, an actual review for the type-specific site safety standard would be omitted. The Prime Minister may grant this certification when all requirements specified by the Enforcement Regulation of the SSA are met.[108]

For an applicant who submits the type certification and compliance certification to the Cabinet Office, the actual review to undergo is the third and fourth criteria, i.e. the launch plan[109] and a part of the payload review.[110] Since a person who intends to obtain a license to control a spacecraft is responsible for satisfying the requirements for the payload

104 SAA, *supra* note 55, arts. 6 (i) and 13; Guidelines on Type Certification for Launch Vehicles (revised 1st ed.) (30 March 2018), https://www8.cao.go.jp/space/english/activity/documents/guidelines2.pdf. (last accessed 19 June 2025).

105 SAA, *supra* note 55, arts. 4 (2)(ii) and 6 (i). No detailed procedures to obtain a foreign certification is specified in the Enforce Regulation of the SAA due to the low possibility to launch a foreign SLV from the Japanese territory in the near future.

106 SAA, *supra* note 55, arts. 4 (2) (iii) and 16 (2).

107 *Id.*, art. 16 (2)(iii).

108 *Id.*, arts. 4 (2) (iii), 6 (ii) & 16; Enforcement Regulation of the SAA, *supra* note 102, arts. 8 & 16; see Guidelines on Compliance Certification for Launch Site (revised 1st ed.) (30 March 2018), https://www8.cao.go.jp/space/english/activity/documents/guidelines3.pdf (last accessed 19 June 2025).

109 SAA, *supra* note 55, arts. 4 (2) (iv) & 6 (iii); Review Standards and Standard Period of Time for Process Relating to Procedures under the Act on Launching of Spacecraft, etc. and Control of Spacecraft (15 November 2017), at 3-8, https://www8.cao.go.jp/space/english/activity/documents/reviewstand.pdf (last accessed 19 June 2025) [hereinafter "Review Standards"].

110 SAA, *supra* note 55, arts. 4 (2) (v) & 6(iv).

review (see 3.2.2 below),[111] the applicant who has the "type certification" and "compliance certification" shall only meet the criterion of the launch plan. The launch plan comprises the methods for and the schedules of the launching of the spacecraft, etc., as well as the planned trajectory and the methods of ensuring the safety of the spacecraft, etc. and the launch site.[112]

JAXA also needs a launch permission due to its status that it is not a governmental agency but a national R & D agency. However, the processes of obtaining type certification and compliance certification are considerably simplified.[113]

For an applicant who has the type certification and the compliance certification, standard period-of-time for processing a permission is one to three months, while without them, four to six months would be needed.[114] From 2018 to 2024, 16 launch permissions have been granted from the Prime Minister. [115]

3.2.2. Licensing Schemes Of The "Control Of A Spacecraft"

The original Space Activities Act in 2016 provided "[a] person who intends to implement the control of a spacecraft using a spacecraft control facility located in Japan must obtain a license from the Prime Minister for each of the spacecraft."[116] "Spacecraft control facility" means radio equipment to detect signals indicating the position, attitude and condition of a spacecraft in outer space and to transmit signals to control the position, attitude and condition of the said spacecraft. Receiving and transmitting signals to spacecraft may be done either directly or via other radio equipment.[117] Noting there is only one "spacecraft control facility" for one spacecraft, the licensing scheme focuses on the person who controls spacecraft control facility for which Japan executes enforcement jurisdiction due to its territorial principle.

111 Review Standards, *supra* note 109, at 8.

112 SAA, *supra* note 55, arts. 4 (2) (iv) & 6 (3); Review Standards, *supra* note 109, at 3-8.

113 SAA, *supra* note 55, art. 19.

114 Review Standards, *supra* note 109, at 3.

115 NSPS (n/d). Launch permission based on Article 4 (1) of the Space Activities Act, <https://www8.cao.go.jp/space/application/space_activity/application.html> (in Japanese) (accessed 15 June 2025).

116 SAA, *supra* note 55, art. 20 (1).

117 *Id.*, art. 2 (vi).

The location of the spacecraft control facility for which a license is needed is enlarged by the 2021 amendment of the Act as: "--- in Japan, onboard a ship or aircraft with Japanese nationality or on the spacecraft in outer space for which the Cabinet Office Order states that Japan retains jurisdiction (hereinafter "spacecraft control facility in Japan, etc.)".[118] The Space Resources Act adopted in 2021 as an additional act of the SAA[119] prompted this amendment of the SAA. Noting the broad definition of the "spacecraft" in the SAA[120] that includes devices, robots and structures to prospect, extract, transfer and store space resources in orbits and on the celestial bodies, and considering that such spacecraft would be controlled by a spacecraft control facility placed not only in Japan but also from another spacecraft in orbit or on the celestial body, SAA was amended.[121] By the amendment of the SAA, the strict territorial principle in granting a license was slightly alleviated.

It is necessary for an applicant to meet all the requirements specified in Article 22 of the SAA and the Enforcement Regulation of the SAA to obtain a license to control a spacecraft.[122] The types of the requirements are roughly categorized into three: first, the lawfulness of the purposes and methods of use of the spacecraft under international and national law as well as appropriateness from a public safety point of view. This requirement includes the fourth criterion to obtain a launch permission mentioned in the preceding subsection.[123] Second, the appropriate space debris mitigation measures in all stages of the mission. These measures are specified in detail in the Enforcement Regulation of the SAA[124] and Guidelines on License Related to Control of Spacecraft (hereinafter "Spacecraft Control License Guidelines").[125] As one of the characteristics

118 Amended Act of the SAA, Act No. 83, 23 December 2021, art. 20 (1) [hereinafter "Amended SAA 2021"].

119 Space Resources Act, *infra* note 178.

120 SAA, *supra* note 55, art. 2(ii).

121 Amended SAA 2021, *supra* note 118, art. 20.

122 Enforcement Regulation of the SAA, *supra* note 102, art. 22.

123 SAA, *supra* note 55, art. 22 (i).

124 Enforcement Regulation of the SAA, *supra* note 102, arts. 22-23.

125 Guidelines on License Related to Control of Spacecraft (revised first ed.) (30 March 2018) at 6.2 & 6.3, https://www8.cao.go.jp/space/english/activity/documents/guidelines4.pdf (last accessed 21 June 2025) [hereinafter "Spacecraft Control License Guidelines"].

of the SAA, concrete measures on space debris mitigation are also specified in the Act itself,[126] which is rare in comparison with other States' space activities act.[127] Third, Article 22 (ii) of the SAA provides that an applicant must prove the planned missions "are not likely to cause an adverse effect on the prevention of the harmful contamination of outer space, including the Moon and other celestial bodies and the prevention of potentially harmful interference with activities of other countries in the peaceful exploration and use of outer space provided in Article IX of the Outer Space Treaty".[128] This also shows the characteristics of the SAA. Like space debris mitigation measures, somewhat detailed requirements that are usually specified in the licensing regulations or guidelines are found the in the Act itself. Further, it is worth specifically mentioning that the comprehensive protection of space environment is required by explicitly referring to the terminology of the Outer Space Treaty ("harmful contamination" and "harmful interference").

From 2018 to 2024, 128 licenses to control a spacecraft has been granted by the Prime Minister. [129]

3.2.3. On-Orbit Transfer Of Spacecraft

Japan's SAA also provides the on-orbit transfer of the control of spacecraft. Depending on the type of on-orbit transfer, an applicant's obligation is to obtain either a license or "authorization" (a national law concept, and a subset of the "authorization" found in Article VI of the Outer Space Treaty), or even only a notification to the Prime Minister. As substantially territorial principles is applied,[130] the nationality of the transferor or

126 SAA, *supra* note 55, art. 22(ii)-(iv).

127 As another rare case, for example, Austrian Outer Space Act includes a provision on the mitigation of space debris in the Act itself, but Japan's SAA has by far more detailed provisions. Austrian Law on the Authorisation of Space Activities and the Establishment of a National Registry, section 5, https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/index.html (last accessed 19 June 2025).

128 SAA, *supra* note, 55, art. 22 (ii). The detailed standards are specified in the Enforcement Regulation of the SAA, *supra* note 102, at art. 22 (i)- (vi); Spacecraft Control License Guidelines, *supra* note 125, 6.2.5 & 6.2.6.

129 NSPS (n/d), Number of the licenses provided to the control of a spacecraft based on Article 20 (1) of the Space Activities Act, <https://www8.cao.go.jp/space/application/space_activity/application.html> (in Japanese) (last accessed 5 June 2025).

130 2016 original SSA provides a rule based on complete territorial principle for on-orbit transfer of spacecraft. Amended SSA 2021 enlarged the place of spacecraft control facility to the concept of quasi-territorial principle, but in general, today's on-orbit transfer of the control of a spacecraft is based on territorial principle. SSA, *supra* note 55, art. 26; Amended SSA 2021, *supra* note 118, art. 26.

transferee is irrelevant, but the place of the spacecraft control facility to control a spacecraft after its on-orbit transfer matters.[131] If a transferee, a Japanese or foreigner, intends to use a spacecraft control facility placed "in Japan, etc."[132] (for the purpose of simple expression, in this subsection, hereinafter it will be written only "in Japan") after obtaining a spacecraft on-orbit, while the spacecraft control facility has been located outside Japan, this is considered the same transaction to obtain a license to control a spacecraft that is not yet launched, and a transferee must obtain a license to control a spacecraft.[133] If a transferee, a Japanese or foreigner, intends to use a spacecraft control facility placed in Japan after obtaining a spacecraft on-orbit and the spacecraft control facility has already been located in Japan, a transferee has to obtain only an "authorization" from the Prime Minister.[134] The Enforcement Regulation of the SAA details the procedure to obtain an authorization, which is less strict than to obtain a license.[135] If a spacecraft operator, whose spacecraft control facility is naturally located in Japan, intends to transfer its spacecraft to a person (irrespective of nationality) who intends to control that spacecraft from outside Japan, all that spacecraft operator must do is to make a notification to the Prime Minister in advance to that effect.[136] As the Japanese government would lose the enforcement jurisdiction over the spacecraft control facility located outside Japan, governmental regulations on the spacecraft would be substantially alleviated.

No action by a spacecraft operator is needed for the following cases: i) a Japanese spacecraft operator whose spacecraft control facility has been outside Japan intends to transfer its spacecraft on-orbit either to a Japanese or a foreigner who intends to use its spacecraft control facility also located outside Japan; and ii) a Japanese person who intends to obtain the control of a spacecraft on-orbit whose spacecraft control facility has been located outside Japan, and that person intends to keep a spacecraft control facility outside Japan

131 Amended SAA 2021, *supra* note 118, art. 26.

132 It was "in Japan" in article. 26 of the 2016 Act, but the Amended SAA 2021 changed the expression to "in Japan, etc.". SSA, *supra* note 55, art. 26; Amended SSA 2021, *supra* note 118, art. 26.

133 Amended SSA 2021, *supra* note 118, art. 20.

134 *Id.*, art. 26 (1).

135 Enforcement Regulation of the SAA, *supra* note 102, art. 27 (1).

136 Amended SAA 2021, *supra* note 118, art. 26 (2); Enforcement Regulation of the SAA, *supra* note 102, art. 27 (2).

after obtaining the said spacecraft. The government does not require even a notification in these cases because these two types of transactions do not have the territorial or quasi-territorial link between the spacecraft control facility and Japan, and it is the territorial- and quasi-territorial (since 2021) link with Japan that is the central of the licensing scheme to control a spacecraft. However, licensing schemes not focusing on the nationality of an operator of a spacecraft may not fulfill Japan's obligation under Article VI of the Outer Space Treaty, which obligates a State Party to ensure that its non-governmental entities observe international law rules. UNGA national space legislation recommendations also requests that a State "should issue authorizations for and ensure supervision over space activities carried out elsewhere by its citizens and/or legal persons".[137] That could be a legal issue to be revisited with respect to Japan's approach of national licensing and supervision schemes in the future.

3.2.4. Third Party Liability

A person who implements the launching of spacecraft, etc. using a launch site located in Japan or onboard a ship or aircraft with Japanese nationality is strictly liable to compensate for any "launch vehicle fall damage".[138] "Launch vehicle fall damage" means the same with the damage provided in Article II of the Liability Convention, except that i) the damage must be caused by a SLV or part thereof with or without a spacecraft. In other words, the damage caused only by a spacecraft is not included; and ii) the damage caused to its nationals is included.[139] It is provided that no person other than the person implementing the launching of the spacecraft, etc. shall be held liable.[140] This channeling of liability for the TPL is applied for the SAA to attract launch customers by holding harmless their liability. The same applied even under the partial commercialization era's Amended NASDA Act 1998 and JAXA Act (see 2.1 of this chapter), but SAA clearly provides it for all SLV operators.

137 UNGA national space legislation recommendations, *supra* note 93, para. 2.

138 SAA, *supra* note 55, at art. 35.

139 *Id.*, art. 2 (viii).

140 *Id.*, art. 36 (1).

As the consequence of the application of the channeling of liability, the provisions of the Product Liability Act of Japan do not apply to the launch vehicle fall damage.[141] The channeling of liability also explicitly taken by the French Space Operations Act.[142]

"A launch operator", meaning the person who is granted a permission to launch of spacecraft, etc. under Article 4 (1) of the SAA,[143] must not implement such launching unless it has taken security measures for compensation for damages, which is taken either concluding two kinds of insurance contracts pursuant to this Act or depositing a required amount of money with official depositary.[144] On the other hand, "a spacecraft control operator", meaning the person who obtained the license to control a spacecraft under Article 20 (1) of the SAA, is not required to take security measures before starting its activity. The reason is that controlling a spacecraft is much less dangerous than launching a SLV in terms of the possibility to cause damage on Earth or to other spacecraft in outer space. However, this situation may change in the near future due to the rapidly congested orbital environment caused especially by large constellation of satellites. Already the possible amendment of the SAA had been discussed in the CNSP noting this issue, although the conclusion was to keep the SAA intact for the time being in order not to impose unproven burden to small and medium-sized spacecraft operators.[145]

Since depositing money with official depositary would rarely be selected, a launch operator shall conclude two contracts for a possible compensation for damages.[146] One is the "launch vehicle fall damage liability insurance contract" between a launch operator and an insurer, and the operator must purchase insurance for the amount the Cabinet Office Order specifies as "the appropriate amount in light of the protection of victims of the launch vehicle fall damage, considering the design of the launch vehicle, the location of the

141 *Id.*, art. 36 (2). Product Liability Act, Act. No.85, 1 July 1994 as amended.

142 Loi relative aux opérations spatiales (French Space Operations Act) Loi no. 518 du 3 juin 2008, art. 13 [hereinafter "French Act"].

143 SAA, *supra* note 55, art. 7.

144 *Id.*, art. 9.

145 This topic was discussed in the ad hoc legal subcommittee (chaired by the present author) in the CNSP in Cabinet Office. The final report, titled "Study on the governmental indemnification relating to TPL in orbits" was issued on 20 December 2018. https://www8.cao.go.jp/space/comittee/30-housei/housei-dai5/chukan.pdf (in Japanese) (last visited 20 June 2025).

146 SAA, *supra* note 55, arts. 2 (ix) & 9(2).

launch site or other situations".[147] While it had been fixed to 20 billion yen (130 million U.S. dollars calculating one dollar about 150 yen) for all the existent launch vehicles in Japan, or H-IIA, H-IIB and Epsilon pursuant to the Enforcement Regulation of the SAA until August 2021,[148] the calculating method of maximum probable loss (MPL) was taken from 30 August 2021.[149] The amount covered by the compensation is decided by the combination of the rocket and the launch facility used as the following: H-IIA (202 type) from the first launch complex of Tanegashima Space Center (hereinafter "TSC"), six billion yen; H2A (204 type) from the same launch facility, 8,4 billion yen; Epsilon from the Uchinoura Space Center, 3 billion yen;, H-3(30 type) from the second launch facility of the TSC, 6,9 billion yen, H3 (22 type) from the same launch facility, 13,5 billion yen, and Kairos from Spaceport Kii (owned by Space One Co. Ltd.), 2,4 billion yen.[150] That was revised on 2 December 2024 to put additional rocket type, a variant of the Epsilon of Epsilon-S from the Uchinoura Space Center as 2.4 billion yen.[151]

The other contract is the "launch vehicle fall damage liability indemnification contract" between a launch operator and the government, by which the government may promise to indemnify the launch operator against losses caused by making a compensation for the launch vehicle fall damage for which the said launch operator became liable but cannot be covered by the launch vehicle fall damage liability insurance contract.[152] Such a case occurs when the TPL insurance policy cannot cover the damage because a launch vehicle fall damage is caused by an act of terrorism, a significant disturbance of social order caused by a war, riot, etc. [153] In such a case, the government may indemnify the launch operator for such losses to the extent not exceeding an amount equivalent to the amount covered by the TPL insurance policy.[154] The government may also indemnify the launch operator,

147 *Id.*, art. 9 (2).

148 Enforcement Regulation of the SAA, *supra* note 102, art. 9-2 and the appended chart for Article 9-2.

149 Cabinet Office Notification 121, 30 August 2021.

150 *Id.*

151 Cabinet Office Notification 138, 2 December 2024.

152 SAA, *supra* note 55, arts. 2 (x), 9, 40 (1).

153 *Id.*, arts. 2(ix) & 40 (1). Damage caused by an act of terrorism, a significant disturbance of social order caused by a war, riot, etc. is termed as the "specific launch vehicle fall damage" in the SAA, *supra* note 55, arts 2 (ix) and 9 (2).

154 *Id.*, art. 40 (1); Cabinet Office Notification 138, *supra* note 151.

assuming financial responsibility for paying third-party claims in excess of the operators coverage up to the amount decided by the Cabinet Office Order with the cap amount of 350 billion yen (about 230 million U.S. dollars calculating one dollar being 150 yen).[155] This can apply not only to the damage excessing the amounts covered by the launch vehicle fall damage liability insurance, but also that the insurance policy does not cover at all.[156] Such governmental indemnification schemes were introduced to enhance international competitiveness of launch business.[157]

3.3. Satellite Remote Sensing Data Act Of Japan

Japan was the fourth country to adopt an independent remote sensing data act after the US (1984, 1992)[158] , Canada (2005)[159] and Germany (2007).[160] In addition, although it is not an independent act, one chapter (titre 7) is reserved for the regulation of the remote sensing data in the 2008 French Space Operations Act.[161]

Japan needed a Satellite Remote Sensing Data Act (SRSDA)[162] not for the appropriate implementation of the UN treaties on outer space, but to protect the national and international security on one hand, and to promote remote sensing data business on the other hand.[163] In the licensing scheme, SRSDA takes territorial principle that is stricter than the SAA. A person (irrespective of the nationality) who intends to use the "Satellite Remote Sensing Instrument" through the "Command and Control Ground Radio Station" located

155 SAA, *supra* note 55, art. 40 (2); Regulations of the SAA, *supra* note 102, art. 32-2.

156 SAA, *supra* note, 55, art. 20 (2).

157 *Id.*, art. 40 (2).

158 US. Land Remote Sensing Commercialization Act, PL 98-365, 17 July 1984 (repealed); US. Land Remote Sensing Policy Act, PL102-555, 28 October1992.

159 Canada. Remote Sensing Space Systems Act (25 November 2005), c.45., as amended.

160 Germany. Act to Give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote Sensing Data, BGBL 2007, part. I, 28 November 2007, pp. 2580 ff.

161 French Act, *supra* note 142, arts. 23-25. Detailed provisions of articles 23-25 of the French Act are found in Decree no. 2009-640, 9 June 2009, and Decree no. 2013-654, 19 July 2013.

162 The formal name of this Act is Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data. See *supra* note 65.

163 *Id.*, art. 1. SRSDA became effective on 15 November 2017, a year earlier than the SAA. The reason was there were already multiple private persons waiting for the earliest opportunity to apply for the license to use a Satellite Remote Sensing Instrument.

in the Japanese territory must obtain a license from the Prime Minister for each "Satellite Remote Sensing Instrument".[164] This is a license for the use of a satellite instrument/sensor, not a license to control a satellite itself. If the same person intends to control a remote sensing satellite and to use the "Satellite Remote Sensing Instrument" onboard that satellite, the person must apply for the two licenses in accordance with the SAA and SRSDA. The license to use Satellite Remote Sensing Instrument is not required for the "specified user organization" as a national and local governmental organization in Japan as well as a governmental organization of a foreign country.[165]

Note should be taken about the special meaning of the "Satellite Remote Sensing Instrument" defined in Article 2 (ii) of this Act. This is not any remote sensing instruments/sensors, but ones with having "distinguishing accuracy of target" whose thresholds are specified by the Regulation for Enforcement of the Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data (hereinafter "Enforcement Regulation of the SRSDA") in the form of the Cabinet Office Order.[166] "Distinguishing Accuracy of Target", simply put the threshold resolution, varies depending on the types of sensors: an optical sensor, not exceeding 2 meters; a synthetic aperture radar (SAR) sensor, not exceeding 3 meters; a hyperspectral sensor, not exceeding 10 meters, and with detectable wavelength bands exceeding 49; and a thermal infrared sensor, not exceeding 5 meters.[167]

Major requirements for the license to use a Satellite Remote Sensing Instrument are: i) the appropriate preventive measures have been taken to prevent any person other than the applicant from accessing to the Instrument; ii) preventive measures of divulgence, loss or damage of "Satellite Remote Sensing Data" and other safety management of such Data have been taken pursuant to the Enforcement Regulation of the SRSDA; and iii) the use of Satellite Remote Sensing Instrument is determined as unlikely to cause adverse effect on ensuring peace of the international society.[168]

164 SRSDA, *supra* note 65, art. 4 (1). The "Command and Control Ground Radio Station" is defined in *id.*, art. 2 (iii).

165 SRSDA, *supra* note 65, arts. 2 (vii) & 4.

166 *Id.*, art. 2 (ii); Regulation for Enforcement of the Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data, Cabinet Office Order No.41, 9 August 2017, art. 2 (i)-(iv) [hereinafter "Enforcement Regulation of the SRSDA"].

167 Enforcement Regulation of the SRSDA, *supra* note 166, art. 3.

168 SRSDA, *supra* note 65, art. 6; Enforcement Regulation of the SRSDA, *supra* note 166, arts. 6-7.

"Satellite Remote Sensing Data" have special meanings for the purpose of the SRSDA. They comprise "raw data" and the "standard data" taken by the use of "Satellite Remote Sensing Instrument", and they are assessed as data likely to cause adverse effect on ensuring the national and international peace and security by Enforcement Regulation of the SRSDA in view of: i) the distinguishing accuracy of target; ii) the extent and degree of modification of raw data; iii) the elapsed time since such Data was recorded; and iv) other circumstances.[169] Copies of that information on electromagnetic recording would also be the Satellite Remote Sensing Data.[170] According to such criteria, for instance, in case of an optical sensor, data with resolution not exceeding 2 meters, which is within five years after the recording is the Satellite Remote Sensing Data with respect to raw data, and data with resolution not exceeding 25 centimeters irrespective of the elapsed time is the Satellite Remote Sensing Data for the standard data. For the SAR sensors, data whose resolution is not exceeding 3 meters, which is within five years after the recording for raw data and data whose resolution is less than 24 centimeters irrespective of the elapsed time are included in the Satellite Remote Sensing Data.[171]

Data taken by a "Satellite Remote Sensing Data User" (a person who obtained a license to use a Satellite Remote Sensing Instrument), may be distributed only to persons who already have obtained a "certification" from the Prime Minister to handle a certain category of such Data, e.g., an optical sensor data of 2 meter resolution recorded within 5 years ago after the recording.[172] This is one of the characteristics of Japan's SRSDA that data distribution can be possible only among persons who have certifications. The Prime Minister must grant the certification if an application for the certification conforms to the criteria specified in the SRSDA.[173] The certification is not required for the "Specified Data Handling Organization" comprising a national or local governmental organization

169 "Satellite Remote Sensing Data" is defined in SRSDA, *supra* note 65, art. 2 (vi). "Raw data and the "standard data" are defined in the Enforcement Regulation of the SRSDA, *supra* note 166, art. 1 (v)-(vi).

170 SRSDA, *supra* note 65, art .2(vi).

171 Enforcement Regulation of the SRSDA, *supra* note 166, art. 3.

172 SRSDA, *supra* note 65, art.18; Enforcement Regulation of the SRSDA, *supra* note 166, art. 7.

173 SRSDA, *supra* note 65, art. 21 (3) & 25.

in Japan or a governmental organization of the US, Canada, Germany and France as specified in the Order for Enforcement of the Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data as a Cabinet Order.[174] Those four countries are specified because the same level of the protection for the distribution of data as Japan is expected since they have specific national legislation on the protection of the sensitive satellite remote sensing data.

Finally, another characteristic of SRSDA is an explicit "shutter control" provision stated in the Act itself based on the territorial principle. The Prime Minister may issue an order to a "Satellite Remote Sensing Data Holder"[175] having a domicile or the principal office in Japan to prohibit the provision of the "Satellite Remote Sensing Data" for a certain restricted time and a category of such Data.[176] The Prime Minister may only request a foreign data handler not to provide such data.[177]

3.4. Space Resources Act As An Additional Act To The Space Activities Act Of Japan

3.4.1. Background

The Act on the Promotion of Business Activities for the Exploration and Development of Space Resources (hereinafter "Space Resources Act") was voted into an Act on 15 June 2021, promulgated on 23 June 2021,[178] and entered into force 12 December 2021.[179]

From the technical point of view, the Space Resources Act was not necessarily needed as "spacecraft" defined in the SAA encompassing any devices, robots, rovers and other structure to explore, develop, and use space resources placed on the celestial bodies or

174 *Id.*, arts. 2(vii) & 21 (1); Order for Enforcement of the Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data, Cabinet Order No. 282, 15 November 2017, art. 2(2).

175 "Satellite Remote Sensing Data Holder" is defined as "a person possessing Satellite Remote Sensing Data (other than Specified Data Handling Organization)". SRSDA, *supra* note 65, art. 2 (viii).

176 SRSDA, *supra* note 65, art. 19 (1).

177 *Id.*, art. 19 (2).

178 Act on the Promotion of Business Activities for the Exploration and Development of Space Resources, Act No. 83, 23 June 2021 [hereinafter "Space Resources Act"].

179 *Id.*, supplementary provisions, art.1.

operating in outer space, [180] and therefore, the license to control a spacecraft obtained pursuant to the SAA would enable a private person to mine and extract space resources. However, some Diet members thought that the nature of the activities to explore and develop space resources is essentially different from operating various kinds of satellites and that different requirements to grant a license should be established. [181]

Before the drafting of a Space Resources Bill by the Diet members, an ad hoc subcommittee named "Task Force to promote space business through better legal environment" was established in the CNSP, Cabinet Office and studied if Japan needed an act or some other legal measures to encourage Japanese space business[182] under the circumstances that the US (2015)[183] and Luxembourg (2017)[184] adopted national laws that guaranteed ownership of space resources of a private person under a certain conditions. The Task Force's final report did not directly recommend to make a space resources act, but it emphasized that a guarantee was needed for the predictability of a private person's business plan to confirm that exploration of space resources would be lawful under the OST. For that purpose, one idea suggested was the making of a licensing scheme to explore space resources in the form of the guideline as a subcategory of the licensing of the control of a spacecraft under the SAA and the Enforcement Regulation of the SAA.[185] The report also pointed out the necessity to actively participate in international discussions for the peaceful and cooperative exploration and exploitation of space resources.[186] Eventually, the Enforcement Regulation of the SAA was amended in September 2019 to add a subcategory of "exploration of space resources" in the "space science or space exploration" category in clarifying the purpose and methods of use of spacecraft (Art. 22 (i) of the SAA) .[187]

180 SAA, *supra* note 55, art. 2(ii).

181 Kobayashi, Takayuki and Ohno, Keitaro (2022). Commentary of the Space Resources Act (in Japanese).Tokyo: Daiichihoki, at 195.

182 The Task Force was set up in October 2017 and submitted the report to the CNSP in May 2018. The present author was the chair of the Task Force. NSPS (30 May 2018) "Points on discussion on the on-orbit collision and space resources related activities" (in Japanese), https://www8.cao.go.jp/space/comittee/dai70/siryou2.pdf, (last accessed 18 June 2025)[hereinafter "Task Force"].

183 US Commercial Space Launch Competitiveness Act, Title IV.PL.114-90, 25 November 2015.

184 Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace.

185 Task Force, *supra* note 182, at 5-6.

186 *Id.*, at 7-8.

187 Amended Enforcement Regulation of the SAA 2019, Cabinet Office Order No.27, 14 September 2019, Form17 based on art. 20.

As international discussion in the Legal Subcommittee of the UN Committee on the Peaceful Uses of Outer Space (COPUOS)[188] and Hague International Space Resources Governance Working Group[189] had deepened, like-minded Diet members of the ruling LDP started an intensive effort to draft a space resources bill around February 2020. It was then discussed and agreed upon in the unformal bi-partisan Consultative Committee on 21 October 2020, which was to be followed by the approval in the Special Committee on the Space and Maritime Development of the LDP on 5 November 2020. Finally, the General Assembly of the LDP decided that a Space Resources Bill would be submitted to the Diet.[190] After submitting a Space Resources Bill to the Diet, it was rather smoothly made into a full-fledged law. The Bill was introduced in the House of Representatives on 9 June 2021 and passed in the Plenary on 10 June 2021.[191] Next, it was sent to the House of Councilors on the same day. The bill was passed in the Cabinet Committee thereof on 11June and then passed in the Plenary on 15 June 2021, which made the Act on the Promotion of Business Activities for the Exploration and Development of Space Resources a full-fledged act on the same day.[192] The Act was promulgated on 23 June 2021.[193] The Act came into effect 6 months after the promulgation, or 23 December 2021 pursuant to the supplementary provisions of this Act.[194]

188 Agenda item "General exchange of views on potential legal models for activities in exploration, exploitation and utilization of space resources" was adopted in 2016. The five years working group for this agenda item was established in the 60th Legal Subcommittee in 2021. A/AC.105/1113, para. 251 (27 April 2016); A/AC.105/1243, paras. 255-258 (24 June 2021).

189 Hague International Space Resources Governance Working Group (n/d), Building Blocks and Commentary, https://www.universiteitleiden.nl/en/law/institute-of-public-law/institute-of-air-space-law/the-hague-space-resources-governance-working-group (last visited 20 June 2025).

190 Kobayashi and Ohno, *supra* note 181, at 127-158.

191 Bill No. 37, 9 June 2021. The discussion of the Cabinet Committee of the House of Representatives was omitted and sent directly to the Plenary.

192 The procedure in the Diet is found, https://www.sangiin.go.jp/japanese/joho1/kousei/gian/204/meisai/m204090204037.htm (in Japanese) (last visited 20 June 2025).

193 Space Resources Act, *supra* note 178.

194 *Id.*, supplementary provisions, art. 1.

3.4.2. Contents/Commentary Of The Space Resources Act

As this is an additional Act to the SAA, Space Resources Act is a short one, consisting of only eight Articles (substantial part) and five supplementary provisions that specifies procedural aspects of the Act. Space Resources Act establishes special provisions of the license to explore and develop space resources in the SSA and specify rules for the acquisition of ownership of space resources and other necessary matters in order to adequately implement the UN space treaties and other relevant international agreements to which Japan is a Party as well as to promote business activities relating to space resources.[195]

Article 2 defines two key terms for this Act. The first is "space resources" meaning "water, minerals and other natural resources that exist in outer space, including the Moon and other celestial bodies".[196] These are restricted to tangible objects as Civil Code of Japan determines it is only a tangible object that can be the target of the ownership.[197] The second is the "exploration and development of space resources" meaning (i) "mining, extraction and other similar activities specified by Cabinet Office Order" (hereinafter "mining, etc.") and (ii) examination of the existence of space resources that contribute to mining, etc. of space resources and related processing, storage and other acts specified by the Cabinet Order. "Other acts" specified by the Cabinet Office Order (entitled "Regulation for Enforcement of the Act on Promoting Business Activities for Exploring and Developing Space Resources" [hereinafter "Enforcement Regulation of the Space Resources Act"]) is the transportation of space resources.[198] Mining, etc. for the purpose of scientific research is excluded from the definition.[199]

195 Space Resources Act, *supra* note 178, art. 1.

196 *Id.*, art. 2 (i).

197 Civil Code, *supra* note 48, art. 85; Kobayashi & Ohno, *supra* note 181, at 200-201.

198 Regulation for Enforcement of the Act on Promoting Business Activities for Exploring and Developing Space Resources, Cabinet Office Order No. 73, 16 December 2021, art. 2.

199 Space Resources Act, *supra* note 178, art. 2 (ii) (a)(b).

An applicant shall submit a "business activities plan" in addition to the requirements for the "control of a spacecraft" specified in the SAA (Art. 20 (1)).[200] The business activities plan includes the period, location and method, and the contents of the business activities of the exploration and development of space resources.[201] The Prime Minister must not grant the license unless the following requirements are satisfied: (i) the business activities plan complies with the basic principles of the Basic Space Act as well as it is not likely to cause any adverse effect on the implementation of the UN treaties on outer space to which Japan is a Party, and ensuring public safety; and (ii) the applicant has a sufficient ability to carry out the business activities plan.[202]

One of the most important provisions of the Space Resources Act is the acquisition of the ownership of space resources. Article 5 provides: "A person who conducts business activities related to the exploration and development of space resources shall acquire the ownership of space resources that have been mined, etc. for the exploration and development of space resources, by possessing said space resources with the intention to own". The conditions to claim ownership of space resources is the observance of international law and relevant Japanese law and regulations as well as the possession of the target space resources and the intention to own it.[203] In order to ensure the observance of international law, the government must take an account that the good-faith implementation of the international agreements by which Japan is bound is not likely to be disrupted by applying this Act, [204] and it is specifically provided that no provision of the Space Resources Act "shall unjustifiably harm the interests of other States exercising freedom of the exploration and use of outer space, including the Moon and other celestial bodies."[205]

200 *Id.*, art. 3.

201 *Id.*, art. 3 (1)(2).

202 *Id.*, art. 3 (2)

203 Kobayashi & Ohno, *supra* note 181, at 226-230.

204 Space Resources Act, *supra* note 178, art. 6(1).

205 *Id.*, art.6 (2).

The Prime Minister shall give a public notice about the fact that a license has been granted and relevant information thereof, without delay, on the internet and/or other appropriate methods with a view to promoting international cooperation and avoiding disputes concerning exploration and development of space resources.[206] However, the whole or a part of such information may be withheld to be publicized pursuant to the Enforcement Regulation of the Space Resources Act If there are any special circumstances where the publication of such matters is likely to unfairly affect the planned business activities.[207]

Relating to that, this Act also requires the government to take several measures on the exploration and development of space resources. The first is to endeavor to establish an internationally consistent regime on the exploration and development of space resources, jointly with other States, through the cooperation with international organizations and other international frameworks; the second is to take necessary measures to promote international information sharing, international coordination and other international partnerships with respect to the private business activities on the exploration and development of space resources; and the third is to nurture national industry and strengthen international competitiveness on the exploration and development of space resources while pursuing the preceding two tasks.[208] For that purpose, the government shall give technical advice, provide information and give other assistance to private space operators.[209]

There have been two licenses to explore and develop space resources given from the Prime Minister. Both were granted to ispace, inc., a global lunar exploration company with its headquarters in Japan [210] for the same type of missions, and neither was successful due to the failed soft landing of its exploration probe.[211] Both licenses had the same

206 *Id.*, art. 4.

207 *Id.*

208 *Id.*, art. 7.

209 *Id.*, art. 8.

210 ispace.inc., https://ispace-inc.com/, (last accessed 25 June 2025).

211 ispace (26 May 2023). Press release: ispace Announces Results of the „HAKUTO-R“ Mission 1 Lunar Landing, https://ispace-inc.com/wp-content/uploads/2023/05/EN_ispace_release_20230506_Final-Results.pdf (last accessed 25 June 2025); ispace (6 June 2025). Press release: Status Update on ispace Mission 2 SMBC x HAKUTO-R Venture Moon, https://ispace-inc.com/wp-content/uploads/2025/06/20250606-Update-1.pdf (last accessed 25 June 2025).

contents: ipsace had a contract with NASA in December 2020 to acquire regolith from the lunar surface to sell it to NASA. The method was to "collect regolith that accumulates on the footpad of the landing gear during the touchdown on the surface, photograph the collected regolith and conduct an "in-place" transfer of ownership of the lunar regolith to NASA. After ownership transfer, the collected material becomes the property of NASA, under Artemis program. Under the contract, the lunar regolith will not be returned to Earth".[212] The Prime Minister gave the license on 4 November 2022[213] and 17 December 2024[214] respectively.

4. CURRENT CHALLENGES THAT LEAD TO FUTURE STEPS

4.1. Licensing Guidelines To Meet The Deteriorating Orbital Environment

Taking note of the rapidly increasing space objects that leads to more congested outer space every day, licensing schemes to introduce Japan's space objects into outer space have to be designed in a manner that would contribute to protecting the orbital environment as much as possible. The challenge is not only about the number of space objects. As new types of space activities have been developed since the latter half of the second decade of the 21st century such as on-orbit servicing (OOS), satellite large constellation and space tourism, novel type of conditions seemed necessary for granting a license to control of a spacecraft, because a broad activity is possible under the license concerned.

Among new type of activities, commercially-based refueling satellites started in 2020[215] and active space debris is on the verge of starting as a space business.[216] Under the Japanese SAA, a private operator intending to conduct an OOS activity must obtain a license to

212 ispace (8 November 2022). Press Release: ispace Receives License to Conduct Business Activity on the Moon from Japanese Government, https://ispace-inc.com/wp-content/uploads/2022/11/EN_ispace_ release_20221108_ SpaceResourcesAct.pdf (last accessed 25 June 2025).

213 NSPS (4 November 2022). License No. S22-019, https://www8.cao.go.jp/space/english/resource/documents/bap_e_22019.pdf (last accessed 25 June 2025).

214 NSPS (17 December 2024). License No. S24-025, https://www8.cao.go.jp/space/english/resource/documents/bap_e_24025.pdf (last accessed 25 June 2025).

215 See, e.g., Intelsat (21 June 2021). In-Orbit Mission Success: Extending the Life of Intelsat 10-02, https://www.intelsat.com/resources/blog/in-orbit-mission-success-extending-the-life-of-intelsat-10-02/ (last accessed 27 June 2-25).

216 See, e.g., Astroscale (11 December 2024). Astroscale's ADRAS-J Achieves Historic 15-Meter Approach to Space Debris, https://astroscale.com/astroscales-adras-j-achieves-historic-15-meter-approach-to-space-debris/ (last accessed 27 June 2025).

control a spacecraft, but as in the case of the exploration and development of space resources, refueling, repairing, or removing another spacecraft is essentially different type of activities from operating an application satellite. Thus, the Guidelines on a License to Operate a Spacecraft Performing On-Orbit Servicing (hereinafter "OOS Guidelines") was formulated in November 2021 as additional requirements to obtain a license to control a spacecraft. [217] Under the Guidelines, OOS is categorized into five types of activities, i.e., i) rendezvous, ii) proximity operation, iii) final approach and capture, iv) servicing, and v) separation, and a service operator who applies for a license must meet necessary requirements on technical, legal and administrative aspects of the relevant parts of the OOS Guidelines. One example of a legal aspect of requirements in case of a capture of a client's space debris is: a service operator must obtain a proof that the client has completed the proper procedures with the State of registry of the client object that is to be removed from orbit. If no registration is made for the client's object, information on launching States and nationality of owners or operators of the client's object shall be provided to the NSPS. As the NSPS publicizes relevant information and obligates a service operator to make appropriate notification, potentially affected States could request consultation to Japan prior to the service mission. [218] For the transparency and safety of the third-parties' satellite operators, a service operator must provide relevant information on its planned OOS to NSPS, the government space situational awareness (SSA) center, etc., and as appropriate, a press release shall be made.[219] In accordance with the OOS Guidelines, Japan's OOS company, Astrosclale, furnished its information to NSPS, which is available on the internet.[220]

Concerned with ever congested outer space, new requirements have been introduced in the licensing obligation for the control of a spacecraft. Guidelines for Collision Avoidance with Satellites, etc. made in February 2025 (hereinafter "Collision Avoidance Guidelines")

217 NSPS, (10 November 2021). Guidelines on a License to Operate a Spacecraft Performing On-Orbit Servicing, https://www8.cao.go.jp/space/english/activity/documents/guideline_oosgl.pdf (last accessed 27 June 2025).

218 *Id.*, Point 4.1. (Prevention of infringement of rights of related to the client object).

219 *Id.*, point 4.3. (Information disclosures for ensured transparency).

220 NSPS (1 November 2024). Information for transparency regarding the implementation of on-orbit services, https://www8.cao.go.jp/space/english/activity/documents/mission_e.pdf (last accessed 27 June 2025).

states that an operator of a spacecraft capable of transferring in the Earth orbit (primary object) shall meet all requirements concerning the collision avoidance in accordance with this Guidelines.[221] These include to: establish risk assessment schemes in its entity such as to use reliable SSA services; provide necessary notification of its missions and respond to the request from another operator who is entitled to get information; and to own appropriate technical capabilities for collision avoidance.[222]

Japan's building Guidelines as a part of licensing schemes could be said one country's contribution to the safer and more transparency spacecraft operation, and as a voluntary international cooperation for promoting practical space traffic management (STM).

4.2. Future Steps

As start-ups are planning to start a suborbital space tourism and new types of high-altitude activities. Thus, the study to amend the SAA has just started in the direction of establishing permission schemes of suborbital launch, and possibly human space flight while the latter has no technological background up to date.[223] It is too early to predict how the SAA would actually be amended, but it would be expected permission schemes would be amended so as to catch up with new types of launch and intentional re-entry.

Another issue is the territorial principle all Japanese space laws apply in the schemes of the permission, license, authorization and certification. Although the Dutch Law and the Belgium Law also apply territorial principle, these laws assert personal jurisdiction in some cases.[224] In contrast, the SAA takes more strict territorial principle based on Japan's policy that uncertainty over the actual exercise of jurisdiction should be limited

221 NSPS (27 February 2025). Guidelines for Collision Avoidance with Satellites, etc. https://www8.cao.go.jp/space/english/activity/documents/guidelines_ca.pdf (last accessed 27 June 2025).

222 *Id.*

223 NSPS (4 June 2025). Secretariat Report of the 1st Meeting of the Working Group to Amend the Space Activities Act (in Japanese), https://www8.cao.go.jp/space/comittee/32-kaisei_wg/k_wg-dai1/siryou2.pdf (last accessed 29 June 2025). The present author is a member of this working group.

224 Belgium: Law of 17 Sept. 2005 on the Activities of Launching, Flight Operation or Guidance of Space Objects art. 2(2); The Netherlands, Law Incorporating Rules Concerning Space Activities and the Establishment of a Registry of Space Objects art. 2(2).

and to avoid double-licensing requirements for promoting space business. However, the problem may occur when Japanese nationals may encounter regulatory voids in seeking to carry out space activities in a foreign country, which might place Japan in a situation where it does not fulfill its responsibility to its "national activities in outer space" under the Outer Space Treaty.[225] As the UNGA national legislation recommendation states that the State should ascertain national jurisdiction based on territorial jurisdiction and also "it should issue authorizations for and ensure supervision over space activities carried out elsewhere by its citizens and/or legal persons established, registered or seated in territory under its jurisdiction and/or control",[226] the combination of the territorial jurisdiction and personal jurisdiction is a recommended practice, "provided, however, that if another State is exercising jurisdiction with respect to such activities".[227] Thus, while more national space laws are to be enacted to implement international space law, the less problematic of the SAA would be, the amendment of the SAA might take this issue into consideration.

225 OST, *supra* note 20, art. VI.

226 UNGA national space legislation recommendations, *supra* note 93, para. 2.

227 *Id.*

REFERENCES

MONOGRAPHS

Aoki, Setsuko (2006). Japan's Space Strategy (in Japanese). Tokyo: Keio University Press.

Kobayashi, Takayuki and Ohno, Keitaro (2022). Commentary of the Space Resources Act (in Japanese).Tokyo: Daiichihoki.

Kozuka, Soichiro and Sato, Masahiko (eds.) (2024). Introduction to Space Law for Entrepreneurs [3d. ed] (in Japanese).Tokyo: Yuhikaku.

ARTICLE FROM THE BOOK

Vlasic, Ivan A (1991). "The Legal Aspects of Peaceful and Non-Peaceful Uses of Outer Space", in: Bhupendra Jasani (ed.). Peaceful and Non-Peaceful Uses of Space. New York: Taylor & Francis.

ARTICLES FROM JOURNAL

Aoki, Setsuko (2009). "Current Status and Recent Developments in Japan's National Space Law and its Relevance to Pacific Rim Space Law and Activities", Journal of Space Law, 2009 vol. 35, no.2, 363-438.

Aoki, Setsuko (2012). "Japanese Space Activities Act in the Making", Zeitshcrift Für Luft-Und Weltraumrecht, 2012, vol. 61, no.1, 111-128.

Itokawa, Hideo et al, (1963). Survey of Japanese Space Program with Emphasis on Kappa and Lambda Observation Rocket: Seisan Kenkyu, vol. 15, no.7 (NASA TT F-303) also found: https://apps.dtic.mil/sti/tr/pdf/ADA395762.pdf (last accessed 18 June 2025).

ONLINE SOURCES

Astroscale (11 December 2024). "Astroscale's ADRAS-J Achieves Historic 15-Meter Approach to Space Debris", https://astroscale.com/astroscales-adras-j-achieves-historic-15-meter-approach-to-space-debris/ (last accessed 27 June 2025).

Council for Science and Technology Policy (CSTP) (2001). "RSC's Commercial Satellite Launch and its Challenges" (in Japanese), https://www8.cao.go.jp/cstp/tyousakai/cosmo/haihu02/siryou2-1.pdf (last accessed 21 June 2025).

Graham, William (28 June 2025). "Japan's GOSAT-GW launches aboard final H-IIA rocket", https://www.nasaspaceflight.com/2025/06/gosat-gw-launch/ (last accessed 29 June 2025).

Institute of Space and Astronautical Science (ISAS)(n/d). "History of Japanese Space Research", https://www.isas.jaxa.jp/e/japan_s_history/brief.shtml (last accessed 1 June 2025).

ispace.inc. (n/d). https://ispace-inc.com/, (last accessed 25 June 2025).

ispace (26 May 2023). "Press release: ispace Announces Results of the "HAKUTO-R" Mission 1 Lunar Landing", https://ispace-inc.com/wp-content/uploads/2023/05/EN_ispace_release_ 20230506_Final-Results.pdf (last accessed 25 June 2025).

ispace (6 June 2025). "Press release: Status Update on ispace Mission 2 SMBC x HAKUTO-R Venture Moon", https://ispace-inc.com/wp-content/uploads/2025/06/ 20250606-Update-1.pdf (last accessed 25 June 2025).

ispace (8 November 2022). "Press Release: ispace Receives License to Conduct Business Activity on the Moon from Japanese Government",

https://ispace-inc.com/wp-content/uploads/2022/11/EN_ispace_ release_20221108 _SpaceResourcesAct.pdf (last accessed 25 June 2025).

Intelsat (21 June 2021). "In-Orbit Mission Success: Extending the Life of Intelsat 10-02", https://www.intelsat.com/resources/blog/in-orbit-mission-success-extending -the-life-of-intelsat-10-02/ (last accessed 27 June 2025).

Japan Aerospace Exploration Agency (JASA) (n/d). "N-1", https://www.jaxa.jp/projects/rockets/n1/ (in Japanese) (last accessed 18 June 2025).

JAXA(n/d). "N-2", https://www.jaxa.jp/projects/rockets/n2/ (in Japanese) (last accessed 18 June 2025).

JAXA (n/d). "H-1", https://www.jaxa.jp/projects/rockets/h1/(in Japanese) (last accessed 18 June 2025).

Ogasawara, Hiroshi (2024). "70 Years History of Japan's Rockets", https://spacemate.jp/_ct/17740641 (in Japanese) (last accessed 18 June 2025).

US National Security Council (24 September 1975). "National Security Memorandum 306", https://www.fordlibrarymuseum.gov/sites/default/files/pdf_documents/library/document/0310/nsdm306.pdf (last accessed 20 June 2025).

US Trade Representatives (USTR) (n/d). "National trade estimates with Japan ("satellites")", https://ustr.gov/archive/Document_Library/Reports_Publications/ 1996/1996_National_Trade_Estimate/1996_National_Trade_Estimate-Japan.html (last accessed 21 June 2025).

Japanese Diet minutes and government information (incl. online) *unless otherwise noted, the documents below are written in Japanese.

<Diet>

House of Councilors (13 June 1969). Minutes of Special Committee on the Science and Technology Promotion Measures, vol. 9, at 1.

House of Councilors (20 May 2008). Cabinet Standing Committee, Resolution on the Space Basic Bill, para.6.

House of Representatives (8 May 1969). Minutes of Special Committee on Science and Technology Promotion Measures, vol.11, at 5.

House of Representatives (9 May 1969). Minutes of Plenary Session, vol. 35, at 1.

House of Representatives (5 February 1983). Minutes of the Standing Budget Committee, vol.5, at 14.

House of Representatives (6 February 1985). Minutes of the Standing Budget Committee, vol. 5, at 3.

House of Representatives (20 May 2008). Cabinet Standing Committee, Resolution on the Promotion of the Space Development and Use, para.6.

The procedures of the discussion of the Space Resources Act in the Diet is found, https://www.sangiin.go.jp/japanese/joho1/kousei/gian/204/meisai/m204090204037.htm (last accessed 20 June 2025).

<Cabinet>

Cabinet (29 March 1983). Oral Agreement of the Cabinet Meeting on the Accession to and Implementation of the Three of the UN treaties on Outer Space.

<Prime Minister Office, Space Activities Commission (abolished)>

Special Working Group on the United Nations Treaties on Outer Space of the Space Activities Commission, Prime Minister Office (22 June 1976). Report on the Basic Issues on the Necessary National Laws for the Accession to the UN Treaties on Outer Space.

<prior to the establishment of the Committee on National Space Policy (CNSP) 2008-2012 in the Strategic Headquarters (2008-2012). The information has been transferred in the National Space Policy Secretariat (NSPS), Cabinet Office HP>

Expert Committee on the Space Development Strategy in the Strategic Headquarters (all meeting records from 28 October 2008 (1st mtg) to 13 January 2012 (21st mtg) that contain the processes of the study of the working group on the study of the Space Activities Act), https://www8.cao.go.jp/space/archive1/kaisai.html (last accessed 23 June 2025).

<NSPS, Cabinet Office>

Cabinet Office Notification 121, 30 August 2021.

Cabinet Office Notification 138, 2 December 2024.

NSPS (ad hoc legal subcommittee in the CNSP) (20 December 2018).The final report, titled "Study on the governmental indemnification relating to TPL in orbits", https://www8.cao.go.jp/space/comittee/30-housei/housei-dai5/chukan.pdf (last accessed 20 June 2025).

NSPS (n/d). All five Basic Space Plans and their relevant documents are found, https://www8.cao.go.jp/space/plan/keikaku.html (last accessed 3 June 2025).

NSPS (Strategic Headquarters) (9 January 2015) Basic Space Plan Third, https://www8.cao.go.jp/space/plan/plan2/plan2.pdf (last accessed 15 June 2025).

NSPS (n/d). Information and Applying for a Permission Related to the Launching of Spacecraft, etc. and License Related to the Control of Spacecraft,

https://www8.cao.go.jp/space/english/activity/application.html (last accessed 15 June 2025).

NSPS (1 November 2024). Information for transparency regarding the implementation of on-orbit services, https://www8.cao.go.jp/space/english/activity/documents/mission_e.pdf (last accessed 27 June 2025).

NSPS (n/d). Launch permission based on Article 4 (1) of the Space Activities Act, https://www8.cao.go.jp/space/application/space_activity/application.html (accessed 15 June 2025).

NSPS (n/d), Number of the licenses provided to the control of a spacecraft based on Article 20 (1) of the Space Activities Act, https://www8.cao.go.jp/space/application/space_activity/application.html (last accessed 5 June 2025).

NSPS (4 November 2022), License No. S22-019 (English),

https://www8.cao.go.jp/space/english/resource/documents/bap_e_22019.pdf (last accessed 25 June 2025).

NSPS (17 December 2024). License No. S24-025 (English),

https://www8.cao.go.jp/space/english/resource/documents/bap_e_24025.pdf (last accessed 25 June 2025).

NSPS (Task Force) (30 May 2018) "Points on discussion on the on-orbit collision and space resources related activities"), https://www8.cao.go.jp/space/comittee/dai70/siryou2.pdf (last accessed 18 June 2025).

NSPS (23 June 2015). Space Legislation Subcommittee in the Committee on National Space Policy, Minutes of the 4th Meeting held on June 23, 2015, https://www8.cao.go.jp/space/comittee/27-housei/housei-dai4/gijiroku.pdf (last accessed 12 June 2025).

TREATIES

Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 22 April 1968, 19 UST 7570, 672 UNTS 119.

Convention on International Liability for Damage Caused by Space Objects, 29 March 1972, 24 UST, 2389, 961 UNTS 187.

Convention on Registration of Objects Launched into Outer Space, 14 January 1975, 28 UST 695, 1023 UNTS 15.

Exchange of Notes Constituting an Agreement Concerning Co-Operation in Space Activities for Peaceful Purposes (with attachment), 31 July 1969, registered by the US 4 March 1970, No. 10342.

Exchange of Notes Constituting an Agreement Relating to Space Launch Assistance, 3 December 1980, registered by the U.S. 1 March 1982, No.20830.

Exchange of Notes Constituting an Agreement Relating to the Furnishing of Satellite Launching and Associated Services, 23 Mary 1975, registered by the US 11 March 1976, No. 14641.

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 27 January 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205.

US-Japan Agreement on Satellite Procurement, 15 June 1990.

NATIONAL LAWS AND REGULATIONS OF JAPAN

<law>

Act Concerning the National Space Development Agency of Japan, Act No.50, 23 June 1969.

Amended Act Concerning the National Space Development Agency of Japan, Act No. 87 of 3 June 1998.

Act Concerning Japan Aerospace Exploration Agency, Act No. 161 of 13 December 2002.

Amended Act Concerning Japan Aerospace Exploration Agency, Act No. 76 of 16 November 2016.

Amended Act Concerning Japan Aerospace Exploration Agency JAXA, Act No. 76 of 15 November 2018.

Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data, Act No. 77, 16 November 2016.

Act for the Establishment of the Cabinet Office, Act No. 89 of 17 July 1999.

Act on Launching of Spacecraft, etc. and Control of Spacecraft, Act No. 76, Nov. 16, 2016

Amended Act on Launching of Space Spacecraft, etc. and Control of Spacecraft, Act No.83, 23 December 2021.

Act on the Promotion of Business Activities for the Exploration and Development of Space Resources, Act No. 83, 23 June 2021.

Bill on the Promotion of Business Activities for the Exploitation and Development of Space Resources, Bill No.37, 9 June 2021.

Basic Space Act, Act No. 43, May 28, 2008.

Broadcast Act, Act No. 132, 2 May1950 as amended.

Civil Code, Act No. 89, 27 April 1896 as amended.

Electricity Utility Act, Act No. 170, 11 July 1964 as amended.

Foreign Exchange and Foreign Trade Act, Act No. 228, 1 December 1949 as amended.

Gun-Powder Control Act, Act No. 149, May 4, 1950 as amended.

High-Pressured Gas Safety Act, Act No.204, 7 June 1951 as amended.

Product Liability Act, Act. No.85, 1 July 1994 as amended.

Radio Act, Act No.131, 2 May 1960 as amended.

Telecommunications Business Act, Act No. 86, 25 December 1984 as amended.

Tort Liability Act, Act No. 125, 22 October 1957 as amended.

CABINET ORDER, CABINET OFFICE ORDER (REGULATION), GUIDELINES AND REVIEW STANDARDS

(note) English Translation of the Regulations and Guidelines concerning Space Activities Act, Satellite Remote Sensing Data Acta, and Space Resources Business Promotion Act are found: https://www8.cao.go.jp/space/english/activity/application.html (last accessed 15 June 2025).

<Cabinet Order>

Order for Enforcement of the Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data, Cabinet Order No. 282, 15 November 2017.

<Cabinet Office Order>

Regulation for Enforcement of the Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data, Cabinet Office Order No.41, 9 August 2017.

Regulation for Enforcement of the Act on Launching of Spacecraft, etc. and Control of Spacecraft, Cabinet Office Order No. 50, 15 November 2017.

Amended Regulation for the Enforcement of the Act on Launching of Spacecraft, etc. and Control of Spacecraft, Cabinet Office Order No. 27, 14 September 2019.

Regulation for Enforcement of the Act on Promoting Business Activities for Exploring and Developing Space Resources, Cabinet Office Order No. 73, 16 December 2021.

<Guidelines and Standards made in the NSPS>

Guidelines for Collision Avoidance with Satellites, etc. (27 February 2025),

https://www8.cao.go.jp/space/english/activity/documents/guidelines_ca.pdf (last accessed 27 June 2025).

Guidelines on a License to Operate a Spacecraft Performing On-Orbit Servicing (10 November 2021),

https://www8.cao.go.jp/space/english/activity/documents/guideline_oosgl.pdf (last accessed 27 June 2025).

Guidelines on Compliance Certification for Launch Site (revised 1st ed.) (30 March 2018), https://www8.cao.go.jp/space/english/activity/documents/guidelines3.pdf (last accessed 19 June 2025).

Guidelines on License Related to Control of Spacecraft, (revised first ed.) (30 March 2018) https://www8.cao.go.jp/space/english/activity/documents/guidelines4.pdf (last accessed 21 June 2025).

Guidelines on Type Certification for Launch Vehicles (revised 1st ed.) (30 March 2018), https://www8.cao.go.jp/space/english/activity/documents/guidelines2.pdf. (last accessed 19 June 2025).

Review Standards and Standard Period of Time for Process Relating to Procedures under the Act on Launching of Spacecraft, etc. and Control of Spacecraft (15 November 2017). https://www8.cao.go.jp/space/english/activity/documents/reviewstand.pdf (last accessed 19 June 2025).

FOREIGN LAWS

Austria: Austrian Law on the Authorisation of Space Activities and the Establishment of a National Registry, section 5,

https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/index.html (last accessed 19 June 2025)

Belgium: Law of 17 Sept. 2005 on the Activities of Launching, Flight Operation or Guidance of Space Objects art. 2(2);

Canada: Remote Sensing Space Systems Act (25 November 2005), c.45., as amended.

France: Loi relative aux opérations spatiales (French Space Operations Act) Loi no. 518 du 3 juin 2008, art. 13.

Germany: Act to Give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote Sensing Data, BGBL 2007, part. I, 28 November 2007, pp. 2580 ff.

Luxembourg: Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace.

The Netherlands: Law Incorporating Rules Concerning Space Activities and the Establishment of a Registry of Space Objects,

US: US Commercial Space Launch Competitiveness Act, Title IV.PL.114-90, 25 November 2015.

US: Land Remote Sensing Commercialization Act, PL 98-365, 17 July 1984 (repealed).

US: Land Remote Sensing Policy Act, PL102-555, 28 October1992.

UN DOCUMENTS AND A NON-GOVERNMENTAL REPORT

United Nations General Assembly Resolution 68/74 "Recommendation on national legislation relevant to the peaceful exploration and use of outer space".

UN Doc. A/AC.105/1113 (27 April 2016)

UN Doc. A/AC.105/1243 (24 June 2021).

Hague International Space Resources Governance Working Group (n/d), Building Blocks and Commentary, https://www.universiteitleiden.nl/en/law/institute-of-public-law/institute-of-air-space-law/the-hague-space-resources-governance-working-group (last visited 20 June 2025).

SOUTH KOREA

Table of Contents

About the Author

Nayoung Youn

Nayoung Youn recently works as a senior researcher at KARI (Korea Aerospace Research Institute). She is now in charge of various projects including analyzing international and national space legislations on sustainable space activities, space resources activities, utilization of nuclear power for space exploration, space finance, and GNSS (Global Navigation Satellite System). She has a Doctor degree in space law from the Institute of Air Law, Space Law and Cyber Law at the University of Cologne. She also holds her LL.M. in international space law from Keio University in Japan and an Advanced LL.M. in the International Institute of Air & Space Law at Leiden University. Nayoung has worked in a variety of environments, including banks, law firms, and international organizations (UNOOSA).

169-84 Gwahak-ro Yuseong-gu Daejeon, 34133,
Republic of Korea
+82-10-8625-9323
nayoungy@kari.re.kr

Abstract

This chapter critically examines the development, structure, and evolving trajectory of the Republic of Korea's national space law framework, in the context of the country's growing technological ambitions and strategic imperatives. Korea has undergone a dramatic transformation in its space activities over the past three decades, evolving from a state-led satellite program into a competitive, innovation-driven space actor with both civil and commercial goals. In response to this evolution, Korea's legal and regulatory apparatus has been incrementally expanded and modified to support launch permission, liability, registration, and industry participation.

The analysis begins by tracing the legislative history of Korea's core statutes, including the Space Development Promotion Act and the Act on Compensation for Damage caused by Space Objects, and highlights their gradual alignment with international space law principles, particularly those outlined in the UN space treaties. The chapter then provides a detailed commentary on how Korea's legal framework addresses, or fails to address, technological advances such as commercial launch activities, satellite constellations, and space traffic coordination. Key governance transitions, including the establishment of the Korea AeroSpace Administration (KASA) in 2024, are assessed in light of the broader policy landscape and the ambitions expressed in the 2025 National Space Development Promotion Implementation Plan.

By identifying existing legal gaps, institutional fragmentation, and limitations in international legal engagement, the chapter underscores the need for structural reforms, such as the consolidation of space laws into a comprehensive basic space law and the incorporation of soft-law principles related to sustainability and international cooperation. Korea's experience offers valuable lessons for emerging spacefaring states seeking to balance national development goals with responsible global participation in the governance of outer space.

Keywords: national space law, Republic of Korea, space legislation, space governance, space policy, Korea AeroSpace Administration, commercialization of space, space liability, regulatory reform

1. INTRODUCTION

The Republic of Korea (hereinafter, Korea)'s national space law framework offers a compelling case study in the legal institutionalization of a country's technological and strategic ambitions. Over the past four decades, Korea has transformed itself from a space technology importer into a capable spacefaring nation with aspirations reaching toward lunar and Martian exploration.[1] This transition has been mirrored by the evolution of its legal infrastructure, from early industry promotion statutes to increasingly complex regulatory regimes addressing launch permission, liability, space object registration, and international legal obligations.[2]

A pivotal milestone in this legal trajectory was the enactment of the Space Development Promotion Act (SDPA)[3] in 2005 and the Act on Compensation for Damage caused by Space Objects (ACDSO)[4] in 2007. These laws established the foundational architecture for Korea's national space governance, enabling both domestic regulatory control and international compliance. More recently, the establishment of the Korea AeroSpace Administration (KASA) in 2024 signaled a major institutional shift toward centralized governance and enhanced public-private cooperation.[5]

Today, Korea's space law operates within an increasingly complex global environment, one marked by blurred civil-military boundaries, growing commercial participation, and intensifying geopolitical competition. The domestic legal framework is now called upon to do more than promote industry; it must govern risk, ensure legal accountability, and support national strategic autonomy.

1 Kookmin Ilbo (2024) Korea starts 'moon landing' in earnest… 2032 launch target. Available at: https://www.kmib.co.kr/article/view.asp?arcid=1730709485 (Accessed: 12 June 2025); Edaily (2025) "Mars is an Opportunity"… South Korea's Mars mission moves forward. Available at: https://www.edaily.co.kr/News/Read?newsId=02801126642171544 (Accessed: 12 June 2025).

2 Kim, Doo Hwan (2012). Space Law and Policy in the Republic of Korea. Place: United Nations Office for Outer Space Affairs. Available at: https://www.unoosa.org/pdf/pres/2010/SLW2010/02-09.pdf (Accessed: 12 June 2025).

3 Space Development Promotion Act, Law no. 20959, enforced 28 November 2025, amended on 27 May 2025. Available at: https://law.go.kr/lsInfoP.

4 Act on Compensation for Damage Caused by Space Object, Law no. 14839, enforced 27 May 2024, amended on 26 January 2024. Available at: https://law.go.kr/%eb%b2%95%eb%a0%b9/%ec%9a%b0%ec%a3%bc%ec%86%90%ed%95%b4%eb%b0%b0%ec%83%81%eb%b2%95 (Accessed: 12 June 2025).

5 Spacenews (2024) South Korea's new space agency outlines plans. Available at: https://spacenews.com/south-koreas-new-space-agency-outlines-plans/ (Accessed: 12 June 2025).

This chapter traces the development and structure of Korea's space law, analyzes its responsiveness to technological and normative change, and highlights its evolving role as a regulatory tool. By identifying key legal gaps, institutional challenges, and future reform pathways, it situates Korea's legal framework within the broader global discourse on responsible and strategic space governance.

2. HISTORY OF THE LAW-MAKING PROCESS

Korea's current legal regime is the product of decades of incremental lawmaking, shaped by the nation's evolving technological capacity, policy priorities, and international obligations. Understanding how this framework emerged requires tracing its legislative origins, from initial aerospace promotion laws to the adoption of specialized space statutes and, eventually, institutional transformation through the creation of KASA.

This section examines that trajectory in three distinct phases: (1) the foundational period (1987–2005), (2) the legislative consolidation phase (2005–2007), and (3) the most recent era of institutional reform and regulatory expansion (2024–present).

2.1 Foundational Phase (1987-2005)

The legal foundation of Korea's space governance can be traced to the enactment of the Aerospace Industry Development Promotion Act in 1987 (hereinafter, the 1987 Act),[6] which signaled the Korean government's early recognition of aerospace as a strategically vital industry. Enacted during a period of rapid industrialization, the 1987 Act focused on promoting domestic aerospace capabilities through government subsidies, coordination mechanisms, and technology localization efforts. Although not space-specific in its scope, this Act provided the first legislative basis for public sector engagement in space-adjacent domains and supported the incubation of key institutional actors.

6 Aerospace Industry Development Promotion Act, Law no. 20169, enforced 31 July 2024, amended on 30 January 2024. Available at: https://law.go.kr/LSW/lsInfoP.

Between 1987 and 2005, Korea pursued a gradualist approach to space development, emphasizing international collaboration and foreign technology acquisition over the development of an autonomous domestic infrastructure. During this period, the absence of launch capability and indigenous spacecraft delayed the emergence of specialized space legislation. The lack of binding legal norms for launch authorization, registration, or liability reflected Korea's status as a user, not an operator, of space technology during this formative phase.

However, the administrative systems developed under the 1987 Act laid the groundwork for later reforms. In particular, the establishment of cross-ministerial consultation mechanisms for aerospace planning foreshadowed later institutional configurations under space-specific legislation.[7]

2.2 Legislative Consolidation And Systemic Framework (2005–2007)

The adoption of the Space Development Promotion Act (SDPA) in 2005 marked a significant legislative turning point. This law was Korea's first dedicated space statute, introducing an integrated framework for national space planning, launch permission, space object registration, and international cooperation.[8] The SDPA institutionalized the five-year Basic Plan for Space Development and vested authority in the National Space Committee to coordinate policy across agencies.[9] This shift reflected Korea's increasing technical competence and its intention to establish itself as a capable and responsible spacefaring nation.

7 See, Shin, Hong-Kyun (2005). "Space Exploitation Act: Its Implication and Application", in: the Korean Journal of Air & Space Law and Policy, 2005, Vol. 20 No. 2, pp. 277-292.

8 See, Kim, *supra* note 2.

9 Articles 5, 6 of the Space Development Promotion Act.

The SDPA was followed swiftly by the Act on Compensation for Damage caused by Space Objects (ACDSO) in 2007.[10] The ACDSO was designed to operationalize Korea's international obligations under the 1972 Liability Convention[11] and introduced provisions on third-party insurance, government indemnification, and procedures for processing domestic and international claims. This legal pairing represents a rare example of early regulatory synchronization between operational space activities and legal risk mitigation structures.[12] The ACDSO thereby strengthened the credibility of Korea's emerging launch program and laid the legal foundation for future commercial participation in high-liability domains.

2.3 Institutional Transformation And Contemporary Reforms (2024–Present)

The most significant transformation in Korea's space governance since 2007 occurred with the establishment of the KASA in May 2024.[13] Envisioned as Korea's centralized space agency, KASA was created in response to longstanding concerns regarding bureaucratic fragmentation and insufficient policy integration.[14] Backed by legislation enacted by the National Assembly in early 2024, KASA consolidated space-related functions previously scattered across multiple ministries, including the Ministry of Science and ICT, the Ministry of Defense, and the Ministry of Trade, Industry and Energy.

KASA's enabling law endowed the agency with significant financial and regulatory authority, including an initial budget of KRW 758.9 billion (USD 556 million).[15] This institutional centralization was accompanied by revisions to the SDPA, enabling contractual flexibility for private firms, technology transfer incentives, and provisions for private access to public

10 Act on Compensation for Damage Caused by Space Object, Law no. 8714, enforced 22 June 2008, enacted 21 December 2007. Available at: https://www.law.go.kr/lsInfoP.

11 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 672 UNTS 119, adopted on 22 April 1968, entered into force on 3 December 1968 (the 'Rescue Agreement').

12 Shin, *supra* note 7

13 Spacenews, *supra* note 5.

14 Ministry of Science and ICT (2022). Fourth Space Development Promotion Basic Plan. Available at: https://www.msit.go.kr/bbs/view.do?sCode=user&nttSeqNo=3017397&bbsSeqNo=65 (Accessed: 15 June 2025).

15 KASA (2025). KASA's 2025 Proposed Budget Set at KRW 964.9 Billion. Available at: https://www.kasa.go.kr/prog/bbsArticle/BBSMSTR_000000000041/view.do?bbsId=BBSMSTR_000000000041&nttId=B000000000756Ij2hD1 (Accessed: 12 June 2025).

infrastructure.[16] These reforms represent a new phase in Korea's legislative evolution, one aimed at fostering commercial ecosystem development, public-private partnerships, and long-term programmatic sustainability.[17]

3. COMMENTARY ON THE NATIONAL SPACE LAW

This section provides a detailed analysis of Korea's national space law by examining its institutional structure, primary statutes, responsiveness to technological change, and broader strategic function. Through a combination of legal commentary and policy interpretation, it explores how Korea's legal framework addresses current regulatory demands and anticipates future challenges.

The section is organized into five subsections:

Section 3.1 offers a provision-by-provision commentary on Korea's two foundational statutes, the Space Development Promotion Act (SDPA) and the Act on Compensation for Damage Caused by Space Objects (ACDSO), and evaluates their internal structure, regulatory intent, and operational mechanisms.

Section 3.2 assesses how these instruments implement Korea's international legal obligations, particularly under the UN space treaties, and to what extent they reflect harmonization with global legal norms.

Section 3.3 identifies the limitations of the current legal framework in addressing emerging technologies and novel commercial models, including space traffic coordination and in-orbit operations.

Section 3.4 analyzes how Korea's space law engages with national security priorities, civil-military integration, and economic sovereignty in the context of increasing geopolitical competition.

16 See, Special Act on Establishment and Operation of the Korea Aerospace Administration, Law no. 20144, enforced 27 May 2024, enacted 26 January 2024. Available at: https://www.law.go.kr/LSW/lsInfoP.do?lsiSeq=259383#0000 (Accessed: 12 June 2025).

17 KASA (2024). Purpose of Establishment. Available at: https://www.kasa.go.kr/eng/sub04_01_01.do;jsessionid=QDYkOcWtsHI5Rv1S7pVLowMIwZZezXHCcD_UsVbY.homepage10 (Accessed: 12 June 2025).

Section 3.5 synthesizes the key structural and doctrinal challenges revealed across the previous subsections and outlines the need for legislative reform to ensure legal adaptability, institutional coherence, and regulatory credibility.

Through this structured analysis, the section aims to show how Korea's evolving space law serves not only to promote industrial growth but also to safeguard national interests and contribute meaningfully to global space governance.

3.1. Legal Framework And Primary Instruments

Korea's national space legislation is built upon two core statutes: the Space Development Promotion Act (SDPA) and the Act on Compensation for Damage Caused by Space Objects (ACDSO). These are supported by a broader set of Presidential Decrees, ministerial enforcement rules, and administrative guidelines. Collectively, they form a multi-tiered legal framework that combines programmatic planning, industrial promotion, launch permission, liability governance, and alignment with international space law.[18]

3.1.1. The Space Development Promotion Act (SDPA)

Originally enacted in 2005 and most recently revised through Law No. 20478 (effective 23 April 2025), the SDPA functions as Korea's primary legislative instrument for the regulation and promotion of space activities. The 2025 revision notably reflects Korea's regulatory maturation by addressing new technological domains and integrating space governance with broader national policy mechanisms.

Article 2(3-2): Sub-Orbital Launch Vehicle

This newly introduced clause defines a "space launch vehicle" to include sub-orbital launch vehicles, vehicles that may not reach orbit but satisfy performance thresholds prescribed by Presidential Decree.[19] By explicitly recognizing suborbital vehicles, Korea preempts emerging commercial use cases such as space tourism and scientific sounding rockets. Unlike other jurisdictions that rely on regulatory interpretation, Korea embeds this scope directly into statutory language.

18 Articles 5, 8, 9, 11, 14, 18, 20-2, 22 of the Space Development Promotion Act.

19 Article 1-2 of the Enforcement Decree of Space Development Promotion Act.

Articles 8–10: Registration of Space Objects and Meteorites

These provisions implement Korea's obligations under the 1975 Registration Convention. They require pre-launch notifications and post-launch registration of space objects. Additionally, Articles 8-2 and 8-3 establish a regulatory regime for meteorites discovered or imported into Korea, prohibiting foreign export and allowing voluntary domestic registration. This reflects Korea's assertion of jurisdictional authority over celestial material, a rare statutory inclusion among spacefaring nations.

Articles 3, 5–6: Government Responsibility and Planning Structure

These articles define the government's obligation to ensure peaceful space development and maintain strategic plans, notably the Five-Year Master Plan and Annual Implementation Plans. The National Space Committee, chaired by the President and comprising key ministries including defense and intelligence agencies, exemplifies Korea's high-level coordination approach. Civilian vice-chairpersons and cross-ministerial involvement reflect Korea's whole-of-government model.

Articles 14–14-3: Civil Liability and Treaty Implementation

Article 14 imposes domestic civil liability for space-related damage, while Articles 14-2 and 14-3 implement obligations from the 1968 Rescue Agreement.[20] These articles go beyond administrative practice by embedding treaty compliance into the legislative text itself, reinforcing Korea's legalist approach to international law implementation.

Articles 18–18-8: Private Sector Promotion and Strategic Technologies

These provisions support commercial participation in space activities. Article 18-7 enables the designation of "New Space Technologies" for prioritized government procurement. Article 18-8 exempts space R&D entities from certain firearm and explosive regulations, permitting controlled use of solid propellants. Together, they bridge the legal gap between industrial safety regulation and space innovation.

20 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 672 UNTS 119, adopted on 22 April 1968, entered into force on 3 December 1968 (the 'Rescue Agreement').

Articles 23-2 to 23-4: Investment Promotion Zones and Education Policy

These articles institutionalize regional space industry clusters and permit the creation of specialized high schools in designated zones. The linkage of industrial development with human capital pipelines demonstrates Korea's integrative legislative approach, rarely seen in other space laws.

3.1.2. The Act On Compensation For Damage Caused By Space Objects (ACDSO)

Enacted in 2007 to domesticate Korea's obligations under the 1972 Liability Convention, the ACDSO sets out a clear structure for assigning liability and managing risk from space activities. It represents one of the few national laws that systematically codify space liability principles.

Article 1: Purpose

The Act's objective is dual: it aims to protect victims while promoting stable national space development. It internalizes global space governance norms within the Korean legal system.

Article 2: Definitions

The Act defines "launching party" broadly to include those who pre-register or register space objects under the SDPA. This exceeds the 1972 Liability Convention's "launching State" concept, acknowledging the complexity of modern launch arrangements involving contractors, sub-launchers, and rideshare missions.[21]

Article 3: Reciprocity and International Claims

Article 3(1) affirms Korea's right to recover funds paid under international liability. Article 3(2) introduces a reciprocity clause, enabling Korea to limit claims from nationals of non-reciprocating states, a sovereign safeguard unusual in space law.

21 Article I(c) of the Liability Convention.

Article 4: Strict and Fault-Based Liability

This provision codifies strict liability for Earth-based damage and fault-based liability for incidents in space. It also limits recourse against third-party suppliers to cases of gross negligence, reducing contractor exposure. Notably, the Product Liability Act is expressly excluded, emphasizing the sui generis nature of space risk.

Article 5: Liability Cap

The Act sets a statutory liability cap at KRW 200 billion (approx. USD 150 million). Unlike many jurisdictions that delegate this to administrative rulemaking, Korea enshrines this cap in primary legislation, enhancing legal certainty. However, this fixed amount may become outdated without regular review, especially given inflation and evolving mission profiles.

Article 6: Mandatory Insurance

Operators must obtain third-party insurance, with coverage levels determined by KASA, considering mission complexity and insurance market conditions. The provision mirrors the U.S. FAA's "Maximum Probable Loss (MPL)" regime, adapted to Korea's regulatory context.

Article 7: Government Support

If damages exceed insurance coverage, the government may provide supplemental compensation, subject to parliamentary approval. This reflects a public-private risk-sharing model comparable to the French CNES-backed reinsurance framework and the U.S. indemnification scheme for excess MPL.

Article 8: Limitation Periods

The Act limits claims to one year from discovery and three years from the event. Given the technical and evidentiary burdens in space incidents, future reforms may consider extending these periods to enhance fairness.

Article 9: Regulatory Sunset

This article mandates biennial reviews of claim limitation periods using a sunset clause structure, ensuring responsiveness to legal and technical developments.

3.1.3. Synthesis

Together, the SDPA and the ACDSO form a coherent legal infrastructure for Korea's space activities, covering everything from strategic planning and private sector support to international treaty compliance and liability governance. Their structure reflects not only Korea's alignment with international norms but also its normative innovation, as evidenced by uniquely Korean provisions such as the sub-orbital launch vehicle definition, meteorite regulation, and public indemnification for excess damages.

These statutes represent Korea's transition from a technology-adopting state to a norm-contributing space actor. As space activities diversify and global norms evolve, further refinements will be needed to maintain Korea's regulatory credibility and strategic competitiveness.

3.2. Harmonization With International Space Law

Korea's national space legislation reflects a structured, though not yet fully codified, approach to aligning domestic regulatory frameworks with international space law. As a party to four foundational United Nations treaties, the 1967 Outer Space Treaty,[22] the 1968 Rescue Agreement, the 1972 Liability Convention, and the 1975 Registration Convention[23] , Korea has progressively translated these obligations into domestic law, primarily through the SDPA and the ACDSO.[24]

Rather than relying on self-executing incorporation, Korea employs a selective legislative transposition model, embedding international principles into national statutes and implementing regulations. This model facilitates functional compliance while maintaining administrative flexibility. However, notable gaps remain in areas such as fault-based

22 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 610 UNTS 205, adopted on 27 January 1967, entered into force on 10 October 1967 (the 'Outer Space Treaty').

23 Convention on Registration of Objects Launched into Outer Space, 1023 UNTS 15, adopted on 14 January 1975, entered into force on 15 September 1976 (the 'Registration Convention').

24 United Nations Office for Outer Space Affairs (2024). Status of International Agreements Relating to Activities in Outer Space, as of 2024. Korea has ratified four major treaties, except the Moon Agreement. Available at: https://www.unoosa.org/oosa/de/ourwork/spacelaw/treaties/status/index.html (Accessed: 12 June 2025).

liability for outer space incidents under Article III of the Liability Convention and operational procedures for Article IX consultations under the 1967 Outer Space Treaty.

The SDPA sets forth detailed launch permission requirements, including documentation on vehicle safety, environmental protection, and mission viability.[25] Insurance coverage is mandated, and permissions are conditional upon risk assessment and operational readiness. These procedures align with international best practices and ensure compliance with the 1975 Registration Convention and the 1967 Outer Space Treaty, particularly through obligatory registration of space objects with both national authorities and the United Nations.

Complementing the SDPA, the ACDSO, enacted in 2007, establishes Korea's liability and insurance regime in accordance with the 1972 Liability Convention. It mandates third-party liability insurance for both domestic and foreign launches and delineates the process for damage claims. The ACDSO features a dual-track structure that distinguishes between public and private missions, offering government indemnification where commercial insurance proves insufficient. This reflects a precautionary approach and strengthens Korea's credibility in high-risk domains such as launch services.

Further compliance under Korea's legal framework exhibits a structurally nuanced and multi-channeled approach to harmonizing international space law. This is achieved through four primary channels:

1. Direct Legislative Incorporation

The SDPA expressly mandates conformity with the 1967 Outer Space Treaty, the 1968 Rescue Agreement, the 1972 Liability Convention, and the 1975 Registration Convention. Article 3(1) of the SDPA requires compliance with international norms, while Articles 9, 10, 14-2, and 14-3 of the SDPA establish mechanisms for registration and astronaut return obligations. Article 27 of the SDPA imposes criminal penalties for violations, institutionalizing international compliance within the domestic legal order.

25 Article 11 of the Space Development Promotion Act.

2. Institutionalized Regulatory Mechanisms

Articles 11 of the SDPA provide launch permission procedures aligned with international obligations. Article 6 of the ACDSO mandates third-party insurance consistent with the 1972 Liability Convention. These provisions embed international standards into Korea's national permission regime, creating a dual compliance structure that binds both public authorities and private operators.

3. Responsive Integration of Emerging Norms

Korean space legislation engages evolving global standards, including soft-law mechanisms. National security clauses (Article 21 of the SDPA) are invoked to support space debris mitigation efforts; Article 18-8 of the SDPA enables interagency review of dual-use technologies under export control frameworks; and Article 18-4 of the SDPA promotes dissemination of space-derived benefits in line with Article I of the 1967 Outer Space Treaty.

4. Cross-Border Coordination Frameworks

Article 20 of the SDPA mandates interagency collaboration for launch safety, mirroring ICAO and IMO practices. While Article 8 of the ACDSO incorporates a three-year limitation period for damage claims, paralleling international jurisdictional norms, Article 18-8 of the SDPA introduces export control restrictions for strategic technologies. Article 14-2 and 14-3 of the SDPA extends beyond Rescue Agreement obligations by detailing procedural timelines and recovery protocols for foreign space objects.

Collectively, these mechanisms establish a harmonized, though not fully codified, legal system that integrates international space law principles into the Korean regulatory context. The framework reflects a dynamic interaction between binding treaty obligations, domestic legislative choices, and emerging global governance standards.

3.3. Responsiveness To Technological Advances

Korea's national space law framework was originally formulated in the early 2000s during a period when state-led missions dominated the technological and institutional landscape. The SDPA enacted in 2005, reflected this paradigm by focusing primarily on government-sponsored projects and research institutions, while offering only minimal regulatory guidance for private sector engagement.[26] At the time, the emergence of small satellite constellations, reusable launch vehicles, and on-orbit servicing missions was still beyond the practical scope of domestic lawmaking.

The landscape has shifted significantly over the past decade, driven by the global rise of "NewSpace" actors and the deepening commercialization of space technologies. While Korea has recognized these trends, responses in its legal framework remain preliminary. For instance, although the 2019 amendment to the SDPA improved industrial promotion measures, no binding launch licensing system has yet been enacted. Rather, the Ministry of Science and ICT and the newly established KASA are currently preparing a "launch license" regime, which would allow repeated launches of the same vehicle from the same site without a new permit each time. Government proposals, announced in March 2024, are under review by the National Assembly and focus on easing administrative burdens on private launch operators, including potential delegation of defense-related approvals to the Ministry of National Defense.[27]

This planned licensing system reflects an incremental shift toward recognizing the role of commercial launch providers. However, until the proposals are passed and operationalized through the SDPA and its Enforcement Decree[28] , Korea lacks a formal and enforceable launch licensing framework, meaning that all private launch activities continue to require case-by-case "launch permits" under Article 11 of the SDPA.

26 The enactment reason of the Space Development Promotion Act, Law no. 7538, enforced 1 December 2005, enacted on 31 May 2005. Available at: https://law.go.kr/lsInfoP.

27 KIM & CHANG (2024). Proposed Amendment to the Space Development Promotion Act. Available at: https://www.kimchang.com/en/insights/detail.kc?curPage=3&sch_section=4&idx=29665&sch_cate_idxs_arr=&sch_date=&scroll=1728.6666259765625&index=N&cate_title=&sch_nm=space (Accessed: 12 June 2025); Ministry of Science and ICT (2024). Proposed Amendment to the Space Development Promotion Act. Available at: https://www.moleg.go.kr/lawinfo/makingInfo.

28 Enforcement Decree of Space Development Promotion Act, Presidential Decree no. 35457, enforced 23 April 2025, amended on 22 April 2025. Available at: https://www.law.go.kr/%EB%B2%95%EB%A0%B9/%EC%9A%B0%EC%A3%BC%EA%B0%9C%EB%B0%9C%EC%A7%84%ED%9D%A5%EB%B2%95%EC%8B%9C%ED%96%89%EB%A0%B9 (Accessed: 15 June 2025).

However, these reforms remain incomplete. There are no explicit statutory provisions governing key emerging technologies such as rendezvous and proximity operations (RPO), in-orbit servicing, or space traffic coordination (STC). The legal framework is also silent on on-orbit manufacturing, satellite-as-a-service models, and the deployment of large-scale satellite constellations, which require specific licensing, liability, and spectrum management regimes. In practice, such gaps have been partially addressed through ministerial guidelines, including technical standards and safety protocols. Yet these soft-law instruments lack the binding force of statute and do not offer sufficient predictability or legal protection for commercial operators.[29]

This legal uncertainty poses a particular challenge as domestic private actors such as Innospace and Perigee Aerospace expand their launch capabilities and seek international partnerships. Without codified mechanisms to assess new mission types, approve complex operations, or allocate liability under evolving risk profiles, the Korean legal environment risks becoming fragmented and reactive. This, in turn, may discourage foreign investment, complicate insurance underwriting, and hinder Korea's participation in transnational supply chains for advanced space services.

Furthermore, Korea has yet to establish a legal framework for addressing dual-use space technologies beyond export control protocols administered under general security laws. This is increasingly problematic given that commercial providers are now routinely involved in satellite imagery, global navigation augmentation, and encrypted communications, all of which have national security implications.

Korea's current reliance on policy documents, roadmaps, and ministerial notices offers administrative flexibility but lacks legal enforceability. For example, the government's fourth Basic Plan for Space Development (2022–2026) highlights goals such as enhancing private sector participation and advancing reusable launch vehicles, but these goals are not reflected in binding legal mandates.[30]

29 See, von der Dunk, F. (2012) 'Contradictio in Terminis or Realpolitik?', in Marboe, I. (ed.) Soft Law in Outer Space: The Function of Non-binding Norms in International Space Law. Vienna: Böhlau Verlag; Bohlmann, U. (2005) 'Legal Aspects of the "Space Exploration Initiatives"', in Benkö, M. et al. (eds) Space Law: Current Problems and Perspectives for Future Regulation. The Hague: Eleven International Publishing, p. 240.

30 See, the fourth Space Development Promotion Basic Plan, *supra* note 14.

3.4. Reflection Of Geostrategic Interests And National Needs

Korea's national space law regime reflects a strategic dualism: the simultaneous pursuit of industrial competitiveness and the preservation of national autonomy in critical space capabilities. This bifurcated orientation is not merely rhetorical but emerges from Korea's unique geopolitical condition, namely, its persistent security tensions on the Korean Peninsula.

One of the clearest manifestations of Korea's geostrategic priorities is the Korean Positioning System (KPS), a regional navigation satellite system currently under development.[31] While couched in technical terms of accuracy and interoperability with the U.S. GPS (Global Positioning System), the KPS program serves an unambiguous strategic function: ensuring independent and resilient positioning, navigation, and timing (PNT) capabilities in the event of restricted access to foreign GNSS platforms during crises or conflicts.[32] Although the SDPA acknowledges the contribution of "national security" and the promotion of "national economy" in Article 1, it contains no statutory language that directly mandates or protects sovereign autonomy in critical infrastructure systems such as navigation, reconnaissance, or communications satellites.[33]

More broadly, the current legislative framework does not adequately regulate dual-use technologies or civil-military integration. While Korea remains fully committed to the peaceful uses of outer space under the 1967 Outer Space Treaty, the domestic legal system lacks concrete mechanisms for implementing Article IV, which prohibits the placement of weapons of mass destruction in orbit or on celestial bodies.[34] No legislative or regulatory instruments exist to monitor, restrict, or enforce prohibitions on militarization beyond what is operationalized through interagency security reviews and export control protocols, which are not space-specific.

31 GPS World (2018). Korea will launch its own satellite positioning system. Available at: https://www.gpsworld.com/korea-will-launch-its-own-satellite-positioning-system/ (Accessed: 15 June 2025).

32 Republic of Korea (2023). Statement on Agenda Item 9 Global Navigation Satellite Systems (United Nations Office for Outer Space Affairs, Scientific and Technical Subcommittee 2023). Available at: https://www.unoosa.org/documents/pdf/copuos/stsc/2023/Statements/16_AM/9_Republic_of_Korea_16_Feb_AM.pdf (Accessed: 15 June 2025).

33 Article 1 and Article 13 of the Space Development Promotion Act.

34 Article IV of the Outer Space Treaty.

Korea's evolving space ambitions further complicate the legal picture. The country is now actively participating in international programs such as NASA's Artemis initiative and is advancing indigenous lunar missions, including the Korea Pathfinder Lunar Orbiter (KPLO) and follow-on landers.[35] At the same time, defense-oriented programs, such as early-warning satellite constellations and electro-optical reconnaissance platforms, are becoming institutionalized under the Ministry of National Defense and the Agency for Defense Development.[36] This convergence of civil and military objectives has not yet been accompanied by a legal framework capable of reconciling their divergent risk profiles, funding mechanisms, and international obligations.

Additionally, Korea faces emerging legal tensions in the realm of economic security and foreign influence over strategic sectors. Unlike the United States' Committee on Foreign Investment in the United States (CFIUS)[37] or similar mechanisms in the EU and Japan, Korea currently lacks a space-specific foreign investment review process. This absence may prove increasingly problematic as domestic space startups seek foreign capital, enter cross-border partnerships, or offer space data services with potential security implications.

Finally, the lack of legal protections for space-based critical infrastructure, including satellite ground stations, launch facilities, and data relay networks, raises concerns about the resilience and sovereignty of Korea's space assets. As cyber threats, jamming, and geo-economic coercion become more prevalent, legal measures to designate and protect national space development infrastructure may be necessary to ensure operational continuity and secure access to space.

35 Daisy Dobrijevic (2023). Danuri: Facts about the Korea Pathfinder Lunar Orbiter (KPLO). Available at: https://www.space.com/danuri-korea-pathfinder-lunar-orbiter-kplo-moon-mission (Accessed: 15 June 2025); Republic of Korea (2024). Statement on Agenda Item 15 Space Exploration and Innovation (United Nations Office for Outer Space Affairs, Committee on the Peaceful Uses of Outer Space 2024). Available at: https://www.unoosa.org/documents/pdf/copuos/2024/statements/15_ROK.pdf (Accessed: 12 June 2025).

36 KIM & CHANG (2024). Proposed Amendment to the Space Development Promotion Act. Available at: https://www.kimchang.com/en/insights/detail.kc?curPage=3&sch_section=4&idx=29665&sch_cate_idxs_arr=&sch_date=&scroll=1728.6666259765625&index=N&cate_title=&sch_nm=space (Accessed: 12 June 2025).

37 For U.S. practice, see U.S. Department of the Treasury, CFIUS Laws and Guidance. Available at: https://home.treasury.gov/policy-issues/international/the-committee-on-foreign-investment-in-the-united-states-cfius/cfius-laws-and-guidance (Accessed: 15 June 2025).

In sum, Korea's space law has so far prioritized industrial promotion and peaceful use principles, but it must now evolve to systematically address national security imperatives, dual-use governance, and economic sovereignty. This calls for a more integrated legal architecture, potentially through a dedicated Space Security Act or revisions to the SDPA and related statutes, to reflect Korea's transition from an emerging to a strategically mature space power.

4. CURRENT KEY LEGAL AND REGULATORY CHALLENGES

Korea's evolving space program has reached a critical inflection point where the ambitions of a globally competitive space sector confront the structural limitations of its current legal and regulatory framework. This section examines the most pressing challenges facing Korean space law today: legal ambiguity for commercial operators, underdeveloped regulatory mechanisms for emerging technologies, and a persistent gap between soft-law policy instruments and binding legal authority. Drawing from recent institutional reforms, international legal trends, and domestic academic assessments, the analysis emphasizes the need for comprehensive legislative updates that align with Korea's national objectives and international obligations.

4.1. Commercial Sector Uncertainty And Private Infrastructure Access

A central tension in Korea's legal landscape lies in the discrepancy between stated policy goals to stimulate private sector growth and the underdeveloped legal environment in which private firms must operate.[38] While the SDPA was amended in 2019 and again in 2023 to introduce sub-orbital and/or private launch permission provisions, specific regulations regarding launch site authorization, export control compliance, space traffic coordination, and liability thresholds remain undefined or fragmented across non-binding guidelines.[39]

38 KoreaTechToday (2024). Korean Government Unveils KASA, Aiming for 10% Share in Global Aerospace Market. Available at: https://www.koreatechtoday.com/korean-government-unveils-kasa-aiming-for-10-share-in-global-aerospace-market/ (Accessed: 15 June 2025).

39 See, the amendment reason of the Space Development Promotion Act, Law no. 18867, enforced 11 December 2022, amended on 10 June 2022. Available at: https://www.law.go.kr/LSW//lsInfoP.

This is particularly problematic for emerging domestic firms such as Innospace,[40] Perigee Aerospace,[41] and Hanwha Aerospace,[42] which must navigate international competition while operating in a regulatory vacuum. There is no codified legal pathway for accessing government-owned space infrastructure, nor for negotiating public-private partnerships for satellite development or shared payload integration. Security clearance requirements for commercial entities working on dual-use technologies are governed only by interagency practice, not legal statute.

Furthermore, intellectual property generated through government-funded research is subject to unclear rules regarding transferability, licensing, and commercialization.[43] As identified in recent Korean legal literature, the absence of a predictable, rights-based commercial legal regime dampens investment incentives and inhibits participation in global value chains for next-generation satellite systems.[44]

4.2. Technology Regulation And Dual-Use Governance

The Korean legal framework also faces structural challenges in regulating emerging technologies. While recent SDPA revisions introduced Article 15, 15-2, and 15-3 on space situational awareness (SSA) and Article 17 on utilization of satellite information, these provisions remain general in scope and lack implementing regulations that define technical thresholds, compliance procedures, or enforcement penalties.[45]

Regulatory silence on on-orbit servicing, satellite mega-constellations, in-space manufacturing, or lunar resource activities undermines Korea's legal readiness for advanced mission architectures. As domestic capabilities expand toward cis-lunar missions

40 Innospace website. Available at: https://www.innospc.com/ (Accessed: 12 June 2025).

41 Perigee Aerospace website. Available at: https://perigee.space/ (Accessed: 12 June 2025).

42 Hanwha Aerospace website. Available at: https://www.hanwhaaerospace.com/eng/index.do (Accessed: 12 June 2025).

43 Sankyungtoday (2024). Next-Generation Launch Vehicle IP Conflict: Mediation Committee Dismisses Case… Hanwha-KARI Dspute Continues. Available at: https://www.sankyungtoday.com/news/articleView.html?idxno=47816 (Accessed: 12 June 2025).

44 Kim, Youngjoo (2024). The International Legal Framework and Regulatory Responses for Commercial Space Activities. Available at: https://www.klri.re.kr/kor/publication/2248/view.do (Accessed: 12 June 2025).

45 Articles 15, 15-2, 15-3, and 17 of the Space Development Promotion Act.

and Korea increases its cooperation with Artemis Accord states, the legal infrastructure must evolve accordingly. Yet, as of 2025, Korea still lacks legal instruments to define the status of extracted space resources, conditions for orbital debris disposal, or liability allocation in multinational lunar missions.

Additionally, many Korean-developed space technologies fall into the dual-use category.[46] Yet there is no dedicated legal framework to classify, monitor, or authorize dual-use space technologies, an omission that creates vulnerabilities in international trust, export security, and technological autonomy. This legal gap is made more critical by the expanding military dimensions of Korea's space agenda, including EO reconnaissance satellites and missile early warning systems operated by defense-related institutions.

4.3. Soft Law Dependence And Lack Of Enforceability

Korea has made significant progress in aligning its legal system with international norms, such as endorsing the UNCOPUOS Guidelines for the Long-term Sustainability of Outer Space Activities (LTS Guidelines),[47] the IADC Space Debris Mitigation Guidelines,[48] UN Space Debris Mitigation Guidelines.[49] However, these commitments remain voluntary in nature. There is currently no binding domestic legal obligation for either public or private space operators to implement debris mitigation measures, conduct end-of-life disposal planning, or share conjunction data with foreign entities.

As global initiatives increasingly move toward formalizing space traffic coordination (STC) frameworks, particularly through efforts led by the United States, the European Union, and Japan, Korea's lack of a statutory basis for operator obligations, collision avoidance procedures, or data-sharing mandates poses a growing risk. While soft-law instruments and ministerial notices have offered interim flexibility, they lack the legal enforceability required for long-term reliability and international interoperability.

46 Lee, Sunghoon (2022). Development Direction of South Korea's Space Power in the New Space Era: Focusing on Actors, Domains, and Norms. Available at: https://www.inss.re.kr/upload/bbs/BBSA05/202211/F20221129131745882.pdf (Accessed: 15 June 2025).

47 The Guidelines for the Long-term Sustainability of Outer Space Activities were adopted by the Committee on the Peaceful Uses of Outer Space (UNCOPUOS). Available at: https://spacesustainability.unoosa.org/content/the_guidelines (Accessed: 12 June 2025).

48 IADC Space Debris Mitigation Guidelines. Available at: https://www.iadc-home.org/documents_public/view/id/318#u (Accessed: 15 June 2025).

49 Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space. Available at: https://www.unoosa.org/pdf/publications/st_space_49E.pdf (Accessed: 15 June 2025).

This regulatory gap creates a strategic vulnerability. Without a clear and codified legal framework, Korea may find itself excluded from binding international arrangements that will govern access to congested orbital regimes, shape data exchange protocols, and determine eligibility for participation in future STC networks.

To mitigate this risk, Korea must move beyond policy-level alignment and begin codifying key obligations for operator-level STC compliance. These should include mandatory requirements for conjunction analysis, pre- and post-maneuver coordination, and real-time data-sharing protocols. Where appropriate, bilateral or multilateral agreements should also be pursued to ensure reciprocity and transparency with key international partners. Without such concrete legal measures, Korea's ability to integrate into next-generation orbital governance frameworks, and to influence their development, will remain limited.

5. NEXT STEPS TO MAKE THE LAW EVOLVE IN THE FUTURE

Korea's legal approach to space has matured alongside its technological trajectory, from a policy environment once focused primarily on industrial promotion to one increasingly challenged by the demands of strategic capability, international governance, and commercial innovation. The passage from the Aerospace Industry Development Promotion Act of 1987 to the establishment of the KASA in 2024 marks not only administrative evolution but also the beginning of a shift in legal culture: from fragmented promotion-oriented statutes to an integrated regulatory regime addressing sovereignty, security, sustainability, and competitiveness.

As Korea aspires to join the world's top five space powers, its legal infrastructure must undergo a corresponding transformation.[50] This section identifies three key vectors of legal reform: institutional consolidation, private sector integration and deep space exploration.

50 See, KASA (2025). KASA Announces 2025 Work Plan to Propel Korea as a Top 5 Aerospace Nation. Available at: https://www.kasa.go.kr/prog/bbsArticle/BBSMSTR_000000000041/view.do?bbsId=BBSMSTR_000000000041&nttId=B000000001474Ho4eE5 (Accessed: 15 June 2025).

5.1. Institutional Consolidation And Legal Coherence

While the SDPA already contains many provisions characteristic of a foundational space law, including long-term planning obligations, references to KASA, and inter-ministerial coordination mechanisms, it remains structured primarily as an industrial promotion statute. Its regulatory scope is supplemented by separate instruments such as the ACDSO and the Special Act on the Establishment and Operation of KASA, which collectively fragment the legal landscape. As a result, Korea still lacks a single, integrated statute that consolidates strategic governance principles, institutional mandates, and cross-cutting regulatory functions into a unified framework. Establishing such a Basic Space Law would enhance legal clarity, elevate the symbolic coherence of national space legislation, and provide a more stable foundation for Korea's role in international legal and policy discourse.

In parallel, KASA must be equipped with a clear regulatory mandate and supporting subordinate legislation that covers licensing, safety reviews, insurance management, public-private cooperation, and interagency oversight. Without this, the centralization promised by KASA's creation risks being undermined by legacy fragmentation across ministries, including the Ministry of Science and ICT, Ministry of National Defense, and Ministry of Foreign Affairs and so forth.

5.2. Enabling A Competitive Commercial Ecosystem

Korea's legal system must evolve to accommodate the rise of a domestic NewSpace sector. While recent SDPA amendments have introduced permissions for private launch services, it is still difficult to find an end-to-end legal guidance for commercial operators. Critical gaps remain in areas such as launch site licensing, commercial access to government infrastructure, cross-border data sharing, and dual-use technology certification.

5.3. Legal Preparedness For Deep Space Exploration

Korea's stated ambition of a lunar landing by 2032 and Mars exploration by 2045 demands a forward-looking legal framework capable of addressing the unique challenges of deep space missions.[51] These include not only scientific and technical hurdles but also legal readiness in areas such as planetary protection, in-situ resource utilization, multinational program governance, and liability for off-Earth operations.

Currently, Korea's national space law does not provide a clear legal basis for regulating key aspects of deep space activities. There are no statutory provisions on the extraction and use of extraterrestrial resources, such as lunar regolith or asteroid materials, nor on the remediation of space debris beyond low-Earth orbit (LEO). Likewise, no legal framework exists to allocate liability or establish coordination procedures for joint lunar missions or international space exploration partnerships. As Korea expands its participation in the Artemis Accords[52] and develops its own exploration architecture, including the Korea Pathfinder Lunar Orbiter (KPLO) and potential future landers, these gaps may undermine both legal credibility and mission feasibility.

Moreover, the lack of legal mechanisms for implementing planetary protection standards, such as those endorsed by Committee on Space Research (COSPAR), raises concerns about Korea's readiness to comply with emerging international norms governing biosafety, contamination avoidance, and environmental stewardship in outer space.

To support its deep space ambitions, Korea must consider enacting supplementary legislation or dedicated chapters within the SDPA that address these frontier issues. Legal preparedness in this context will require not only statutory clarity on resource rights and international liability, but also integration with global legal developments concerning lunar governance, data sharing, and infrastructure interoperability. Without such provisions, Korea risks legal uncertainty in high-value exploration domains that increasingly depend on multilateral cooperation and rule-based governance.

Korea's space legal framework has matured in tandem with its technological and institutional advancement. Yet, as the country enters a new phase of space competition marked by commercialization, dual-use integration, and rule-based global governance, further legal evolution is imperative. The challenge is not merely to update existing laws, but to build a forward-looking, cohesive legal regime that can manage complex risks, support strategic autonomy, and enable sustainable innovation. A unified basic space law, complemented by regulatory clarity for commercial operators and security-specific legal instruments, would form the backbone of this transformation. In doing so, Korea would not only enhance internal governance capacity, but also emerge as a credible legal contributor to the international space order, one capable of shaping norms rather than merely following them, and of bridging national interests with global responsibilities in the peaceful and responsible use of outer space.

REFERENCES

Act on Compensation for Damage Caused by Space Object, Law no. 14839, enforced 27 May 2024, amended on 26 January 2024. Available at: https://law.go.kr/%eb%b2%95%eb%a0%b9/%ec%9a%b0%ec%a3%bc%ec%86%90%ed%95%b4%eb%b0%b0%ec%83%81%eb%b2%95.

Act on Compensation for Damage Caused by Space Object, Law no. 8714, enforced 22 June 2008, enacted 21 December 2007. Available at: https://www.law.go.kr/lsInfoP.do?lsiSeq=81874&ancYd=20071221&ancNo=08714&efYd=20080622&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000.

Aerospace Industry Development Promotion Act, Law no. 20169, enforced 31 July 2024, amended on 30 January 2024. Available at: https://law.go.kr/LSW/lsInfoP.do?lsiSeq=259513&ancYd=20240130&ancNo=20169&efYd=20240731&nwJoYnInfo=Y&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000.

Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 672 UNTS 119, adopted on 22 April 1968, entered into force on 3 December 1968 (the 'Rescue Agreement').

Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 672 UNTS 119, adopted on 22 April 1968, entered into force on 3 December 1968 (the 'Rescue Agreement').

Bohlmann, U. (2005) 'Legal Aspects of the "Space Exploration Initiatives"', in Benkö, M. et al. (eds) Space Law: Current Problems and Perspectives for Future Regulation. The Hague: Eleven International Publishing, p. 240.

Convention on Registration of Objects Launched into Outer Space, 1023 UNTS 15, adopted on 14 January 1975, entered into force on 15 September 1976 (the 'Registration Convention').

Daisy Dobrijevic (2023). Danuri: Facts about the Korea Pathfinder Lunar Orbiter (KPLO). Available at: https://www.space.com/danuri-korea-pathfinder-lunar-orbiter-kplo-moon-mission

Edaily (2025) "Mars is an Opportunity"… South Korea's Mars mission moves forward. Available at: https://www.edaily.co.kr/News/Read?newsId=02801126642171544.

Enforcement Decree of Space Development Promotion Act, Presidential Decree no. 35457, enforced 23 April 2025, amended on 22 April 2025. Available at: https://www.law.go.kr/%EB%B2%95%EB%A0%B9/%EC%9A%B0%EC%A3%BC%EA%B0%9C%EB%B0%9C%EC%A7%84%ED%9D%A5%EB%B2%95%EC%8B%9C%ED%96%89%EB%A0%B9.

GPS World (2018). Korea will launch its own satellite positioning system. Available at: https://www.gpsworld.com/korea-will-launch-its-own-satellite-positioning-system/.

Hanwha Aerospace website. Available at: https://www.hanwhaaerospace.com/eng/index.do.

IADC Space Debris Mitigation Guidelines. Available at: https://www.iadc-home.org/documents_public/view/id/318#u.

Innospace website. Available at: https://www.innospc.com/.

KASA (2024). Purpose of Establishment. Available at: https://www.kasa.go.kr/eng/sub04_01_01.do;jsessionid=QDYkOcWtsHI5Rv1S7pVLowMIwZZezXHCcD_UsVbY.homepage10.

KASA (2025). KASA Announces 2025 Work Plan to Propel Korea as a Top 5 Aerospace Nation. Available at: https://www.kasa.go.kr/prog/bbsArticle/BBSMSTR_000000000041/view.do?bbsId=BBSMSTR_000000000041&nttId=B000000001474Ho4eE5.

KASA (2025). KASA's 2025 Proposed Budget Set at KRW 964.9 Billion. Available at: https://www.kasa.go.kr/prog/bbsArticle/BBSMSTR_000000000041/view.do?bbsId=BBSMSTR_000000000041&nttId=B000000000756Ij2hD1.

KIM & CHANG (2024). Proposed Amendment to the Space Development Promotion Act. Available at: https://www.kimchang.com/en/insights/detail.kc?curPage=3&sch_section=4&idx=29665&sch_cate_idxs_arr=&sch_date=&scroll=1728.6666259765625&index=N&cate_title=&sch_nm=space

KIM & CHANG (2024). Proposed Amendment to the Space Development Promotion Act. Available at: https://www.kimchang.com/en/insights/detail.kc?curPage=3&sch_section=4&idx=29665&sch_cate_idxs_arr=&sch_date=&scroll=1728.6666259765625&index=N&cate_title=&sch_nm=space.

Kim, Doo Hwan (2012). Space Law and Policy in the Republic of Korea. Place: United Nations Office for Outer Space Affairs. Available at: https://www.unoosa.org/pdf/pres/2010/SLW2010/02-09.pdf.

Kim, Youngjoo (2024). The International Legal Framework and Regulatory Responses for Commercial Space Activities. Available at: https://www.klri.re.kr/kor/publication/2248/view.do.

Kookmin Ilbo (2024) Korea starts 'moon landing' in earnest... 2032 launch target. Available at: https://www.kmib.co.kr/article/view.asp?arcid=1730709485

KoreaTechToday (2024). Korean Government Unveils KASA, Aiming for 10% Share in Global Aerospace Market. Available at: https://www.koreatechtoday.com/korean-government-unveils-kasa-aiming-for-10-share-in-global-aerospace-market/.

Lee, Sunghoon (2022). Development Direction of South Korea's Space Power in the New Space Era: Focusing on Actors, Domains, and Norms. Available at: https://www.inss.re.kr/upload/bbs/BBSA05/202211/F20221129131745882.pdf.

Ministry of Science and ICT (2022). Fourth Space Development Promotion Basic Plan. Available at: https://www.msit.go.kr/bbs/view.do?sCode=user&nttSeqNo=3017397&bbsSeqNo=65.

Ministry of Science and ICT (2024). Proposed Amendment to the Space Development Promotion Act. Available at: https://www.moleg.go.kr/lawinfo/makingInfo.mo?mid=a10104010000&lawSeq=77254&lawCd=0&lawType=TYPE5&currentPage=1&keyField=lmNm&keyWord=%EC%9A%B0%EC%A3%BC%EA%B0%9C%EB%B0%9C&stYdFmt=&edYdFmt=&lsClsCd=&cptOfiOrgCd=.

NASA (2021). Republic of Korea Joins List of Nations to Sign Artemis Accords. Available at: https://www.nasa.gov/missions/artemis/republic-of-korea-joins-list-of-nations-to-sign-artemis-accords/.

Perigee Aerospace website. Available at: https://perigee.space/.

Republic of Korea (2023). Statement on Agenda Item 9 Global Navigation Satellite Systems (United Nations Office for Outer Space Affairs, Scientific and Technical Subcommittee 2023). Available at: https://www.unoosa.org/documents/pdf/copuos/stsc/2023/Statements/16_AM/9_Republic_of_Korea_16_Feb_AM.pdf.

Republic of Korea (2024). Statement on Agenda Item 15 Space Exploration and Innovation (United Nations Office for Outer Space Affairs, Committee on the Peaceful Uses of Outer Space 2024). Available at: https://www.unoosa.org/documents/pdf/copuos/2024/statements/15_ROK.pdf.

Sankyungtoday (2024). Next-Generation Launch Vehicle IP Conflict: Mediation Committee Dismisses Case… Hanwha-KARI Dspute Continues. Available at: https://www.sankyungtoday.com/news/articleView.html?idxno=47816.

Shin, Hong-Kyun (2005). “Space Exploitation Act: Its Implication and Application”, in: the Korean Journal of Air & Space Law and Policy, 2005, Vol. 20 No. 2, pp. 277-292.

Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space. Available at: https://www.unoosa.org/pdf/publications/st_space_49E.pdf.

Space Development Promotion Act, Law no. 20959, enforced 28 November 2025, amended on 27 May 2025. Available at: https://law.go.kr/lsInfoP.do?lsiSeq=271241&ancYd=20250527&ancNo=20959&efYd=20251128&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000.

Spacenews (2024) South Korea’s new space agency outlines plans. Available at: https://spacenews.com/south-koreas-new-space-agency-outlines-plans/.

Special Act on Establishment and Operation of the Korea Aerospace Administration, Law no. 20144, enforced 27 May 2024, enacted 26 January 2024. Available at: https://www.law.go.kr/LSW/lsInfoP.do?lsiSeq=259383#0000.

The amendment reason of the Space Development Promotion Act, Law no. 18867, enforced 11 December 2022, amended on 10 June 2022. Available at: https://www.law.go.kr/LSW//lsInfoP.do?lsiSeq=242909&ancYd=20220610&ancNo=18867&efYd=20221211&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000.

The enactment reason of the Space Development Promotion Act, Law no. 7538, enforced 1 December 2005, enacted on 31 May 2005. Available at: https://law.go.kr/lsInfoP.do?lsiSeq=68401&ancYd=20050531&ancNo=07538&efYd=20051201&nwJoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000.

The Guidelines for the Long-term Sustainability of Outer Space Activities were adopted by the Committee on the Peaceful Uses of Outer Space (UNCOPUOS). Available at: https://spacesustainability.unoosa.org/content/the_guidelines.

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 610 UNTS 205, adopted on 27 January 1967, entered into force on 10 October 1967 (the 'Outer Space Treaty').

U.S. Department of the Treasury, CFIUS Laws and Guidance. Available at: https://home.treasury.gov/policy-issues/international/the-committee-on-foreign-investment-in-the-united-states-cfius/cfius-laws-and-guidance.

United Nations Office for Outer Space Affairs (2024). Status of International Agreements Relating to Activities in Outer Space, as of 2024. Available at: https://www.unoosa.org/oosa/de/ourwork/spacelaw/treaties/status/index.html.

von der Dunk, F. (2012) 'Contradictio in Terminis or Realpolitik?', in Marboe, I. (ed.) Soft Law in Outer Space: The Function of Non-binding Norms in International Space Law. Vienna: Böhlau Verlag

INDONESIA

Table of Contents

About the Author

Deden H. A. Alfathimy

Deden Habibi Ali Alfathimy is a PhD student in Politics and International Relations at the University of Leicester. He was granted a Future 100 PhD studentship from the University's Space Park Leicester, studying Indonesia in the context of "Space Policy in the Global Space Age." Deden is on study-leave status as a space policy researcher at the National Research and Innovation Agency of Indonesia (BRIN; formerly the National Institute of Aeronautics and Space/ LAPAN).

dhaa1@leicester.ac.uk

Runggu Prilia Ardes

Runggu Prilia Ardes is a researcher at the National Research and Innovation Agency of Indonesia (BRIN) specializing in space law and policy. She was one of the key legal drafters for Indonesian space regulations and has been in the field for over than ten years. She holds a master degree in air and space law from Leiden University, The Netherlands. She is currently focusing on space policy in relation to the national development program and environmental policy.

rung001@brin.go.id

Abstract

This chapter evaluates the making and relevance of the contemporary Indonesian space law revolving around the Indonesian Law Number 21 Year 2013 on Space Activities (the Space Activities Act). The law-making process is assessed from as early as 2002 when Indonesia finally ratified the Outer Space Treaty 1967. The Law's relevance since 2013 to date then will be discussed in chapter-by-chapter basis by putting them in the context of a wider Indonesian legal ecosystem involving other sectors forming a comprehensive *corpus juris spatialis*, as well as non-legal influences including the actual needs, technological, and geopolitical shifts. Some challenges both in terms of its implementation/ derivation and enactment/ enforcement are briefly surveyed. At the end, this chapter highlights several efforts that are and might be taken by Indonesian authorities and stakeholders to bridge the gap between the existing legal instruments and their outer space vision on the Republic's centenary in 2045.

Keywords: Indonesia, space law, *corpus juris spatialis*

1. INTRODUCTION

Indonesia can be considered as a regional pioneer and a global leader in the development of national space law, having enacted one of the most comprehensive and forward-looking legal frameworks for space activities. The Indonesian Law Number 21 Year 2013 on Space Activities (Space Activities Act/ *UU Keantariksaan*) is widely recognised as the first and most detailed national space law in Southeast Asia, following previous pioneering in space activities since the early global Space Age. This legislative achievement reflects Indonesia's longstanding commitment to harnessing outer space for peaceful uses to achieve national development, security, and technological advancement. However, the lawmaking was not a straightforward process, whilst its desired outcome is still hard to realise.

Nevertheless, the genesis and evolution of Indonesia's space law are deeply intertwined with the nation's unique geographical, political, and developmental context. As the world's largest archipelagic state, Indonesia has long relied on space-based technologies for national integration, disaster management, and economic growth. The law's formulation was shaped by decades of institutional development, international engagement, and the need to harmonise national interests with global dynamics. It draws upon lessons from international best practices, yet is tailored to Indonesia's distinct needs, addressing everything from satellite operations and spaceports to liability, insurance, environmental protection, and the growing role of private actors. The law's comprehensiveness is further reinforced by its integration with Indonesia's broader legal system and its alignment with international treaties, ensuring both legal certainty and adaptability to future challenges, to constitute a complete and adaptive Indonesia's *corpus juris spatialis*. This body of space law is evolving with some identified works ahead to be done by greater participation beyond public entities.

This chapter begins by tracing the contemporary historical and political drivers behind the Space Activities Act, including the influence of national reform (Post-Suharto *Reformation*), technological advances, and Indonesia's strategic imperatives. It then provides an analysis of the law-making process, the structure and substance of the Act, and its harmonisation with other national and international legal instruments. The chapter also examines the ongoing challenges in implementation, the evolving role of the national space agency, and the existing dynamics between law, policy, and Indonesian space programme. Some predictable next steps in the making Indonesian space law is also briefly discussed to conclude this chapter.

2. HISTORY

2.1. The Initial Drivers Of The Making Of Space Activities Act

The National Aerospace Congress (*Kongres Kedirgantaraan Nasional*) led by DEPANRI, including the first in 1998 and the second in 2003 (Sitindjak *et al.*, 1998; Adrianti Puji Sunaryati *et al.*, 2004), played a pivotal role as a policymaking and consensus-building forum on outer space affairs that became a prime driver for the subsequent process of the making of the Space Activities Act. These congresses brought together national stakeholders from government, academia, industry, and civil society, resulting in key recommendations, among others: the National Aerospace Conception (*Konepsi Kedirgantaraan Nasional*), future space planning and development, and the determination of Indonesia's position on global space issues such as the definition and delimitation of outer space as well as the geostationary orbit.

In wider political context, both congresses witnessed a very pivotal change of Indonesian politics called *Reformasi* (Reformation) following the end of Suharto's regime in May 1998. One of the most important changes demanded by *Reformasi* was the security sector reform which necessitates the revision of the laws regarding military activities and personnel. This context created not only a conducive environment for reviewing and updating Indonesia's legal instruments in general but also opened a fitter legal standing to finally ratify the Outer Space Treaty 1967. It was apparent in the revision of Indonesian military and defence laws in the early 2000s, particularly with the adoption of the Law Number 34 of 2004 on the Armed Forces, removed ambiguity regarding the status of the geostationary orbit and the Indonesian Airforce's obligation over parts of outer space stipulated in the Law Number 20 of 1982. It paved a smoother way for Indonesian lawmakers to ratify the Outer Space Treaty 1967 after, peculiarly for some observers, ratified the other three space treaties earlier: the Rescue Agreement, Liability Convention, and Registration Convention (Alfathimy and Ardes, 2025, p. 453).

Beyond paperwork, the surge of privatisation and commercialisation of space activities in early 2000s, especially in telecommunications, was a significant factor too. Indonesia's pioneering use of the *Palapa* satellite system in 1976 made it the first developing country to own and operate a domestic communication satellite, followed by further ventures such as *Garuda* and *Cakrawarta*. However, the once-government-led *Palapa* system was privatised in early 2000s after the Indonesian government divested its major share to a Singaporean company to cope with the 1998 financial crisis which triggered wide public critics, including from a prominent space lawyer like Priyatna Abdurrasyid who called the attempt as "naïve" (Abdurrasyid, 2006, p. 169). Nevertheless, the increasing participation of both public and private entities in space activities necessitated clear legal provisions for licensing, liability, and the regulation of private sector involvement, further accelerating the push for a comprehensive national space law.

The Congress' decisions, *Reformasi*, as well as diversification were also combined with some perpetual factors in the country in shaping the Indonesian space law. The lawmaking was fundamentally driven by Indonesia's unique geographical and demographic characteristics. As the world's largest archipelagic nation, spanning over 17,000 islands and home to hundreds of millions of people speaking hundreds of languages, Indonesia faced significant challenges in national integration, communication, and disaster management. These realities made the continuity and wider application of space science and technologies—especially in telecommunications, remote sensing, weather forecasting, and disaster mitigation—constant need. The country's dependency on space-based solutions put more urgency for a comprehensive legal framework to govern space activities and ensure their sustainability and alignment with national interests over time.

Those contemporary and natural-driven push could also date back to the making of Indonesian space-related laws and institutions since early 1960s. The recent generations keep, if not share, similar visions set by Indonesia's founding leaders and subsequent governments, who recognized early on the strategic importance of outer space for Indonesia. This vision was institutionalized through the extension of the Aviation Council (*Dewan Penerbangan Republik Indonesia*) into the National Aeronautics/Aviation and Space Council (*Dewan Penerbangan dan Antariksa Republik Indonesia*/ DEPANRI) and the establishment of the National Institute for Aeronautics and Space (*Lembaga Penerbangan dan Antariksa Nasional*/ LAPAN), both in 1963. Even the distinct spatiality of outer space had been incorporated since the making of the Agrarian Law in 1960 (Simarangkir, 2011). In 1980s, a team to study the possibility to draft of an Aerospace Bill was established and started some preliminary studies (Supancana, 2022, p. 26). But it was not until the early 2000s the whole idea and provisions of the current Space Activities Act were truly formulated.

2.2. The Law-Making Process Of The Space Activities Act

The process of Indonesian Space Activities Act law-making was lengthy, methodical, and consultative, spanning more than a decade from the initial academic draft to the enactment of the bill. Early steps in the 1980s involved interdepartmental working groups tasked with assessing the need for a national space law and the feasibility of ratifying relevant international treaties (Supancana, 2022, p. 26). Subsequently, some comparative studies were conducted on space legislation in countries such as the USA, UK, France, Russia, Australia, Sweden, and South Africa as well as model from the United Nations, aiming to identify best practices and tailor a legal model suited to Indonesia's unique context. More concrete steps towards the Space Activities Bill followed the success of the National Aerospace Congress in 1998 and 2003.

The academic draft of the Space Activities Act, firstly drafted in 2003 and finalised in 2012, served as a scientific and policy justification for legislation, incorporating philosophical, sociological, and juridical perspectives. This draft outlined the law's background, objectives, problem identification, theoretical and empirical studies, and harmonisation with existing national and international legal instruments. It also benefited from broad public consultations, ensuring the inclusion of diverse stakeholder interests, including government agencies, industry, academia, and civil society.

Deliberations in the Indonesian Parliament were extensive. The legislative process began with an initial executive-legislative meeting, followed by the compilation of an inventory of 571 issues, of which 137 were debated in detail by a Working Committee, 10 by a Formulating Team, and 101 by a Synchronisation Team (Supancana, 2015, pp. 104–105). Public hearings and expert input were integral to the process, and two new issues—commercialisation and export control—were added during parliamentary debates to address contemporary challenges in space activities.

Finally on 6 August 2013, the Law No. 21 of 2013 on Space Activities was enacted. The Act comprises 19 chapters and 105 articles, covering a wide range of topics: general provisions, governance and supervision of space activities, spaceports, safety and security, search and recovery, state responsibility and liability, registration, international cooperation, insurance, financing, community participation, sanctions, and more.

With such comprehensiveness, some argue that this Act is characterized as visionary, comprehensive, and outward-looking, balancing national interests with international obligations and aligning with international standards and best practices (Supancana, 2016, p. 229). Furthermore, the Act mandates further implementing regulations on issues such as licensing, registration, liability, commercialisation, and accident investigation, many of which require coordination among multiple government agencies and stakeholder.

2.3. The Contextual Fitness Of The Law-Making Process

Though its lawmaking process had started before 2011, the Space Act was formally promulgated through the law-making procedures under the Act Number 12 of 2011 (*the Legislation Act of 2011*) on Procedures for the Formation of Legislation before amended by the Act Number 13 of 2022. One of the main highlights of Legislation Act of 2011 was the adoption of the *Stufenbau Theory* introduced by Hans Kelsen. Article 7 and 8 of the Legislation Act of 2011 stipulates the types and hierarchy of legislations as follows:

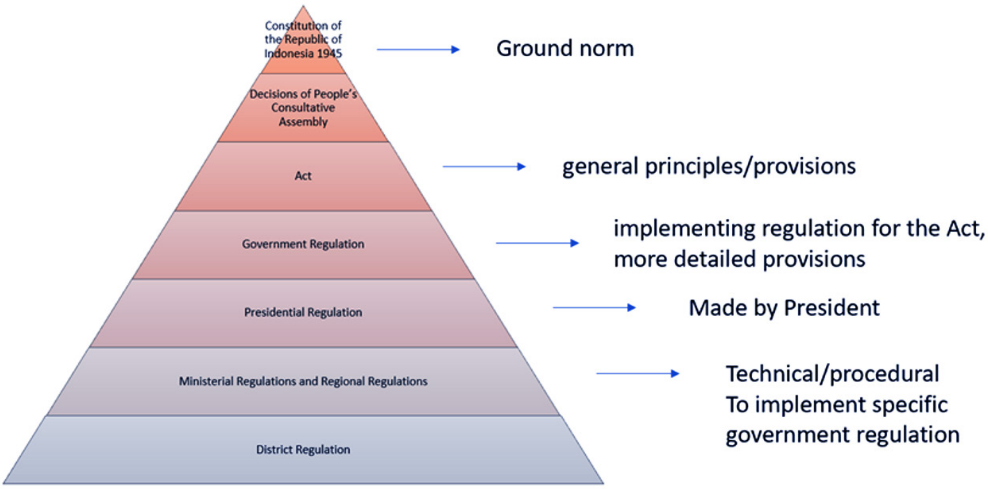


Figure ...: Hierarchy of Indonesian Regulation
Source: Self-processed

The Legislation Act of 2011 mandates that the making of Academic Paper which contains all the substantial contents and its relation to other legislations.[1] The paper at least should contain backgrounds, aims of drafting, targets, and scope of regulation. The 2012 version, believed as the last version, of the Academic Paper of the Space Activities Act reiterates Indonesia's intentions in drafting a national space law. It was drafted by a team under supervision of the National Institute of Aeronautics and Space (*Lembaga Penerbangan dan Antariksa Nasional*/ LAPAN), the then space agency. The departed Mardianis, one of the leading space law expert, was involved as among the leaders representing the government.

The main purpose of the Act is to provide legal basis for Indonesian space activities. The Act is also seen as a social engineering tool to tackle any barriers in achieving space technology mastery and national goals (LAPAN, 2012, p. 5). Space technology mastery becomes a prominent goal for Indonesia due to its raising awareness on the benefits that space technology can offer. As the largest archipelagic country, space application is essential in managing the provinces, connectivity, as well as natural resources in Indonesia.

Another driving force is risks coming from earth or outer space that may harm national security and safety. Situated in the "*ring of fire*", Indonesia frequently encounters various natural disasters such as earthquake, flood, volcanic eruption, etc. Space technology and its application is significant in mitigating and remediating such disasters. As for disasters coming from outer space, aside of natural causes like solar storm, threat from space debris falling into Indonesian jurisdiction has become a major issue. On a lesser scale, global development of space activities, as well as obligations set forth under international space treaties also serve as a driving force of drafting Indonesian Space Act.

Based on the hierarchy in the figure above, an Act is one of the higher legislations in Indonesia. However, the contents of an Act should be in line with the Indonesian Constitution of 1945 and other relevant regulations of equivalent level (in this case another acts). Accordingly, the goals and/or the forces mentioned above are forms of implementation of Article 31 paragraph 5 of the Indonesian Constitution of 1945 which

1 Article 9 of the Legislation Act of 2011.

stipulates that the advancement of science and technology should uphold national unity for the progress of civilisation and human welfare. Thus, national space law and space program should be directed towards national welfare.

The drafters of the Act also took careful consideration and harmonisation with other relevant national acts. Such analysis is available at Chapter 3 of the Academic Paper (LAPAN, 2012, chap. 3). This chapter aims to coordinate and implement legal principles in other regulations that are relevant to space activities, to justify different approach of a principle in space activities, and to fill legal gaps that might be crucial for space activities. Table ... below describes the relevant acts for space activities.

Topics	**Related Acts**
To coordinate and implement other legal principles to space activities	the Constitution of 1945; law on national ministry; law on international relations; law on international agreement; law on national system of research, development and application of science and technology; law on telecommunication; law on broadcasting; law on disaster management; law on capital investment; law on nuclear energy; law on spatial management; law on archives; law on public information disclosure; law on intellectual property rights; law on environment; law on local governance; and law on arbitration and alternative dispute resolution
To justify different approach	law on state territory (to exclude state sovereignty of outer space)
To fill legal gaps	law on aviation (to give delimitation of outer space); law on insurance (to introduce coverage on space launch insurance);

Table ...
Analysis on positive law

After the Space Act has enacted, Indonesia continuously aligns its space programs with the national development plan. This alignment is done through its national space master plan which are now under revision to harmonize with the new national development plan 2025-2045. Thus, the law-making process of Indonesian Space Act is inconformity with the laws and regulations.

3. COMMENTARY

3.1. The Space Activities Act

1. General Provisions

The Indonesian Space Act starts with general provisions for keywords relevant to the Act. The definitions are derived from international laws that Indonesia have ratified, States practices, and National Conception on Aerospace of 1998 (LAPAN, 2012, p. 33). The source of references of some general provisions are available in Table ... below.

	General Provisions	References
1	Outer space	National Conception on Aerospace of 1998
2	Airspace	National Conception on Aerospace of 1998
3	Space related activities (or space activities)	National Conception on Aerospace of 1998
4	Space objects	National Conception on Aerospace of 1998
5	Space vehicle	Description of "space object" under the Liability Convention of 1972 and the Registration Convention of 1975
6	Spaceport	States practices
7	Operators	Article VI of the Outer Space Treaty of 1967

Table ... general provisions under the Indonesian Space Act and the references

Overall, activity-wise, these definitions are still relevant with current space technology development. If anything, they provide sufficient legal certainty to Indonesian space actors or operators.

2. Space Activities

The second chapter of the Act is “Space Activities”. This chapter stipulates the types of space activities recognized in the Act, describes the business processes of each activity, and reiterates the basic principles enshrined in international space treaties. These all-encompassing activities are regulated under the Act due to the high significance of space applications for the nations’ livelihood and its geographical condition. Space activities as stipulated in Article 7 of the Act are including:

(i) space science;

Research on space science focus on space object observation, such as space weather; space environment; and astrophysics.[2] These activities are relevant to understand phenomenon in outer space, and to foresee any activities in space environment that may affect Indonesian space assets in orbits or on Earth. The research may utilize satellites, space stations, and observation facilities on Earth. In the latter case, Indonesia still lacks telescope and radar optics which is essential to monitor outer space. This field also includes research on astronomy and astrophysics (LAPAN, 2012, pp. 61–63).

The academic paper also includes atmospheric science as part of space science. Atmospheric research is essential for weather monitoring that is useful for agricultural, marine and fisheries, civil aviation, and others. For the latter, Indonesia highly needs a high-resolution terrestrial atmospheric monitoring system to complement data received from other meteorological satellites whether spatial-based or temporal-based. Research and innovation for this system is still rare and is outside of the scope of the Meteorology, Climatology and Geophysical Agency (BMKG). Hence, the terrestrial atmospheric monitoring system is the highlight under the Act (LAPAN, 2012, p. 51). As the main provider of information from those activities, the space agency may cooperate with other governmental agencies and other foreign legal entities.[3]

2 Article 11 of the Indonesian Space Act.

3 *Ibid*.

(ii) remote sensing;

As the biggest archipelagic country in the world, remote sensing plays a vital role for Indonesia. Remote sensing data derive from satellite operation, ground station, and satellite imagery. The Agency is the only one who can build and operate ground stations in Indonesia. Meanwhile, satellite imagery can be obtained from commercial data provider, including foreign providers. However, only the Agency that can procure satellite imagery, particularly for high resolution data. This policy has been applicable since 2012 through the enactment of President Instruction 6 of 2012. Such policy aims to avoid procurement overlap between government agencies, in hopes to minimize government spending on satellite imagery procurement.

Low and medium resolutions are free of charge for government institutions and non-commercial tariff for other stakeholders. High resolution image is subject to commercial charges. The Agency is obliged to store and distribute remote sensing data.

(iii) space technology mastery;

The agency should carry out space technology mastery for launch vehicle, aeronautics, and spin-off. In doing so, the Agency has to strive for technology transfer. The Agency may involve national companies in creating, manufacturing, and constructing infrastructure for the mastery and development of space technology. Foreign entities may be appointed as sub-contractors.

Article 26 (1) of the Act stipulates that the government guarantees the security of sensitive space technology imported into Indonesia. This provision reflects Indonesia's commitment for the non-proliferation of space technology. Government Regulation Number 7 of 2023 on Space Technology Mastery further regulates this matter.

To master launch vehicle or rocket technology and its transfer of technology, the government should actively participate in international and national cooperation. However, the Act prioritizes the former since most of the suitable stakeholders are from other countries. Article 29 of the Act further emphasizes that the government should push technology transfer through international cooperation. Establishment of rocket development program, rocket design and prototype, and rocket testing are the efforts to master rocket technology.

Some ways and means in developing and mastering satellite technology are through the construction and operation of ground stations for telemetry, tracking, and command (TT&C), and by launching satellites on its own capacity or through cooperation. The missions of the satellite in this context are ranging from telecommunications, earth observation, atmospheric and space observation, navigation and other purposes. Everyone can carry out satellite technology development with the guidance from the Agency.

Aeronautics technology development does not only cover aircraft technology but also aim towards supporting technology for the development of rocket technology. The Agency and other space actors may cooperate with other governmental institutions.

Space technology mastery is also aimed towards spin-off technology. In doing so, the Agency shall foster integration and distribution of national capability responsibilities in space activities, both private, academic, research and development institutions, and financial institutions and provide recommendations to the supporting space industry. The Government may become a captive market from national industry that conduct spin-off space technology as recommended by the Agency.

(iv) launching;

The locus of launching in this Act extends from sovereign territory and jurisdiction of Indonesia to national or foreign ships or aircraft located in the sovereign territory or jurisdiction of Indonesia. Indonesian space objects launched by foreigners are also included. Such extension is in-line with the Convention on International Liability for Damage Caused by Space Objects. Furthermore, to launch a space object, space actors must: (i) fulfil financial and insurance requirements; (ii) minimize potential accidents; (iii) not carrying any weapons into space; (iv) not disturbing national security; and

(v) consider and comply to the provisions on flight safety. For any launches in overseas, space actors should take note of agreements that guarantees Indonesia to be waived from liability for any damages.

(v) commercial space activities;

Article 37 of the Act provides basic legal basis for commercial space activities. It allows national and foreign legal entities to conduct commercial space activities in Indonesia. Government may also perform commercial space activities, as it is more about profit-making rather than actor-based (LAPAN, 2012, p. 126). The Act, however, excludes commercial activities for telecommunication as it has been regulated in a different regulation. Further implementation of commercial space activities should be regulated under Government Regulation which are yet to be established to this day.

3. Space Management

The government (in this case the space agency) should carry out space management. The Agency should coordinate any space activities performed by other governmental or legal entities. There also should be master plan for space activities that serve as national guidelines to manage space activities. The plan should include vision and mission, policy, strategy, and strategic roadmap for the next twenty-five years. Currently, the master plan is stipulated in the Presidential Regulation 45 of 2017 on the Space Activities Master Plan 2016-2040.

4. Management and Supervision

Government is obliged to manage and supervise space activities which include regulatory and controlling functions. The regulatory functions is done through the establishment of norms, standards, guidelines, and criteria of the space activities. The controlling functions include guidance, training, issuing license, certification, and provide technical assistance in the field of development and operation.

5. Spaceport

The Act mandates the Agency to build and operate spaceport in Indonesian territory. The Agency may cooperate with Indonesian legal entities to build the spaceport. The Agency will also determine the location of Spaceport, and the site should be determined as national strategic area. According to the space technology ladder by Danielle Woods (2012), launch capability is one of the advanced steps in space technology development. Spaceport is seen as a very high tech, high cost, and high-risk facility, thus government involvement is essential to provide certainty to private legal entities so they will be encouraged to participate.

Spaceport consists of three zones, namely danger zone one, two, and three. The latter zone should be marked as prohibited area. The spaceport will also consist of primary and supporting facilities. Environmental impact assessment should be done prior to constructing spaceport. The Act then further regulates that the Government or Local Government provides facilities in the development of Spaceport. Such facilities may be done in forms such as mentoring, coordinating, ease of permits, etc. Since Indonesia is yet to own a spaceport, the Act did a comparative study with foreign regulation, such as from the United States.

6. Security and Safety

Each space actor is responsible for the security of space activities. Security and safety are measured through the fulfilment of standards and procedures for all space activities. The Act further assigns duties and authorities of launch safety officer in ensuring the safety of spaceport and/or launching which are the general practices done by other States like Australia and the United States in regulating their respective space launch activities.

7. Mitigation of Fallen Space Objects, Search and Rescue of Astronauts

This chapter is an implementation article for the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space of 1968 which was ratified by Indonesia in 1999. The chapter starts by emphasizing that fallen space objects may consist of man-made and natural objects, whether detected or undetected.

Any fallen space objects found in Indonesian territory should be submitted to the Agency which has the authority to identify the object. The Agency will investigate the cause of accident and/or serious disaster in space activities. The Agency may establish a technical expert team.

When a foreign space vehicle encounters an accident in the territory and jurisdiction of Indonesia, the official representative of the launching State of the vehicle, State of the launching enterprise of the Space Vehicle, State of the designer, and State where the space vehicle is produced may be involved in the investigation if it is not contradicting with national interest. The chapter also protects fallen space objects from being destroyed, moved, and taken in whole or in part by unauthorized legal subjects. However, in case of any accidents, parts of space vehicle may be relocated upon approval by the competent authority.

On the search and rescue of astronauts, the Act guarantees that the Government is responsible in conducting such activities for any incidents happening in Indonesia. These Acts should be coordinated with the Agency for Search and Rescue.

8. Registration

Every Indonesian space object, irrespective of the launching location, should be registered to the Agency. Applicants shall submit information such as: (i) name of launching State; (ii) information on an appropriate designator of the space vehicle or its registration number; (iii) date, time, and location of launch; (iv) basic orbital parameters, including nodal period, inclination, apogee, and perigee; (v) general function of the space vehicle; (vi) name of other participating States (if any); and (vii) any other related and useful information for the purpose of registration. The Agency will process the registration submitted by giving a registration number and will inform to the United Nations of such registry. These informations and procedures are in line with the Registration Convention of 1975.

9. International Cooperation

Realizing its current limitations in space capabilities, Indonesia regards international cooperation as imperative in achieving its goal to master space technology. International cooperation can be done in the form of space technology mastery, technology utilisation, knowledge transfer, technology transfer and/or capacity building. In this case, the Government should actively seek opportunities for international cooperation, including through international organisation. The cooperation should be directed for transfer of technology and/or science as well as to push technological autonomy. Each cooperation should strive to create:

a. training and employment opportunities;

b. making connection between research institutes, whether government or private;

c. joint venture between government and private sector; and

d. research development, human resources, implementation programs, *etc*.

10. Liability and Compensation

This chapter reiterates the general principles of liability and compensation to third-party under the Outer Space Treaty 1967 and the Liability Convention 1972. The government of Indonesia is internationally liable for any damages to a third-party outside of its nationals. The burden of compensation, however, is transferred to the relevant space actors.

The Act also implements the liability principles based on the location of the damages, which are divided into absolute liability and fault-based liability. To avoid legal uncertainties, the Space Act stipulates that in case of transfer of ownership, liability of space actors is transferred at the time of enactment of the ownership transfer agreement. If the asset is owned by the government, the transfer should be done in accordance with the regulation on state/regional property.

The Act sets time limits for claim for damages, which are one year after the damage arise or a year after the victim is aware of any damages. It is further stipulated that only physical and direct damages that will be covered. This also includes cleaning-up fee. In case of joint liability, the relevant space actors may apportion their liability together. At last, for any damages bear by Indonesian nationals can be submitted through the Agency. The Government may facilitate the claim of compensation process as well.

11. Insurance, Security Interest and Facility

A third-party insurance is mandatory for space activities that may cause any damage to a third-party. There is no budget limitations or maximum probable losses set under this Act. The government is exempted from this obligation because the government already presumes State responsibility and will act accordingly.

Security interest in this chapter pays a tribute to the Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets, although Indonesia is yet to become a member to the Protocol. The Space Act opens the possibility to use non-governmental space assets as a security interest. However, such guarantee should respect the third-party liability as well as the civil and administrative sanctions provisions.

As for facility, the Act generally mentions the possibility of space actors to be facilitated in conducting any space activities. Facilities in this regard refers to incentives that are outside the scope of tax.

12. Environmental Preservation

This chapter only refers to Earth environment, not to space environment. In this case, every space actor should preserve environmental functions. The Act prohibits space actors from violating environmental damage quality standards and criteria standards. In other words, this chapter focuses on back contamination.

13. Funding

The Act opens potential sources of funding for space activities which extends from state's budget, grant, private companies and to international cooperation.

14. Citizens Participation

Indonesian citizens are open to participate in ensuring the safety and security of space activities or environment. Everyone from individuals, citizens organisations, professional organisations, private entities, or other citizens organisations are allowed to contribute. Such participations are:

a. supervising and maintaining orderliness;

b. providing inputs to refining the regulations, guidelines, technical standards;

c. reporting any non-compliances with procedures or in case of any incidents or accidents occurred;

d. to sue any space activities that disturbs the safety and security of the environment or public interests.

This chapter is one of a basic provision under Indonesian laws to ensure public transparency and to extent supervision from external perspective.

15. Civil and Administrative Sanctions

Civil sanctions in this context refers to compensations for any damages derived from space activities performed by space actors. Administrative sanctions will be given if any space actors breached provisions on submission of metadata and duplication of remote sensing data; obligations for space launch; violation in determining location, constructing, and planning of spaceport; absenting in doing environmental impact analysis; constructing a building or performing other activities in prohibited zones of a spaceport; violating the standards and procedures of safety; neglecting the directions from launch safety office; or refusing to give statements or technical assistance for investigations performed by the technical experts team. Such sanctions can be given in the form of:

a. written warning;

b. temporary suspension of either a part or the whole activities;

c. administrative fine;

d. demolition of buildings;

e. revocation of license;

f. dissolution of the corporation or legal entity;

g. prohibition to occupy a position; and/or

h. revocation of rights.

16. Criminal Provisions

This section describes any offences that will be given criminal penalties in a form of monetary sanctions or detention. If the offences are performed by corporation or legal entity, in addition to imprisonment and fine to the official, the sanction may be 3 (three) times bigger than those imposed to an individual. The offences are:

a. intentionally do not report the results of the research that is sensitive and may have a wide impact, including causing disruption of national security interests or the interests of the government;

b. intentionally conduct launching and do not comply with the requirements in Article 35 which resulting in damage of goods or persons, including causing loss of life;

c. omitting or modifying the position and take the parts of a space object fall in the territorial of sovereignty and jurisdiction of Indonesia;

d. violating the standards quality and criteria of living environment (Article 88), which caused the pollution or contamination of living environment, as well as causing loss of property or persons; and

e. intentionally violating prohibitions under Article 8 of the Act, which directly related to the prohibitions under the Outer Space Treaty 1967.

17. Other Provisions

This section divides the authority of telecommunication and radiofrequency to the Ministry of Communications and Digital Affairs. The space agency shall report any plans of using radiofrequencies to the Ministry for further coordination to the International Telecommunication Union. The Act also stipulates that the Ministry should prioritize the use of radiofrequency for space activities.

18. Transitional Provisions

The section obliges any ground stations operators other than the Space Agency to report any construction or operations of existing ground stations no later than one year after the enactment of the Act. This is because the Space Act mandates that the Space Agency is the sole entity to construct and operates the ground stations. At the time of drafting, the intention was to simplify some space operation and services to the Agency for efficiency purposes. However, this provision is under review since Indonesia has been focusing on space economy. So, it is possible to reopen ground stations operation to other space actors.

19. Closing Provisions

This chapter provides timeline of completion for the implementing regulations mandated under this Act. Government Regulations (10) and Presidential Regulations (1) should be enacted at max two years after the Space Act is enacted. As for the Agency's Regulations (2) should be enacted maximum a year after this Act is enacted. Then this chapter closes with the enforcement date of this Act, which is the 6th of August 2013.

However, due to technical and political complexities, and then aggravated by the institutional change of the space agency in late 2021 has made such timeline facing major delays. Out of 10 (ten) mandates, at present only two government regulations have been enacted. The first one was enacted in 2018 and the second one in 2023. It is important to note that in 2016 the previous space agency (LAPAN) decided to codify the ten government regulations into four.

As for other regulations, in 2017 Indonesia enacted one Presidential Regulations on Space Masterplan 2016-2040 which currently under revision. All in all, the Indonesian Space Act has provided sufficient legal certainty for current space activities. The provisions under the Act are also in-line with the four international space treaties that Indonesia has ratified. However, as the national space activities and interest escalated, Indonesian space laws should be refined.

3.2. The Indonesia's *Corpus Juris Spatialis* Beyond The Space Activities Act

As a State of law,[4] Indonesia combines three legal systems, namely European continental/ civil law (inherited during the Dutch colonisation), national customary law, and sharia laws. In civil law, all regulations are regulated in writing (Aditya, 2019), including regulations related to the position of statutory regulations.

The hierarchy of national legislations in Indonesia has experienced several minor shifts starting from MPRS Decision Number XX/MPRS/1966, MPR Decision Number III/MPR/2000, Law Number 10 of 2004 to Law Number 12 of 2011 on Procedures for the Formation of Legislation and its amendments. Adopting the *Stufenbau theory*, the Legislation Act stipulates the position of every form of legislation in Indonesia (see Table ... above). The concept of the regulatory ladder is that the regulations below must not conflict with the regulations above (*lex superior derogate legi inferiori*). This legal principle has been implemented in the law-making process of the Indonesian Space Activities Act (see part 2.2. of this Chapter).

In addition to hierarchical consideration, the Indonesia's *corpus juris spatialis* could not neglect the pre-existing and the subsequent laws covering other sectors. The harmonisation of space law with all cross-sectoral laws is a fundamental requirement for the effective governance of space activities in Indonesia. The Academic Paper on the Space Law Bill version 2012 recognised that the regulation of space activities cannot be separated from the broader legal system, as it intersects with various sectors such as telecommunications, broadcasting, disaster mitigation, environmental protection, intellectual property rights, national defence, and international cooperation (LAPAN, 2012, pp. 196–210).

The cross-sectoral requirement applies otherwise too in the making of laws or regulations in other sectors after the enactment of the Space Activities Act. One notable example is in the drafting of the National Air Space Management Bill (*Rancangan Undang-Undang tentang Pengelolaan Ruang Udara Nasional*/ RUU PRUN), especially regarding the

4 Article 1 paragraph (3) of the Constitution of the Republic of Indonesia 1945.

proposed 100–110 km vertical limit for the national airspace boundary. In the explanation part of the Space Activities Act, the outer space is considered started from 100-110km above sea level. Thus, the existing move to specify a 100–110 km boundary in the RUU PRUN reflects a harmonisation effort. This harmonisation is evidential in seeing Indonesian space law not merely consist of Space Activities Act and its derivatives, fostering consistency across Indonesian space-related laws and providing legal certainty for aerospace activities, defence, and commercial interests.

Another example is the Regulation of the Minister of Communication and Information Number 21 Year 2014 on the Use of Radio Frequency Spectrum for Satellite Services and Satellite Orbit. In addition to operationalise the Telecommunications Act (Law Number 36 Year 1999), this ministerial regulation also operationalises provisions in the Space Activities Act regarding the management and use of satellite orbits and radio frequency spectrum, which are critical for satellite operations. It mandates that satellite operators must provide insurance guarantees to cover liability for potential damages caused by their satellites to third parties, reflecting Article 104(1) of the Space Activities Act which requires insurance for all space activities conducted by private entities, whilst government space activities are exempted from this obligation.

In the context of ratifying international space law, international agreements or treaties that have been ratified will be regulated in a Law/Act. The ratification can include the full text of the agreement or add several relevant provisions. In this context, Indonesia has ratified four international space agreements, namely:

(i) Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies through the Law Number 6 of 2002;

(ii) Agreement on the Rescue of Astronauts, the Return of Astronauts and Return of Objects Launched into Outer Space through the Presidential Decree Number 4 of 1999;

(iii) Convention on International Liability for Damage Caused by Space Objects through the Presidential Decree Number 20 of 1996; and

(iv) Convention on Registration of Objects Launched into Outer Space through the Presidential Decree Number 5 of 1997.

It should be noted that Presidential Decree was still in effect at that time. Pre-2004, the Presidential Decree were still recognized as a regulation that was of a stipulation nature and was valid once completed (*einmahlig*) or that was of a regulatory nature and was valid continuously (*dauerhafting*) (Soeprapto, 2020). For a better understanding of the position of Presidential Decree, see Table ... below.

Tap MPRS NO. XX/MPRS/1996	Tap MPR No. III/MPR/2000
Constitutions of the Republic of Indonesia 1945	Constitutions of the Republic of Indonesia 1945
MPR Decisions (Tap MPR)	MPR Decisions (Tap MPR)
Act	Act
Government Regulations	Government Regulations
Presidential Decree	Presidential Decree
Implementing regulations: Ministerial Regulations and Ministerial Instructions	Local Government Regulations

Table ...: hierarchy of Indonesian legislation before 2004
Source: self-processed.

Although the Outer Space Treaty 1967 is the Magna Charta of space law, the other space treaties are still considered multilateral treaty and has regulatory nature. Thus, despite having different legal power, the ratifications through the Presidential Decree should not be viewed to diminish the legal force of three international space treaties.

Law Number 24 of 2000 on International Agreement contains further context on this matter. The Law differentiates ratification process through a Law/Act and a Presidential Decree. Article 10 of the International Agreement Law describes that ratification through Law/Act is available for regulations that are of topics like security, national boundaries, sovereignty and sovereign rights, human rights and environmental, formation of new legal rules, and foreign loan or grant. Meanwhile, for every international agreement that

5 Article 11 (1) of the International Agreement Law.

is outside the scope of Article 10 should be ratified through a Presidential Decree.[5] The Outer Space Treaty 1967 establishes a new international legal regime, whilst the other agreements are specified regulations which also contains some technical or procedural mechanisms. Hence, the Outer Space Treaty is ratified through an Act while the rest are through the Presidential Decree.

The Elucidation of Law Number 16 of 2002, Part I, point 2 explains that this ratification establishes the legal basis for the preparation of laws and regulations that will regulate various aspects of space activities in Indonesia. In other words, this ratification is a form of legal binding at the international level, and indicates the formation of separate national space regulations, that is Law Number 21 of 2013 on Space (the Space Act) which re-embodies the four international space treaties.

3.3. Harmonisation With Non-Legal Contexts

Whilst Space Activities Act never been amended, some updates can be reflected in its derivative regulations or its implementations. Such adaptations could be seen as a form of harmonisation with the ongoing technological development, geopolitical interests, as well as specific national needs. In fact, both domestics politics and global space industries and governance have changed significantly since 2013. Whilst some key norms and principles persist, the derivatives and its implementation reflected the changing context.

3.3.1. Technological Development

Indonesia has outlined a comprehensive masterplan called the *Indonesian Space Activities Masterplan* (*Rencana Induk Penyelenggaraan Keantariksaan*) 2016–2040, or the Indonesian space programme, through the Presidential Regulation Number 45 Year 2017, which aims to build indigenous capabilities in space sciences, satellite and rocket technologies, develop remote sensing capabilities, and ultimately achieve independent satellite launches from domestic soil. The government also aimed for the construction of a national satellite constellation and the development of a spaceport in Biak Island, Papua, to support launches to low Earth orbit (LEO). These steps are intended to reduce reliance on foreign technologies and foster a self-sustaining national space industry.

The masterplan was a continuation of Indonesia's achievement on the LAPAN A-series satellites that marked a significant milestone in the nation's pursuit of independent space technologies which eventually led ways to current the *Satelit Konstelasi Nusantara* project. The LAPAN A-series, which includes LAPAN-TUBSat/A1, LAPAN-A2, LAPAN-A3, and the planned LAPAN-A4 and LAPAN-A5, was realized through a combination of international collaboration and domestic capacity-building. Early models such as LAPAN-TUBSat were developed in partnership with Germany's DLR and Technical University of Berlin, while launches were facilitated by India's ISRO. This approach enabled Indonesia to build technical expertise in satellite engineering, mission design, and ground operations, gradually reducing reliance on foreign technology and setting the stage for more ambitious national projects, including current bid on *Satelit Konstelasi Nusantara* (Nusantara Constellation Satellite). The constellation would consist of a fleet of *equatorial low-earth-orbit* satellites capable for remote sensing and *Internet-of-Things* telecommunication.

3.3.2. Geostrategic Interests

One concept that is still widely accepted to portray the Indonesian geopolitical view is *Wawasan Nusantara* or the Indonesian Archipelagic Outlook. Rooted in the idea of Indonesia as a unified archipelagic state located in between two oceans and two continents, *Wawasan Nusantara* emphasizes the indivisibility of land, sea, airspace, and, increasingly, the space above as integral components of national integrity and security. As the space environment becomes more congested and technologically critical, Indonesia in several occasions revisited the earthly *Wawasan Nusantara* to engage with outer space as a national 'area of interests' (*wilayah kepentingan nasional*) as part of its National Aerospace Conception (Alfathimy, Ras and Nurlambang, 2023). The conception and its interpretations, however, evolve overtime as geopolitical priorities change.

Since 2013, Indonesia has actively engaged with global stakeholders in space sectors and others. However, one of the most important tilts was the rising importance of the Indo-Pacific region and how Indonesia navigated the competitive dynamics among the three regional space powers—India, Japan, and China—each seeking to expand their influence in the region through space diplomacy, technology partnerships, and regional initiatives.

Indonesia has engaged in bilateral and multilateral cooperation with all three, leveraging their strengths while maintaining strategic autonomy (Alfathimy *et al.*, 2022). With India, Indonesia has benefited from technology transfer, satellite launches, and ground station collaborations, notably through agreements that facilitate cost-effective satellite launches and the transfer of ground station facilities. Japan's engagement is multifaceted, involving not only JAXA but also a wide range of research and educational institutions, and is institutionalized through Indonesia's active participation in the Asia-Pacific Regional Space Agency Forum (APRSAF), which Japan leads. Cooperation with China has included earth observation, telemetry, and the signing of renewed agreements for peaceful space use, as well as Indonesia's observer status and gradual engagement with the China-led Asia-Pacific Space Cooperation Organization (APSCO).

Indonesia's strategy in this contested environment is characterized by pragmatic multilateralism and a focus on regional stability. Indonesia's approach has been to extract technological and developmental benefits from each partner, while avoiding overdependence on any single power and carefully managing the sensitivities of regional rivalries. The country positions itself as an aspiring "middle power," advocating for peaceful and equitable use of outer space, and supporting regional mechanisms that foster cooperation while resisting the militarization of space. Indonesia's participation in both Japan- and China-led regional initiatives (such as APRSAF and APSCO), as well as its bilateral ties with India, are complemented by its advocacy for ASEAN-centered approaches and the inclusion of space issues in broader Indo-Pacific dialogues. By maintaining a balance among the competing influences of India, Japan, and China, Indonesia seeks to secure technology transfer, capacity building, and access to space infrastructure, while contributing to the development of a stable, rules-based order in the Indo-Pacific outer space domain. This careful navigation reflects Indonesia's broader foreign policy principles: non-alignment, active engagement, and the pursuit of national development through international cooperation.

3.3.3. Specific National Needs

Ensuring national connectivity and security across Indonesia's dispersed islands is a fundamental need addressed by satellite technology. The country's unique geography, with many remote and isolated communities, makes terrestrial communication infrastructure always challenging and costly. Satellite communication systems are so far indispensable for bridging the digital divide, supporting telecommunication, education, and healthcare services in underserved regions. Additionally, space-based surveillance enhances maritime security by monitoring illegal activities such as *illegal, unreported, and unregulated (IUU) fishing* where vessels turn off tracking systems to evade detection.

In addition to connectivity issues, one of the most critical geographical needs addressed by space technologies in Indonesia is disaster monitoring and management. As an archipelagic nation situated on the *Pacific Ring of Fire*, Indonesia is highly vulnerable to earthquakes, tsunamis, volcanic eruptions, and landslides. Satellite-based Earth observation systems, including Synthetic Aperture Radar (SAR) and high-resolution imaging satellites, play a vital role in providing real-time data for hazard mapping, ground deformation monitoring, and rapid damage assessment following natural disasters. For example, after the 2018 Sulawesi earthquake and tsunami, satellite data enabled authorities to track ground movement with millimetre precision and evaluate land surface stability, thereby informing effective recovery and rebuilding strategies.

Another perpetual need is the management of Indonesia's vast natural resources and weather changes. With over 17,000 islands and extensive marine areas, Indonesia faces significant challenges in monitoring and managing its land and ocean resources. Space technologies, particularly remote sensing satellites, provide essential data for agriculture, fisheries, forestry, and environmental monitoring. These technologies support the identification of potential fishing grounds, monitor deforestation, and assist in sustainable land use planning. The Indonesian government highly rely upon its widespread ground stations to receive and process remote sensing data, ensuring comprehensive coverage of the country's territory and enabling informed decision-making for resource management.

4. CURRENT CHALLENGES

4.1. On The Space Agency

One of the biggest challenges faced by Indonesia is the amalgamation of LAPAN (former space agency) into BRIN (current space agency). The process began when the Law Number 11 of 2019 on National System of Science and Technology was enacted, followed by Law Number 6 of 2023 on Stipulation of Government Regulation *in Lieu* of Law Number 2 of 2022 concerning Job Creation into Law (Omnibus Law). These laws integrated all research activities including its entities to BRIN. On 5 May 2021, President Joko Widodo signed the Presidential Regulation Number 33 of 2021 which assigns BRIN as the sole national research agency. Consequently, four research agencies including LAPAN, and the Ministry of Research and Technology merged into BRIN. Presidential Regulation Number 78 of 2021 officially assigns LAPAN's role as the national space agency to BRIN. Despite the solemn intention to enhance research activities effectively and efficiently, some critics view BRIN covers a wide variety of sectors which may cause difficulties in fully exercising its roles. The establishment of a unit called the *Secretariat for Indonesian Space Agency* (INASA) inside BRIN only addressed the needs for keeping the engagement in space diplomacy and cooperation with international forums (Alfathimy and Nugraha, 2022).

Many critics have come from the perspective that BRIN is a research agency, thus it cannot perform the role of managing, implementing, and supervising of applied activities effectively (Pun/Rdn, 2025). Those commentaries also apply to space activities (Soehardjo, 2025). After the integration, units under LAPAN are spread into different deputies and research organisations. Dispersion of human resources and difference in functions automatically occurred. Functional change in the Research Organisations for Aeronautics and Space is the most striking one. The unit previously not only conducted research, but also obtain, analyse, and distribute remote sensing data to relevant stakeholders. Now, their work is limited to research.[6] Meanwhile, not everyone in the unit of data and

6 Article 3 of the Regulation of the National Research and Innovation Agency Number 5 of 2022 on Research Organisation for Aeronautics and Space, https://peraturan.bpk.go.id/Details/267841/peraturan-brin-no-5-tahun-2022 (accessed on 1 June 2025).

information are familiar with remote sensing data. Consequently, BRIN cannot provide high resolution data to other government agencies. This directly impacts to other governmental agencies activities and work targets as well, and indirectly to the fulfilment of the national long-term development plan.

Another challenge is the fact that other functions which handles procurement management and licensing are also handling other research sectors, ranging from social to technical sciences. This adds more workload to the units, which resulting in the extended period for researchers or other space units to coordinate or to perform their functions effectively. Thus, research and other applied science activities on outer space must compete with other sectors, making it difficult to implement the functions as mandated by the Space Act.

4.2. Challenges In Harmonizing The Space Act With The Current Space Policy Directives

Another challenge is drafting the implementing regulations of the Act itself. In 2016, LAPAN decided to categorize the ten implementing regulations into four, which are (Ardes, Leta and Damayanti, 2016):

- The Government Regulation Number 11 of 2018 on the Procedures of Remote Sensing Activities;
- The Government Regulation on the Procedures of Mastery, Spin-off, and Protection of Space Technology, which has been enacted through the Government Regulation Number 7 of 2023 on Space Technology Mastery;
- The Government Regulation on the Procedures of Constructing and Operating a Spaceport, which later renamed to “Management of Spaceport”; and
- The Government Regulation on the Procedures of Commercial Space Activities.

The Government Regulation on spaceport management is expected to be enacted in 2025. As of the writing of this chapter, it is currently in waiting for signature of approval from related governmental agencies. Aside of substantive complexities, the integration to BRIN also contributed to the delay in drafting such implementing regulations.

Institutional changes have led to major shifts in space program, policy, and direction. The impact is not negative, but it has created different substantial approaches between the Space Act and the rest of implementing regulations. LAPAN previously followed the top-bottom approach that highlights the Agency's crucial role in mastering space technology. In the past, Indonesia's space application awareness was not as high as of current. So, the Agency was at the forefront of space technology mastery with the hope it will help establishing a secure playing field for industries or other legal entities to participate. Now, the policy direction is to foster national economy through space technology applications, particularly by promoting space economy to achieve national long-term development plan 2045.[7] In this regard, both the Agency and the industry can participate in space technology mastery in parallel. The Agency is also strictly limited to focus on research and innovation by hoping to delegate the space operations and commercial activities to the industry. Although the current approach is common in other countries, regulatory conflict arises, particularly because after the integration no necessary changes is made to the law or to the Agency. The Space Act not only highlights research role to the Agency, but also organisation, management, operation, and supervision role for national space activities. By focusing its role and the units to research, BRIN automatically limits its role given by the Space Act.

Bottom-up approach works best when support from the top level also exist (Crescenzi and Rodríguez-Pose, 2011). It can be in a form of policy necessary to establish a healthy environment for the industry. Although the enactment of Omnibus Law guarantees ease

7 Annex to the Law Number 59 of 2024 on National Long-Term Development Plan 2025-2045 https://peraturan.bpk.go.id/Details/299728/uu-no-59-tahun-2024 (accessed on 27 May 2025).

of doing business and investment to local and foreign entities (Public Relations of the Cabinet Secretariat of the Republic of Indonesia, 2019), the realisation cannot be promised. First, the Omnibus Law cannot guarantee that space manufacturing companies entering Indonesia can provide the key technology needed by Indonesia. Most of the international cooperation carried out so far is still full of supporting technology that positions Indonesia as a user, not a creator of technology. Second, space technologies are sensitive (dual-use in nature). There needs to be regulations related to comprehensive and accountable export control. These regulations do not yet exist and are still not codified, still regulated per sector. Therefore, there is still a lot that needs to be fixed to enforce bottom-up approach.

Another impact to the law is the absence of creating a specific implementing regulation on commercial space activities as mandated by the Act and as intended by LAPAN. The commercial aspects of space activities indeed can be generalized and may be similar in nature. The Omnibus Law is another legal basis for commercial activities. However, legal aspects of commercial space activities are not limited to investment and business licenses, it may include reimbursement for catastrophic loss and insurance (von der Dunk, 2018). The Omnibus Law and the Space Act may set the groundwork, but those are not sufficient to provide legal certainty for commercial space activities and need to be further regulated.

4.3. Challenges In Achieving The *Master Plan On Outer Space Activities* (The Indonesian Space Programme)

An internal evaluation of Indonesia's Space Activities Master Plan (*Rencana Induk Penyelenggaraan Keantariksaan, or Renduk Keantariksaan*) for 2016–2020 done by BRIN found that several key targets were not achieved. The main reasons for this failure include a mismatch between the initial assumptions and available resources, changes in political and budgetary priorities, and the lack of a supportive national space ecosystem. For example, while the plan called for integrated development in areas such as space science, remote sensing, technology mastery, launch infrastructure, and commercial activities, progress in many of these areas fell short of expectations.

In the area of space science, targets such as the operationalisation of the National Observatory and the integration of decision support systems for space and atmospheric science were not fully realized. Construction delays, incomplete supporting infrastructure, and insufficient coordination hampered the observatory's progress. Similarly, the planned integration of data systems and early warning models for extreme atmospheric events was only partially implemented, limiting their usefulness for national disaster mitigation efforts.

Technological development goals, particularly in rocket and satellite technology, also faced setbacks. The planned development of advanced multi-stage rockets and the launch of new satellites were delayed due to technical, financial, and logistical constraints. The COVID-19 pandemic further disrupted satellite launch schedules, while limited human resources and outdated facilities slowed progress in both aeronautical and space technology. As a result, the national capacity for independent satellite launches and advanced aerospace manufacturing remains below target.

The failure to achieve these targets has broader implications for Indonesia's space programme. The inability to establish necessary infrastructure and ecosystem, such as the national spaceport and the commercialisation of space-based services, has delayed the growth of a domestic space industry. Additionally, the lack of integration between research, industry, and government stakeholders has hindered the translation of research outputs into practical and commercial applications. To address these issues, the evaluation recommends revising targets, strengthening human resources, improving inter-agency coordination, and developing clearer funding and commercialisation strategies for the next phase of the Master Plan.

Some private entities who shared similar space self-sufficiency aspirations were aware of the stagnant progress of the Indonesian space programme and decided to take a more proactive move. They took initiative to establish an Indonesian Space Association (Asosiasi Antariksa Indonesia / AAI / ARIKSA) on 21 January 2025 in Jakarta (VOI, 2025). This entity aims to consolidate Indonesia's diverse space actors and foster a robust national space ecosystem in close collaboration with public institutions, notably BRIN as de facto space agency.

5. NEXT STEPS

In the foreseeable future, Indonesian space lawmaking would anticipate the urgent needs to finalise and enact the Government Regulation regarding spaceport as well as the revision of the Master Plan 2016-2040. The former is in its finale stage and eyeing an accelerated effort to build an operational spaceport both for domestic and foreign uses, whilst the latter is intended to give updated and more realistic targets of the Indonesian space programme. Following these two, the increasing initiatives from private sectors through ARIKSA to have an Indonesian space policy with a vision called *Space Policy 2045* to contextualise space aspirations, including the would-be-revised Master Plan, with the centenary commemoration of Indonesian independence. The space policy might be promulgated in a form of legal instrument like Presidential Regulation which could also recognise ARIKSA as a representative of space industry in Indonesia. These instruments eventually would give more incentives in the making of another derivative mandated by the Space Activities Act, namely the Government Regulation on commercial space activities.

REFERENCES

Abdurrasyid, H.P. (2006) 'Kebutuhan Perangkat Hukum Nasional dan International dalam Rangka Penataan Dirgantara Nasional', *Indonesian Journal of International Law*, 3(2), pp. 159–173. Available at: https://heinonline.org/HOL/P?h=hein.journals/indjil3&i=171 (Accessed: 9 November 2022).

Aditya, Z.F. (2019) 'ROMANTISME SISTEM HUKUM DI INDONESIA : KAJIAN ATAS KONSTRIBUSI HUKUM ADAT DAN HUKUM ISLAM TERHADAP PEMBANGUNAN HUKUM DI INDONESIA', *Jurnal Rechts Vinding: Media Pembinaan Hukum Nasional*, 8(1), pp. 37–54. Available at: https://doi.org/10.33331/rechtsvinding.v8i1.305.

Adrianti Puji Sunaryati *et al.* (2004) *Laporan Kongres Kedirgantaraan Nasional Kedua, Jakarta, Tanggal 22-24 Desember 2003*. Edited by Hatta Rajasa *et al.* Jakarta: Dewan Penerbangan dan Antariksa Nasional Republik Indonesia.

Alfathimy, D. and Ardes, R. (2025) 'Persistent Collaboration: Between International and Indonesian National Law on the Utilization of Earth Orbit', *Indonesian Journal of International Law*, 22(3). Available at: https://doi.org/10.17304/ijil.vol22.3.1666.

Alfathimy, D.H.A. *et al.* (2022) 'The Indo-Pacific and Space Diplomacy: Opportunities and Challenges', *Astropolitics*, 20(1), pp. 43–63. Available at: https://doi.org/10.1080/14777622.2022.2081076.

Alfathimy, D.H.A. and Nugraha, A.I. (2022) 'What's next for the Indonesian space program?', *The Jakarta Post*, 13 August. Available at: https://www.thejakartapost.com/opinion/2022/08/12/whats-next-for-the-indonesian-space-program.html (Accessed: 9 November 2022).

Alfathimy, D.H.A., Ras, A.R. and Nurlambang, T. (2023) '*Wawasan Nusantara* and space resilience in Indonesia', *AIP Conference Proceedings*, 2941(1), p. 040027. Available at: https://doi.org/10.1063/5.0181401.

Ardes, R.P., Leta, N.M. and Damayanti, C. (2016) 'Pertimbangan Yuridis dan Konsekuensi Pengelompokan Rancangan Peraturan Pemerintah (RPP) sebagai Amanat Undang-Undang RI Nomor 21 Tahun 2013 tentang Keantariksaan', in H. Nasution *et al.* (eds) *Kajian Kebijakan Penerbangan dan Antariksa*. Bogor: In Media, pp. 86–109. Available at: https://doi.org/10.30536/9786026469120.5.

Crescenzi, R. and Rodríguez-Pose, A. (2011) 'Commentary: Reconciling top-down and bottom-up development policies', *Environment and Planning A: Economy and Space*, 43(4), pp. 773–780. Available at: https://doi.org/10.1068/a43492.

von der Dunk, F.G. (2018) 'Billion-dollar questions? Legal aspects of commercial space activities', *Uniform Law Review*, 23(2), pp. 418–446. Available at: https://doi.org/10.1093/ulr/uny022.

LAPAN (2012) *Naskah Akademik Rancangan Undang-Undang tentang Keantariksaan*. Naskah Akademik. Jakarta: *Lembaga Penerbangan dan Antariksa Nasional* - LAPAN (Indonesian National Aeronautics and Space Institute). Available at: https://mardianisdjamaan.blogspot.com/.

Public Relations of the Cabinet Secretariat of the Republic of Indonesia (2019) 'Permudah Izin Usaha, Pemerintah Siapkan "Omnibus Law"', *Sekretariat Kabinet Republik Indonesia*, 25 September. Available at: https://setkab.go.id/permudah-izin-usaha-pemerintah-siapkan-omnibus-law/ (Accessed: 4 July 2025).

Pun/Rdn (2025) 'Syarif Fasha: BRIN Terlalu Superpower, Perlu Revisi UU Guna Fokus terhadap Riset', *EMedia DPR RI*, 19 May. Available at: https://emedia.dpr.go.id/2025/05/19/syarif-fasha-brin-terlalu-superpower-perlu-revisi-uu-guna-fokus-terhadap-riset/ (Accessed: 4 July 2025).

Simarangkir, E.I. (2011) 'Analisis Status Yuridis Ruang Angkasa dari Perspektif Hukum Agraria Indonesia dan Space Treaty 1967', *Risalah Hukum*, 7(2), pp. 1–21. Available at: https://e-journal.fh.unmul.ac.id/index.php/risalah/article/view/178 (Accessed: 9 November 2022).

Sitindjak, A. *et al*. (1998) *Kongres Kedirgantaraan Nasional Pertama. Jakarta, Tanggal 3 & 4 Februari 1998. Laporan Umum. Buku I*. Jakarta: Dewan Penerbangan dan Antariksa Nasional Republik Indonesia.

Soehardjo, J. (2025) 'LAPAN Dilebur Masuk BRIN, Mengapa Jadi Kerugian Indonesia?', *RMOLJATENG*, 7 March. Available at: https://www.rmoljawatengah.id/lapan-dilebur-masuk-brin-mengapa-jadi-kerugian-indonesia (Accessed: 4 July 2025).

Soeprapto, M.F.I. (2020) *Ilmu Perundang-undangan 1: Jenis, Fungsi, dan Materi Muatan*. PT Kanisius.

Supancana, I.B.R. (2015) 'How the Progressive Development of Outer Space Law Affects the Formulation of National Space Legislation: The Experience of Indonesia', *Air and Space Law*, 40(1). Available at: https://kluwerlawonline.com/api/Product/CitationPDFURL?file=Journals\AILA\AILA2015009.pdf (Accessed: 8 November 2022).

Supancana, I.B.R. (2016) 'The Legal Challenges of Implementing National Space Legislation - The Case of Indonesia', *Zeitschrift fur Luft- und Weltraumrecht - German Journal of Air and Space Law*, 65(2), pp. 226–238. Available at: https://heinonline.org/HOL/P?h=hein.journals/zlw65&i=234 (Accessed: 9 November 2022).

Supancana, I.B.R. (2022) 'Indonesian Space Policy, Regulations and Programs: Past Achievements and Future Prospects', in Q. Verspieren *et al*. (eds) *ASEAN Space Programs: History and Way Forward*. Singapore: Springer Singapore, pp. 19–42. Available at: https://doi.org/10.1007/978-981-16-7326-9_2.

VOI (2025) *Indonesia Officially Has An Space Association To Encourage The Administrative Industry, VOI - Waktunya Merevolusi Pemberitaan*. Available at: https://voi.id/en/technology/454427 (Accessed: 4 July 2025).

Wood, D. and Weigel, A. (2012) 'Charting the evolution of satellite programs in developing countries – The Space Technology Ladder', *Space Policy*, 28(1), pp. 15–24. Available at: https://doi.org/10.1016/j.spacepol.2011.11.001.

SINGAPORE

Table of Contents

About the Author

Ryeson Tan

Ryeson Tan graduated from the National University of Singapore with a Bachelor of Laws in 2025, where he served as President of the National University of Singapore chapter of Students for the Exploration and Development of Space (SEDS). He is currently a member of the Space Generation Advisory Council's (SGAC) Space Law & Policy Project Group, contributing to research on liability frameworks for emerging space activities, including in-orbit manufacturing and artificial intelligence applications in space. He also holds membership in the International Law Association (Singapore Branch).

ryesontanwenjun@gmail.com
+6597579653

Abstract

Singapore's burgeoning space sector currently operates within a fragmented regulatory framework, lacking dedicated comprehensive legislation. The existing governance structure encompasses multiple ministries and sector-specific regulations, which are primarily coordinated by the Office for Space Technology and Industry (OSTIn). Although this arrangement enables adaptability to rapid technological developments, it presents significant compliance and commercial challenges, particularly around clarity in liability and insurance requirements, regulatory fragmentation, and enforcement mechanisms. This fragmented structure potentially undermines investor confidence and complicates compliance for satellite operators, launch providers, and startups in the space-related technology sector.

This paper critically examines Singapore's existing space governance, detailing the intricate web of statutes, subsidiary legislation, licensing conditions, international treaty obligations, and OSTIn's non-binding guidelines. It identifies specific regulatory gaps, including OSTIn's limited enforcement capabilities, unclear frameworks for liability allocation, and insufficiently defined insurance obligations. Recognising these constraints, the paper proposes a structured legislative roadmap to enhance regulatory coherence and market predictability.

The primary recommendation is the enactment of a comprehensive Space Activities Act, designed to consolidate regulatory authority, establish clear liability principles, and formalise insurance requirements. Additionally, transforming OSTIn into an independent statutory space agency equipped with robust enforcement powers and dedicated resources is proposed to enhance institutional authority and sectoral oversight. Lastly, the paper advocates for establishing a phased ASEAN Regional Space Agency to leverage regional strengths, harmonise regulatory standards across Southeast Asia, and strengthen the region's global competitiveness.

Collectively, these strategic recommendations aim to elevate Singapore's regulatory effectiveness, promote investment certainty, and position the nation as a leading hub within the competitive global space industry.

Any proposals presented in the paper are the writer's own views.

Keywords: Singapore, space regulation, OSTIn, Statutory framework, regulatory clarity, Space Agency

1. INTRODUCTION

Singapore's space industry has flourished without dedicated space legislation, operating instead through a complex regulatory ecosystem coordinated by the Office for Space Technology and Industry (OSTIn) and administered across multiple ministries. This fragmented approach, while enabling rapid adaptation to emerging technologies, creates compliance challenges for space actors seeking regulatory clarity.

This paper addresses this regulatory gap through a comprehensive two-part analysis. Part I maps Singapore's existing legal framework, distilling the web of statutes, subsidiary legislation, licensing conditions, and non-binding guidelines that govern space activities. This analysis provides satellite owners, launch-service providers, and space-application startups with a practical compliance roadmap spanning the entire operational lifecycle—from initial authorisation to end-of-life disposal.

Part II builds on this foundation by proposing three strategic enhancements designed to elevate Singapore's space governance framework: a comprehensive Space Activities Act to consolidate regulatory authority, transformation of OSTIn into a full-fledged statutory Space Agency with enforcement powers, and establishment of an ASEAN-centred Regional Space Agency to leverage Singapore's strategic position for regional leadership.

Together, these analyses and proposals offer both immediate practical guidance for current space actors and a strategic vision for Singapore's evolution into a premier global space jurisdiction.

1.1. Development Of Singapore's Space Industry And Legal Framework

1.1.1. Development Of Singapore's Space Industry

Singapore's space industry has evolved from nascent academic research in the 1990s to a thriving commercial ecosystem that exemplifies the nation's characteristic approach to emerging technologies. This transformation reflects Singapore's broader regulatory philosophy of adopting flexible, adaptive frameworks that allow innovation to flourish while maintaining appropriate oversight (OSTIn, 2025).

The journey began with Singapore's first satellite launch in 1998, marking the transition from purely academic pursuits to practical space applications (OSTIn, 2025). Early developments were driven by local universities building microsatellites and defence agencies spearheading space-related research and development. This foundation established the technical expertise that would later support commercial ventures (EDB, 2022).

The 2010s witnessed the emergence of private sector players, including ST Engineering's development of TeLEOS-1, satellite communications firms, and space component vendors (ST Electronics, 2015). This commercial expansion accelerated significantly by 2023, when nine satellites were launched, including TeLEOS-2, which features Singapore-built polarimetric synthetic aperture radar technology (OSTIn, 2023). This rapid maturation demonstrates how Singapore's supportive regulatory environment has enabled the space sector to grow from university laboratories into a diverse commercial industry.

Government support has been instrumental in this growth, most notably through the S$150 million Space Technology Development Programme launched in 2022, complemented by strategic international partnerships that leverage Singapore's position as a regional hub (EDB, 2025).

1.1.2. Key Stakeholders And Forums

Understanding Singapore's regulatory landscape for space activities requires examining the key players in the local space ecosystem, as the absence of omnibus space legislation means that regulatory authority and industry development responsibilities are distributed across multiple entities.

1.1.2.1. Office For Space Technology And Industry ("OSTIn")

The facilitation of space activities is led by the OSTIn. Established in 2013 under the Singapore Economic Development Board ("EDB") – a statutory board under the Ministry of Trade and Industry ("MTI") responsible for crafting and implementing strategies to enhance the country's position as a global hub for business, investment, and talent - OSTIn's role was broadly to assist local and global business parties as well as develop local research capabilities (OSTIn, n.d.).

Following a strategic reorganisation in 2020, OSTIn became an autonomous office under MTI with an expanded mandate encompassing five key areas (OSTIn, 2025):

a. Nurturing the development of local space technology capabilities through investments in R&D;
b. Growing a globally competitive local space industry;
c. Developing policies and regulations to support Singapore's space activities;
d. Expanding bilateral and multilateral partnerships, and contributing to strengthening the global governance regime for space activities; and
e. Supporting the development of talent for Singapore's space sector and future workforce.

Notably, OSTIn operates without standalone legislative mandate or direct regulatory power, instead coordinating with relevant ministries for licensing and enforcement (OSTIn, 2025). This structure reflects Singapore's soft law approach, where coordination and consultation often precede formal regulation, allowing the regulatory framework to evolve in tandem with industry needs.

1.1.2.2. Info-Communications Media Development Authority ("IMDA")

IMDA plays a critical regulatory role in Singapore's space ecosystem, particularly for satellite communications and orbital slot coordination. As Singapore's converged regulator for the info-communications and media sectors, IMDA holds statutory authority under the Telecommunications Act 1999 to license and regulate spectrum allocation in accordance with the International Telecommunication Union ("ITU") treaties and frameworks (IMDA, 2024). This mandate is fundamental to space activities, as satellites require specific radio frequency spectrum allocations for communication with ground stations, data transmission, and operational control.

Unlike OSTIn's coordinating role, IMDA exercises direct regulatory authority, making it an essential gatekeeper for satellite operators seeking to establish services in or through Singapore.

Part I

2. NAVIGATING SINGAPORE'S REGULATORY MAZE

Singapore's regulatory framework for space activities reflects its broader legal approach as a dualist common law jurisdiction, wherein international treaty obligations gain domestic legal effect only through explicit legislative enactment (Lewis, *et al.*, 2016). As such, while Singapore aligns itself with key international standards and treaties, these commitments must be translated into specific national regulations to be legally enforceable within the country.

In the absence of an omnibus national space legislation, Singapore's governance structure relies on a blend of established sector-specific laws, licensing regimes, and policy guidelines. This fragmented arrangement provides flexibility and responsiveness to industry developments but also presents regulatory complexity, as space operators must navigate multiple frameworks and coordinating bodies to achieve compliance.

2.1. International Treaties And Obligations

Singapore's space governance framework is fundamentally anchored in international law, reflecting the nation's commitment to multilateral cooperation and rules-based governance in outer space. As a responsible spacefaring nation, Singapore has strategically aligned itself with key treaties and frameworks that establish the foundational principles for peaceful and sustainable space activities (Gan, 2025).

2.1.1. International Treaties Via The Auspices Of The UN

Singapore is party to four of the five major UN space treaties, as detailed in Table 1:

Treaty	Status	Date of Action
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space ("*Outer Space Treaty*") (1967)	Acceded	10 Sep 1976
Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects ("*Rescue Agreement*") (1968)	Ratified	27 Nov 1973
Convention on International Liability for Damage Caused by Space Objects ("*Liability Convention*") (1972)	Ratified	15 Sep 1976
Convention on Registration of Objects Launched into Outer Space ("*Registration Convention*") (1976)	Signed but not ratified	31 Aug 1976

Table 1: International Space Treaties to which Singapore is a Party

Beyond these core treaties, Singapore has committed to adherence to international soft law instruments, including UNOOSA's Space Debris Mitigation Guidelines and Long-Term Sustainability Guidelines. This commitment demonstrates Singapore's characteristic approach of embracing both binding and non-binding international standards to ensure comprehensive governance coverage.

Singapore's treaty participation reflects strategic policy choices that align with its commercial space ambitions. Notably, Singapore is not party to the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (1979), commonly known as the Moon Agreement. This position aligns with most major spacefaring nations, which have avoided the Moon Agreement due to its restrictive provisions on resource extraction and commercial activities.

Singapore has also ratified the ITU Constitution, Convention, and related agreements, establishing the legal foundation for IMDA's regulatory authority over satellite communications and spectrum coordination (ITU, n.d.). These telecommunications treaties are particularly crucial for space operations, as they govern the allocation and coordination of radio frequencies essential for satellite communications, telemetry, and control systems.

2.1.2. Artemis Accords

Singapore's accession to the Artemis Accords on March 28, 2022, exemplifies its strategic approach to space governance, striking a balance between international cooperation and commercial flexibility. The Artemis Accords represent a contemporary, pragmatic framework for space exploration and resource utilisation that aligns with Singapore's ambitions to become a competitive space hub while maintaining adherence to international law principles.

This choice reflects Singapore's broader preference for adaptable governance mechanisms that can respond to rapid technological advancement. Traditional treaty frameworks, while providing essential foundational principles, often lack the agility needed to address emerging challenges such as commercial lunar activities, space resource extraction, and new forms of space debris mitigation. The Artemis Accords' non-binding nature allows for more dynamic norm-setting and consensus-building among participating nations.

Singapore's selective approach to treaty ratification further demonstrates this strategic flexibility. While Singapore has ratified three core UN space treaties, it has only signed, but not ratified, the Registration Convention. This position allows Singapore to align with the Convention's transparency principles through OSTIn's proactive maintenance of a national registry while retaining regulatory flexibility for future domestic framework development.

The emphasis on "soft law" instruments, such as the Artemis Accords and UNOOSA guidelines, reflects Singapore's recognition that effective space governance increasingly relies on flexible, consensus-based approaches rather than rigid treaty obligations. This methodology enables Singapore to contribute to the evolution of international norms through state practice and dialogue, potentially influencing future binding instruments while maintaining the adaptability essential for a rapidly developing commercial space sector.

By embracing both binding treaties that establish fundamental principles and non-binding accords that address emerging issues, Singapore positions itself as a responsible international actor while preserving the regulatory agility necessary to support its domestic space industry ambitions.

2.2. OSTIn Guidelines For Singapore-Related Space Activities

In May 2024, the Office for Space Technology and Industry (OSTIn) published comprehensive guidelines that establish Singapore's framework for space-related activities conducted by its nationals and entities. These guidelines function as guidance documents rather than binding regulations, with OSTIn explicitly stating that "applicable entities should comply with these Guidelines" rather than imposing mandatory requirements.

The guidelines represent Singapore's first systematic approach to providing structure for space activity oversight, addressing the practical challenges of maintaining awareness of space operations conducted by Singaporean entities despite the absence of domestic launch facilities. While the guidelines establish recommendations and requests rather than legal obligations, they create an essential framework for Singapore's compliance with international space law obligations.

2.2.1. Jurisdictional Scope And Applicable Entities

The OSTIn Guidelines for Singapore-related Space establish comprehensive coverage through a broad definition of applicable entities, capturing any entity that has a nexus in Singapore. The framework applies to:

a. Any entity registered or incorporated in Singapore that develops, launches, owns, and/or operates a space object;

b. any entity that has received full or partial funding from the Singapore Government for such activities; and

c. any entity intending to launch a space object from Singapore's territory.

Interestingly, the framework covers any entity aiming to launch a space object from Singapore's territory. Although Singapore currently lacks launch facilities, this provision shows strategic foresight that accounts for potential future infrastructure developments or temporary launch arrangements within Singapore's boundaries.

2.2.2. Space Object Registration Framework

The guidelines establish a registration system for space objects associated with applicable entities, though registration is presented as a request rather than a legal requirement.

The guidelines at paragraphs 2.1 and 2.2 ask parties to submit a Registration Form at least 30 days before launch and to notify the registry of any significant changes to a space object's status either 30 days in advance or, if not feasible, within 30 days after the change.

The guidelines at paragraph 2.2 specify various categories of significant changes, including alterations to planned orbital parameters before launch, commencement of planned re-entry, changes in supervision or function, loss of communication capability, break-up of the space object, and deliberate orbital transfers.

2.2.3. Clarification On International Responsibility

The guidelines also provide important clarification regarding the relationship between registration and international responsibility. OSTIn explicitly states that "the inclusion of a space object on the national registry does not necessarily mean that Singapore is its launching State or State of registry, or that Singapore bears international responsibility for the activities of or related to such space object" (OSTIn, 2024).

This clarification reflects a sophisticated understanding of international space law principles, particularly in cases where multiple states may have jurisdictional interests in a single space mission. The distinction between registration for administrative purposes and assignment of international legal responsibility demonstrates Singapore's careful approach to managing its international obligations while providing oversight of space activities conducted by its nationals.

2.2.4. Safety And Sustainability Guidance

OSTIn also provides guidance on space safety and sustainability, requiring applicable entities to conduct space activities in accordance with international best practices and standards. The guidelines at paragraph 3.2 state that "space activities are to be conducted in a safe and responsible manner during all phases of a space mission, including launch, operation and end-of-life disposal" and that "all applicable entities should ensure that their space activities are aligned to the relevant international requirements, guidelines, standards and best practices" (OSTIn, 2024).

Specifically, the guidelines highlight the following:

a. ISO 14620 – Space Systems – Safety Requirements

d. ISO 24113 – Space Systems – Space Debris Mitigation Requirements

e. Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space;

f. Space Debris Mitigation Guidelines of the Inter-Agency Space Debris Coordination Committee; and

g. Guidelines for the Long-term Sustainability of Outer Space Activities of COPUOS.

These guidelines are ultimately positioned as a "soft law" instrument, providing recommendations rather than legally binding mandates in line with their international obligations. They serve as a crucial step towards ratification of the Registration Convention, while maintaining the flexibility to adapt to evolving technology and best practices. That said, failure to adhere to these guidelines may result in difficulty in obtaining the requisite licenses from other ministries.

2.3. Launch licensing And Authorisation Framework

2.3.1. Current Regulatory Landscape And Geographical Constraints

Singapore's geographical limitations as an island nation preclude the establishment of traditional launch facilities within its borders, leading to the practical reality of relying on foreign launch services to conduct space-related activities. Consequently, there has been no need for Singapore to enact any specific legislation or regulations governing launch operations by local entities beyond the guidelines explored in earlier sections.

2.3.2. International Legal Obligations Under The Outer Space Treaty

Notwithstanding the absence of launch facilities, activities, legislations, and regulations, Singapore remains bound by its international legal obligations under the Outer Space Treaty, to which it is a party. Article VI of the Outer Space Treaty deals with international responsibility, stating that "the activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorisation and continuing supervision by the appropriate State Party to the Treaty". The Liability Convention also accords liability to States that "procures the launching of a space object". The provisions establish Singapore's continuing obligation to authorise and bear responsibility for the space activities of its nationals and entities, regardless of where such activities are conducted (Pedrazzi, 2024).

2.3.3. Practical Regulatory Framework And Consultation Requirements

Given these international obligations, Singapore has established a practical framework for managing space activities conducted by its nationals abroad. Entities planning to procure launch services or conduct launches outside Singapore are encouraged to engage with the OSTIn. OSTIn provides guidance on compliance requirements and facilitates coordination with relevant regulatory authorities.

The consultation process with OSTIn serves multiple purposes. First, it enables Singapore to fulfil its international supervision obligations by maintaining awareness of space activities conducted by its nationals. Second, it allows for the assessment of potential national security implications and ensures coordination with Singapore's broader space policy objectives. Third, it provides an opportunity to identify and address any technical or regulatory compliance issues before activities commence.

The current framework reflects Singapore's pragmatic approach to space regulation, striking a balance between international legal obligations and the practical realities of its geographical constraints. While the absence of specific launch licensing legislation might appear to create regulatory uncertainty, the consultation-based approach provides sufficient flexibility to accommodate the diverse range of space activities pursued by Singaporean entities while ensuring compliance with international obligations.

This framework also positions Singapore to adapt its regulatory approach as the space industry evolves, and as domestic capabilities potentially expand. The consultation mechanism established through OSTIn provides a foundation for more comprehensive regulatory development should Singapore's space sector mature to require more detailed statutory frameworks in the future.

2.4. Licensing Regimes Coordinating The Use Of Radio Frequencies And Orbital Slots

Singapore's satellite operations are governed by a comprehensive licensing framework administered by IMDA under the Telecommunications Act 1999. This regulatory structure comprises three interconnected licensing regimes that collectively ensure the coordinated use of orbital slots and radio frequencies while maintaining compliance with international obligations.

As established earlier, IMDA serves as Singapore's designated authority for registering and coordinating satellite networks with the ITU, managing the efficient allocation of these finite resources. The licensing framework operates across three distinct but complementary areas: satellite orbital slot licensing for space segment operations, satellite communication station licensing for ground segment infrastructure, and commercial service delivery licensing for telecommunications services.

2.4.1. Satellite Orbital Slot License

2.4.1.1. Regulatory Framework And ITU Coordination

As Singapore's notifying administration to the ITU, IMDA manages the allocation and use of satellite orbital slots in accordance with the ITU's Radio Regulations ("RR") (IMDA, n.d.). The ITU has established procedures and provisions in the ITU RR for the registration, coordination, and operation of satellite networks, with satellite network filings submitted only to the ITU by the administration of an ITU Member State (IMDA, 2017).

The licence for the "Use of Satellite Orbital Slot" governs the space segment of satellite networks that are to be included in Singapore's notified networks to the ITU, ensuring efficient use of these valuable and limited resources while preventing harmful interference between satellite networks. This licensing regime applies to both Geostationary Satellite Orbit ("GSO") and Non-Geostationary Satellite Orbit ("NGSO") systems. Upon approval, IMDA assumes responsibility for filing the satellite network application with the ITU on behalf of the licensee.

2.4.1.2. Eligibility And Core Requirements

2.4.1.2.1. Corporate Structure And Local Presence

A fundamental requirement for licence approval is the establishment of a comprehensive local presence and control infrastructure. Firstly, the licensee must be incorporated under the Companies Act 1967. Furthermore, licensees must maintain effective ownership of at least 50% of the satellite operating in the licensed slot for the duration of the license. This requirement ensures Singapore's oversight of orbital slot usage and alignment with national interests.

Critical operational requirements include ensuring satellite network coverage encompasses Singapore's entire territory, including the main island, offshore islands, and territorial waters extending 15 kilometres from the coastline. Additionally, the Telemetry, Tracking & Command ("TT&C") and Network Operations Centre ("NOC") of the satellite network operating in the licensed orbital slot must be physically located within Singapore. This necessitates obtaining a Satellite Communication Station Licence for every satellite earth station established in Singapore (See later section for more details).

2.4.1.2.2. Technical Expertise And Operational Capabilities

Licensees must possess sufficient technical expertise and capability, including an understanding of satellite technical parameters, as well as the necessary experience in establishing and operating satellite networks. Critically, licensees must have the capability to modify or cease transmissions to and from earth stations operating within the satellite networks upon the Authority's request in the event of unacceptable interference caused to an existing network.

The framework also requires familiarity with prevailing ITU regulations and a comprehensive understanding of the ITU RR's rules and procedures related to application, coordination, and implementation. Licensees bear responsibility for the accuracy and completeness of all information required for satellite network filings.

2.4.1.3. Application Assessment And Documentation

2.4.1.3.1. Evaluation Criteria

IMDA evaluates filing requests based on their merits, taking into account whether the applicant has the required technical, financial, and legal credentials to construct, launch, and operate the proposed satellite system in conformity with its business plan. The assessment considers the benefits to Singapore's industry, consumers, and economy, examining the applicant's vision, organisational structure, financial capability, technical plan soundness, implementation capability, and commitments to fulfilling the stated objectives.

2.4.1.4. Application Documentation Requirements

2.4.1.4.1. Vision Statement And Strategic Rationale

Applicants must outline their vision and demonstrate how their proposal will bring benefits to Singapore's industry, consumers, and economy as a whole, while providing specific reasons for selecting Singapore as their notifying authority.

2.4.1.4.2. Organisational Structure And Ownership Documentation

Comprehensive documentation must detail satellite ownership structures, organisational nature and structure, including subsidiaries, associated companies, joint ventures, and trusts. Applications must provide consortium partner track records, explaining how relevant experience and expertise will be leveraged to achieve strategic advantages and develop new capabilities in Singapore.

2.4.1.4.3. Required Corporate Documentation

Required submissions include certified copies of incorporation documents, the Memorandum and Articles of Association, authorised and paid-up capital certificates, banker confirmations, three years of audited accounts (including profit and loss statements, balance sheets, and cash flow statements), auditor reports, interim results, and three-year projections.

2.4.1.4.4. Business And Financial Planning Requirements

Applicants must provide comprehensive eight-year business, financial, and funding plans covering the operational period from the licence grant. This includes detailed business plans with financial statements prepared in accordance with Singapore Accounting Standards, as established by the Accounting and Corporate Regulatory Authority ("ACRA"), along with clearly explained assumptions, including asset depreciation policies and subscriber projections.

Financial projections must include key ratios (return on assets, return on equity, operating profit margin, net profit margin, current ratio, quick ratio, and debt-equity ratio), internal rate of return forecasts, net present value calculations, and payback period analysis. Detailed capital expenditure and working capital requirements for the first five years must be provided alongside comprehensive financing plans specifying funding sources, timing, repayment terms, and contingency provisions.

2.4.1.4.5. Technical Information And Network Specifications

Technical requirements encompass space object parameters that comply with ITU and international regulations, as well as network technical characteristics, service types, serving areas, and contingency measures for unforeseen circumstances, including launch failure. Satellite networks must comply with ITU Space Service software format requirements, with all correspondence submitted electronically.

2.4.1.4.6. Fees And Licence Duration

The licence fee structure reflects the complexity and resources involved in orbital slot management. Annual fees vary based on whether coordination with other administrations is required for the frequency assignment. Satellite orbital slots that require mandatory coordination incur fees of S$80,000 for the first satellite orbital slot filed and S$10,000 for every subsequent slot. In contrast, non-mandatory coordination slots incur fees of S$4,000 for the first slot and S$500 for subsequent slots.

Additional variable fees include ITU processing fees for each applicable satellite network filing submission to be paid by the licensee directly to the ITU, and coordination meeting fees with other administrations requiring the Authority's presence at S$30,000 per meeting and S$3,000 per calendar day for the meeting duration. Successful applicants must pay the applicable licence fees at the point of licensing and before submitting any satellite network filing to the ITU.

Licences are typically granted for a fifteen-year period, renewable for a further period as the Authority thinks fit, providing operational stability while allowing for renewal based on performance review and continued compliance with licensing conditions.

2.4.2. Satellite Communication Station License

The Satellite Communication Station License governs the establishment and operation of earth stations that communicate with satellites, ensuring comprehensive regulatory oversight of Singapore's satellite communication infrastructure. This licensing framework, as outlined in the guidelines administered by IMDA, serves as a prerequisite for orbital slot licensing, providing integrated coverage from the ground to the space segment.

2.4.2.1. Licensed Station Categories

IMDA grants Satellite Communication Station licences for four distinct classes of stations: Very Small Aperture Terminals ("VSAT"), TT&C Earth Stations, Earth Stations, and Portable Satellite Communication Terminals. Each category serves specific operational requirements within Singapore's satellite communication infrastructure.

2.4.2.2. Core Licensing Requirements

The licensing framework establishes several fundamental obligations for operators. Licensees must obtain IMDA's approval for access to any space segment and comply with the relevant rules, regulations, and procedures imposed by satellite operators for station access, booking, and fees. Operations are restricted to radio frequencies or frequency bands specifically approved by IMDA for the licensee's use.

Notably, licensees are prohibited from using satellite communication equipment to provide public telecommunication services without IMDA's prior written approval. This restriction maintains clear boundaries between licensed satellite communication activities and public telecommunications services.

2.4.2.3. Technical Compliance And Interference Management

2.4.2.3.1. Interference Management And Technical Standards

Licensees must implement appropriate interference mitigation measures, including receiver system filters where necessary. Equipment must be designed, constructed, maintained, and operated to comply with applicable emission standards and technical specifications while avoiding interference with other licensed stations, networks, or telecommunications installations.

IMDA retains the authority to withdraw or reallocate frequencies to licensees without assigning reasons, ensuring flexible spectrum management while maintaining regulatory oversight.

2.4.2.4. Administrative And Record-Keeping Obligations

The licensing framework imposes comprehensive record-keeping requirements. Licensees must maintain current records, including installation locations, equipment manufacturer details, model and serial numbers, frequencies, output power, and purchase and disposal dates. These records must be available for IMDA inspection upon request, with updated lists required at least one month prior to licence expiry.

Furthermore, prior written IMDA approval is required for any changes to equipment, operating frequencies, transmission modes, usage patterns, or installation locations, ensuring continued regulatory compliance throughout the licence period.

2.4.2.5. Inspection And Enforcement

IMDA officers, empowered by sections 15 and 57 of the Telecommunications Act 1999, have broad inspection powers, including the authority to enter premises where stations are installed to inspect, examine, or test equipment upon production of proper identification. Stations and licences must be available for inspection at all reasonable times by authorised IMDA officers.

Non-compliance with certain conditions constitutes an offence under applicable regulations, including misuse of equipment for unlawful purposes, unauthorised modification of equipment, and failure to provide access for inspections.

2.4.2.6. Fees And Licence Duration

Annual licence fees are set at $100 per station, with reduced fees of $50 per annum for Portable Satellite Communication Terminals only. Additional fees apply for application processing and frequency management, with rates varying based on occupied bandwidth and satellite orbit type (GSO or NGSO).

Licence fees are payable in advance and are non-refundable, including in cases where IMDA cancels the licence due to licensee requests for variation or early termination, or regulatory violations. Licences are non-transferable except with IMDA's prior written approval.

2.4.3. Commercial Service Delivery Licensing Framework

Beyond the specific satellite orbital slot and communication station licenses, space operators must address the commercial service delivery aspects of their operations through Singapore's telecommunications licensing framework. The nature of commercial services offered to third parties determines whether operators require Facilities-Based Operations ("FBO") or Service-Based Operations ("SBO") licenses, ensuring comprehensive regulatory coverage from space segment operations through to end-user service provision.

2.4.3.1. Facilities-Based Operations Licensing

FBOs are operators intending to deploy any form of telecommunication network, systems and facilities to offer telecommunication switching and/or telecommunication services to other licensed telecommunication operators, businesses, and/or consumers. This licence becomes relevant for space operators establishing and operating telecommunications infrastructure to provide services to third parties in Singapore.

Space ventures typically requiring FBO licences include establishing and operating ground station networks for satellite-based connectivity services such as VSAT networks or dedicated satellite links to businesses or consumers, deploying satellite constellations where Singapore ground segment infrastructure forms part of the service provision network, and providing hosting services for satellite ground segment equipment where operators own and operate underlying telecommunications infrastructure.

2.4.3.2. Service-Based Operator

The SBO licence enables operators to provide telecommunications services by leasing network elements from licensed FBOs, rather than deploying proprietary infrastructure. SBO operators may lease telecommunications network elements such as transmission capacity and switching services from IMDA-licensed FBOs to provide telecommunications services, resell FBO telecommunications services to third parties, or deploy telecommunications network components on a limited scale.

For space enterprises, SBO licences are appropriate when providing telecommunications services without owning core infrastructure. This includes reselling satellite broadband services without owning ground station infrastructure, providing value-added services over existing satellite communication links such as data analytics or specialized communication solutions where underlying links are third-party managed, serving as service providers for satellite imagery or data acquired via third-party ground stations or satellite operators, and offering satellite phone services through reselling satellite operator capacity.

2.4.4. Contraventions Of License

As of 2025, seven breaches of Satellite Orbital Slot Licence conditions have been recorded, demonstrating IMDA's active enforcement approach (IMDA, 2024):

Year	Company	Type of Breach	Penalty
2022	Nanyang Technological University	Breach of Condition 7.1 of the Satellite Orbital Slot Licence (Failure to complete all necessary frequency coordination)	Formal Warning
2022	Nanyang Technological University	Breach of Condition 15.1 of the Satellite Orbital Slot Licence (Failure to provide information to the Authority)	Formal Warning
2022	Nanyang Technological University	Breach of Condition 17.1 of the Satellite Orbital Slot Licence (Failure to comply with international obligations)	Formal Warning
2021	Nanyang Technological University	Breach of Condition 18.1 of the Satellite Orbital Slot Licence (Failure to obtain and maintain Third Party Liability Launch Insurance; and include Government of Singapore and IMDA as insured parties).	Formal Warning

2018	Addvalue Innovation Pte Ltd	Breach of Condition 5 of the Licence to Utilise Singapore Registered Satellite Orbital Slot for the Operation of Satellite Systems (Failure to abide by its proposal on System rollout as submitted to IMDA in its application)	Financial Penalty of $15,000
2018	Addvalue Innovation Pte Ltd	Breach of Condition 17.1 of the Licence to Utilise Singapore Registered Satellite Orbital Slot for the Operation of Satellite Systems (Failure to perform its duties and obligations under the Licence in a manner consistent with the Government's international obligations)	Formal Warning
2013	Fox Sports Asia (S) Pte Ltd	Breach of Condition 13.1(a) of the Satellite Uplink and Downlink Licence (Failure to notify IDA within five days from any change in ownership, shareholding and management arrangements)	Formal warning

Table 2: List of contraventions to the IMDA Orbital Slot Licence

2.4.5. Strategic Compliance Considerations For IMDA Licensing

The regulatory framework governing IMDA's licensing decisions exhibits limited transparency regarding the specific assessment criteria and decision-making processes applied to individual applications. While the licensing guidelines establish broad parameters for evaluation, the detailed conditions and weighting factors influencing licensing outcomes remain largely discretionary. This regulatory opacity is compounded by IMDA's administrative authority to modify licensing conditions and requirements without requiring legislative approval, creating an environment where regulatory expectations may evolve without extensive public consultation or predictable implementation timelines.

Given the structural characteristics of Singapore's telecommunications licensing regime, space operators seeking to maximise their prospects for successful license acquisition should adopt comprehensive compliance strategies that exceed the minimum regulatory requirements. Adherence to OSTIn's guidelines and internationally recognised best practices serves multiple strategic purposes within this regulatory context. Such compliance demonstrates a proactive commitment to responsible space operations, provides additional technical and operational safeguards that may address unspoken regulatory concerns, and facilitates effective inter-ministry coordination by ensuring alignment with broader government policy objectives for the development of the space sector.

The adoption of OSTIn-recommended practices could reduce potential grounds for license rejection by addressing common regulatory concerns related to space debris mitigation, orbital safety, and international cooperation obligations. Furthermore, OSTIn's role in coordinating space policy across government ministries positions compliance with its guidelines as a mechanism for demonstrating alignment with Singapore's comprehensive space sector strategy, potentially strengthening applications through enhanced policy coherence and inter-agency support.

2.5. Data Regulation

Singapore's regulatory framework for data protection presents multifaceted compliance challenges for space sector participants, particularly those engaged in Earth observation activities, satellite communications, or the development of space-based applications that intersect with personal data processing or critical infrastructure systems. This regulatory landscape reflects Singapore's broader policy objectives of maintaining robust data protection standards while preserving the country's position as a regional technology and business hub.

The regulatory framework encompasses three primary areas: personal data protection under the Personal Data Protection Act 2012 ("PDPA"), critical infrastructure cybersecurity under the Cybersecurity Act 2018 ("CSA"), and system security requirements under the Computer Misuse Act 1993 ("CMA"). These overlapping regimes necessitate that space operators implement comprehensive data governance strategies tailored to the unique characteristics of space-based operations.

2.5.1. Data Privacy Framework

2.5.1.1. Scope And Application To Space Operations

The PDPA establishes Singapore's comprehensive data protection regime for private sector organisations and creates significant compliance obligations for space operators across multiple operational contexts. Under section 2 of the PDPA, personal data encompasses "data, whether true or not, about an individual who can be identified from that data, or from that data and other information to which the organisation has or is likely to have access."

This definition requires space operators to consider not only directly identifying information but also data that could lead to identification when combined with other available datasets. The Act's broad jurisdictional scope and expansive definition of personal data necessitate careful analysis of how space-based activities intersect with data protection requirements.

2.5.1.2. Satellite Communication Services And Consent Requirements

For satellite communication service providers, sections 13-15 of the PDPA establish substantial compliance obligations regarding consent and notification. Organisations must obtain appropriate consent before collecting, using, or disclosing personal data. Section 14 of the PDPA requires clear notification to individuals regarding the purposes of data collection.

The implementation of these requirements for satellite-based services presents unique challenges, particularly where services cross multiple jurisdictions or where users lack direct contractual relationships with satellite operators. Space operators must develop consent mechanisms that accommodate the technical constraints of satellite communications while ensuring regulatory compliance across service areas.

2.5.1.3. Earth Observation And Data Classification

Earth observation activities present more nuanced compliance considerations under the PDPA framework. While raw satellite imagery typically does not constitute personal data in its unprocessed form, the increasing resolution capabilities of commercial Earth observation satellites raise important questions about when such data might enable individual identification.

Space operators must therefore implement appropriate data governance procedures to assess whether their Earth observation activities create personal data processing obligations. This assessment becomes particularly critical when imagery is combined with other datasets or processed using artificial intelligence systems that could enhance identification capabilities. Operators should establish clear protocols for data classification and processing that account for potential personal data implications as image resolution and processing capabilities continue to advance.

2.5.1.4. Cross-Border Data Transfer Restrictions

Section 26 of the PDPA creates significant complexity for space operators with global operations by prohibiting personal data transfers to jurisdictions that do not provide comparable protection standards, unless individuals have provided informed consent after being made aware of potential risks.

Given the global nature of space operations and frequent use of international ground station networks and data processing facilities, operators must implement sophisticated data governance frameworks to ensure compliant data flows across jurisdictions. Acceptable safeguards include binding corporate rules, standard contractual clauses, or other mechanisms approved by the Personal Data Protection Commission.

2.5.1.5. Data Breach Notification Requirement

The 2020 PDPA amendments introduced mandatory data breach notification requirements under sections 26D and 26E, requiring organisations to notify both the Personal Data Protection Commission and affected individuals of breaches likely to result in significant harm.

These provisions present challenges for space operators, whose systems may be vulnerable to sophisticated cyber threats and whose extensive global operational footprint can complicate breach assessment and notification procedures. Space operators must establish robust incident response procedures that can quickly assess the severity of a breach, determine notification requirements, and execute timely communications across multiple jurisdictions.

2.5.2. Space Technology Potentially Regulated As A Critical Information Infrastructure

2.5.2.1. Designation Framework And Criteria Designation Framework And Criteria

The CSA establishes a comprehensive regulatory framework for protecting Critical Information Infrastructure ("CII") that may significantly impact space operators whose systems support essential services within Singapore. Section 7 of the CSA empowers the Commissioner of Cybersecurity to designate computer systems as CII where such systems are necessary for the continuous delivery of essential services (as listed under the First Schedule of the CSA) and where their loss or compromise would have a debilitating effect on national security, defence, foreign relations, the economy, public health, public safety, or public order.

CII designations remain valid for five years and may be renewed following reassessment of the relevant systems' criticality. The Cyber Security Agency of Singapore regularly updates its Code of Practices (Cyber Security Agency of Singapore, 2022), along with frequent advisories and guidelines to ensure that systems are adequately protected.

2.5.2.2. Application To Space Systems

The potential application of the CII designation to space systems necessitates careful consideration of how satellite-based services align with Singapore's essential services, as outlined in the First Schedule of the CSA.

Potentially, satellite communication networks that provide backbone connectivity for telecommunications infrastructure, navigation systems that support the transportation and logistics sectors, or Earth observation platforms that enable emergency response services could qualify for CII designation under the Act's broad criteria.

2.5.2.3. Compliance Obligations For Designated Systems

Once designated as CII, operators are subject to extensive compliance obligations as directed by section 12 of the CSA. These requirements include implementing comprehensive cybersecurity risk management programs, establishing robust incident response procedures, conducting regular cybersecurity audits, and maintaining appropriate cybersecurity expertise within their organisations.

This includes adhering to the specifications outlined in the Cybersecurity Code of Practice for Critical Information Infrastructure (Cyber Security Agency of Singapore, 2022), which provides detailed technical and procedural guidelines covering network segmentation, access controls, vulnerability management, and business continuity planning.

2.5.2.4. Information Sharing And Disclosure Requirements

CII owners are subject to comprehensive reporting obligations under the CSA framework. Upon becoming aware of any prescribed cybersecurity incident, owners must immediately notify the Commissioner of Cybersecurity within two hours using the prescribed form and manner, as mandated by Section 14 of the CSA and Regulation 5 of the Cybersecurity (Critical Information Infrastructure) Regulations 2018. This initial notification must be followed by a detailed supplementary report within fourteen days, documenting the incident's cause, impact assessment, and remedial actions taken.

Beyond incident reporting, the Commissioner maintains broad investigative powers under Section 10 of the CSA, enabling requests for information concerning the design, configuration, security protocols, or operational aspects of the CII or any interconnected systems at any time. To encourage compliance and protect commercial interests, the Act includes confidentiality safeguards for information shared with the CSA and provides identity protection for informers in criminal proceedings.

2.5.3. Strategic Considerations

2.5.3.1. Integrated Compliance Framework For Space Operations

The intersection of Singapore's data protection regime with space sector operations demands sophisticated compliance strategies tailored to the unique characteristics of space-based services. Space operators must implement comprehensive data governance frameworks addressing current regulatory requirements while anticipating future developments in both space technology and data protection regulations.

Effective compliance frameworks require several key components: data classification procedures accounting for personal data implications across satellite communications, Earth observation, and navigation services; cross-border data transfer mechanisms accommodating global operations while ensuring regulatory compliance; incident response procedures addressing the unique challenges of space-based system vulnerabilities; and cybersecurity measures appropriate for both terrestrial ground stations and space-based infrastructure.

2.5.3.2. Proactive Regulatory Engagement And Global Coordination

Proactive engagement with Singapore's regulatory authorities—particularly the Personal Data Protection Commission and Cyber Security Agency—enables operators to understand how evolving frameworks affect their specific operational models. Given rapid developments in both space technologies and data protection regulations, maintaining ongoing compliance monitoring and legal review processes is essential for sustainable operations within Singapore's regulatory environment.

The inherently global nature of space operations requires particular attention to jurisdictional conflicts and potential regulatory arbitrage across different national frameworks. Space operators should develop adaptive compliance strategies that accommodate varying regulatory requirements while maintaining operational coherence and commercial viability. This includes establishing clear data handling protocols adaptable to different jurisdictional requirements and cultivating relationships with legal and regulatory experts in key markets to ensure ongoing compliance as regulatory frameworks evolve.

2.6. Export Control Regulations

2.6.1. Strategic Goods Control Framework

The Strategic Goods (Control) Act 2002 ("SGCA") constitutes a critical regulatory pillar for Singapore's space industry, operating within the country's broader non-proliferation strategy. The SGCA regulates the export, transhipment, transit, and transfer of military and dual-use goods and technology to prevent the proliferation of weapons of mass destruction—a framework with profound implications for space operators, given the inherently dual-use nature of most space technologies.

Three key pieces of subsidiary legislation implement the SGCA framework. The Strategic Goods (Control) Regulations establish the procedural and administrative foundation, covering permit applications, management processes, compliance obligations, validity conditions, and enforcement mechanisms. The Strategic Goods (Control) Brokering Order 2019 provides detailed guidance on brokering controls under sections 6(1), read with 6(2)(a) and 6(3)(a) of the SGCA. The Strategic Goods (Control) Order 2024 maintains the current controlled goods list subject to SGCA requirements.

2.6.2. International Alignment And Compliance Requirements

Singapore's strategic goods control regime operates within a comprehensive international framework that incorporates United Nations Security Council sanctions, Singapore's domestic export controls on Russia, which were implemented following its invasion of Ukraine, and alignment with sanctions imposed by major jurisdictions. This multi-layered international alignment ensures Singapore's space industry operates within globally recognised non-proliferation standards while maintaining consistency with broader international security objectives.

The regulatory implications for space operators are particularly significant because most space technologies—including satellite components, ground station equipment, launch systems, and advanced software—fall under dual-use classification with both civilian and potential military applications. Space companies must therefore work closely with Singapore Customs to obtain necessary import and export permits, along with an Import Certificate and Delivery Verification documentation where required. This comprehensive oversight system ensures thorough monitoring of space-related trade while preserving Singapore's reputation as a trusted partner in international security cooperation.

2.7. Issue of Liability And Insurance

Singapore's ratification of the Outer Space Treaty and the Liability Convention establishes the state's international liability for damages caused by space activities conducted by its nationals and entities. This liability exposure creates compelling policy incentives for Singapore to ensure domestic space operators maintain adequate financial resources and insurance coverage to protect the government against potential international claims.

Recognising that satellite operations constitute the predominant high-risk space activity undertaken by entities within Singapore's regulatory jurisdiction, IMDA addresses this liability risk through mandatory insurance requirements embedded within its orbital slot licensing framework. Operators must obtain and maintain coverage naming both the Government of Singapore and IMDA as insured parties, establishing a risk transfer mechanism that aligns domestic regulatory oversight with international treaty obligations. This requirement serves the dual function of facilitating commercial space activities while safeguarding Singapore's sovereign interests through rigorous evaluation of operators' financial credentials and risk management capabilities.

However, the regulatory implementation of insurance requirements exhibits significant limitations in transparency. The insurance obligation receives only cursory mention in IMDA's Orbital Slot License Guidelines (IMDA, 2017) and application website (IMDA, n.d.), with detailed coverage parameters, policy specifications, and compliance criteria remaining largely unspecified in publicly accessible documents. The substantive importance of insurance compliance becomes apparent primarily through IMDA's contraventions reports, where insurance-related violations feature among documented licensing breaches (IMDA, 2024) (See paragraph 80 for a list of reported Orbital Slot License contraventions). This administrative approach creates information asymmetries that may complicate operator compliance planning and undermine regulatory predictability.

When Singapore faces international liability claims, mandatory insurance coverage provides a direct mechanism for recovering compensation from responsible operators rather than absorbing costs through public funds. This framework protects Singapore's fiscal interests while maintaining compliance with international space law obligations. However, the reliance on soft-law instruments embedded in licensing conditions, rather than hard-law statutory provisions, limits legal certainty despite enhancing regulatory agility. For prospective operators, the absence of clear statutory benchmarks may introduce uncertainty until regulatory engagement commences.

2.8. Ownership And Control Regulations Over Sensitive Sectors

Beyond the local ownership and control requirements within IMDA's licensing framework, the Significant Investments Review Act 2024 ("SIRA") may impose additional regulatory obligations on participants in the space sector. SIRA establishes a comprehensive framework for regulating significant investments and changes in control involving entities deemed critical to Singapore's national security interests. While "national security interests" lacks an explicit statutory definition, parliamentary debates indicate that this concept encompasses the pillars of economic stability and the continuous operation of critical systems and services fundamental to Singapore's sovereignty and resilience, requiring protection from threats such as covert ownership or control that could disrupt essential services or compromise sensitive information. Space operators whose activities involve critical infrastructure or sensitive capabilities may be designated as "Designated Entities" under Section 17 of SIRA, subjecting them to mandatory notification requirements and potential regulatory intervention for changes in ownership or significant investments. This regulatory overlay introduces an additional compliance dimension for space operators, extending beyond sector-specific licensing requirements, particularly for entities whose operations intersect with telecommunications infrastructure, national security applications, or other activities deemed strategically significant to Singapore's national interests.

As of 30 June 2025, there are currently nine Designated Entities designated under the Act, comprising key providers in the petrochemical industry, manufacturing of defence equipment and security solutions, marine and shipbuilding services, and digital services (Office of Significant Investments Review, 2024).

Consequently, these Designated Entities are subject to ownership and control regulations under the act. In particular, following the SIRA read with the Guidelines on Criteria for Key Personnel (Office of Significant Investment Review, 2024):

a. An investor has seven days to notify the Minister after becoming a 5% controller of a Designated Entity;
b. An investor must seek the prior written approval of the Minister before:
    i. becoming a 12%, 25%, 50%, or indirect controller of a Designated Entity; or

   ii. acquiring, as a going concern, the business or undertaking (or any part thereof) of a Designated Entity;

c. An existing owner of a Designated Entity must seek the Minister's prior written approval before ceasing to be a 50% or 75% controller of the Designated Entity;

d. Transactions completed in relation to Designated Entities without the necessary approvals are void;

e. The Minister's approval is required for the appointment of a chief executive officer, director, or chairperson of the board of directors of a Designated Entity;

   i. Such approval may be granted with or without conditions

f. Such appointees may be removed by the Minister if:

   i. they were appointed without the Minister's approval,

   ii. any condition of approval is breached, or

   iii. the Minister considers it necessary in the interest of national security

2.8.1. Exemptions For Foreign-Controlled Entities

Notably, despite ExxonMobil Asia Pacific Pte. Ltd. and Shell Singapore Pte. Ltd. being designated entities under SIRA, the Minister has granted specific exemptions to both entities through separate exemption orders. These exemptions from the need of prior written approval from the Minister were granted, provided that the two companies remain wholly owned and controlled by their foreign parent company.

The seven Designated Entities with Singapore-based parent firms are currently not exempt from any of the Act's requirements, suggesting that the exemptions for ExxonMobil and Shell reflect specific policy considerations regarding established foreign investments in critical sectors.

This is significant because it demonstrates that Singapore recognises the commercial realities of multinational corporations operating critical infrastructure through local subsidiaries, while maintaining control by the foreign parent company.

2.8.2. Potential Application To Space Activities

While no space-related entities are currently among the Designated Entities, this could change as Singapore's space sector continues to develop. Under section 17 of SIRA, the Minister can designate any entity incorporated, formed or established in Singapore; any entity that carries out any activity in Singapore; and any entity that provides any goods and services to any person in Singapore, provided such designation serves Singapore's national security interests.

Given the strategic importance of space capabilities to national security, companies operating critical space infrastructure, satellite systems, or providing essential space-based services could potentially be designated in the future. This is particularly relevant considering that space activities often involve dual-use technologies and can have significant implications for national defence, communications, and critical infrastructure.

The potential for designation under SIRA adds another layer of regulatory complexity for space companies operating in Singapore, as it would subject them to ownership and control restrictions that operate in addition to those already applicable under IMDA's licensing regime for orbital slots. Unlike IMDA's licensing requirements, which focus specifically on telecommunications and broadcasting services, SIRA takes a broader view of national security interests and can potentially capture space activities that intersect with critical national infrastructure, defence capabilities, or strategic economic interests.

For space companies with foreign parent entities, the ExxonMobil and Shell precedents suggest that exemptions may be possible where there are compelling commercial or strategic reasons. However, such exemptions would likely depend on factors such as the jurisdiction of the parent company's incorporation and primary place of business, the strategic importance of the space services provided, existing bilateral relationships, and the specific national security considerations involved. Space companies should note that any exemptions would be granted on a case-by-case basis and may include specific conditions regarding ownership structures, operational control, and ongoing obligations.

For multinational space companies, SIRA's impact extends beyond the Singapore subsidiary to the parent company level. Any change in control of a foreign parent company that ultimately controls a designated Singapore entity could potentially trigger SIRA obligations, creating compliance considerations that span multiple jurisdictions. This is particularly relevant for space companies given the consolidation trends in the global space industry and the increasing involvement of private equity and sovereign wealth funds in space investments.

2.8.3. Call-In Powers For Non-Designated Entities

Beyond the framework governing designated entities, section 32 of SIRA empowers the Minister with "call-in" powers over transactions involving non-designated entities that have acted against Singapore's national security interests. This provision extends SIRA's reach beyond the predetermined list of designated entities, creating potential regulatory exposure for any space company operating in Singapore, regardless of whether it has been formally designated.

Where the Minister determines that a non-designated entity has indeed acted against national security interests, the Minister may exercise significant remedial powers under sections 32(5) and 33. These powers include directing the transfer or disposal of all or part of the entity's equity interest or voting power, imposing restrictions on such transfers or disposals, requiring the transfer or disposal of control or business undertakings, and implementing restrictions on the disclosure of information relating to the entity.

For space companies, this call-in mechanism represents a particularly significant consideration given the inherently strategic nature of space activities and their potential dual-use applications. A space company that initially operates outside the designated entity framework could find itself subject to SIRA's most stringent remedial measures if its activities are subsequently deemed to pose national security risks. This could occur where a company's space capabilities, data handling practices, or operational relationships evolve in ways that create new security concerns, or where geopolitical circumstances change the government's assessment of particular activities or ownership structures.

The broad discretionary nature of these call-in powers means that space companies cannot rely solely on their non-designated status for regulatory certainty. Instead, they must consider how their activities, business relationships, and corporate structures might be perceived through a national security lens, particularly as Singapore's space sector continues to develop and attract greater government attention. This is especially relevant for companies involved in earth observation, satellite communications, space-based positioning services, or other activities that could have implications for national defence or critical infrastructure.

As such, companies in the space sector should monitor developments in SIRA designations and consider how such designation might affect their corporate structure, investment plans, and operational flexibility. Unlike other jurisdictions' foreign investment regimes, SIRA sets out a designated list of entities to which the restrictions apply, providing greater certainty for businesses about which entities are subject to the regime's requirements.

3. CURRENT CHALLENGES AND OPPORTUNITIES

Singapore's space regulatory framework, while adaptive and innovation-friendly, faces four critical gaps: regulatory fragmentation across multiple agencies, the limited enforcement powers of OSTIn, and commercial uncertainty due to unclear liability and insurance requirements. These interconnected challenges create a cascade of operational difficulties that undermine the framework's effectiveness. The fragmentation forces companies to navigate multiple regulatory touchpoints with potentially conflicting requirements, while OSTIn's limited enforcement authority weakens oversight and compliance mechanisms across the sector. Most critically, the unclear liability and insurance landscape generates commercial uncertainty that deters investment, complicates risk assessment, and may drive space businesses toward jurisdictions with more predictable regulatory environments, ultimately threatening Singapore's ambitions as a competitive space hub.

Addressing these systemic challenges requires comprehensive reform beyond incremental adjustments. Part II presents three graduated proposals designed to transform Singapore's space governance, arranged in order of implementation feasibility:

g. Proposal 1: Comprehensive Space Activities Act consolidates regulatory authority and establishes statutory certainty for liability and insurance frameworks—the essential legislative foundation.

h. Proposal 2: Statutory Space Agency transforms OSTIn into a full-fledged regulatory authority with enforcement powers and dedicated resources, building upon the legal framework.

i. Proposal 3: ASEAN Regional Space Agency that leverages on regional strengths and improves ASEAN's position in the global space industry by harmonising regulatory frameworks.

These interconnected reforms offer a roadmap from immediate legislative action to ambitious regional leadership, systematically addressing each identified gap while positioning Singapore's space sector for sustainable growth and international competitiveness.

Part II

4. PROPOSED LEGISLATION GOVERNING SPACE ACTIVITIES IN SINGAPORE

4.1. The Imperative For Comprehensive Space Legislation

Singapore's current regulatory approach to space activities remains inherently fragmented across various legal instruments and agencies, resulting in specific regulatory gaps that undermine the country's strategic space ambitions. When a Singapore-licensed satellite malfunctions and disrupts neighbouring countries' communications infrastructure, the current system lacks clear liability allocation mechanisms, potentially exposing Singapore to diplomatic tensions and reputational damage in ASEAN partnerships. Similarly, jurisdictional confusion between multiple agencies with overlapping authority complicates approval processes, while insufficient guidance on insurance requirements forces companies to seek legal clarity elsewhere, undermining Singapore's position as a preferred incorporation destination for space enterprises.

While this fragmented approach offers benefits in adaptability, these advantages are increasingly outweighed by concrete risks. The 2021 OECD report on Evolving Public-Private Relations in the Space Sector, at page 39, highlights that enabling future growth and innovation will require predictable regulatory frameworks (OECD, 2021). The absence of coherent legislation creates information asymmetries that disadvantage Singapore-based companies in international partnerships, as foreign entities struggle to assess regulatory risks when contracting with Singapore space firms. This regulatory opacity undermines Singapore's reputation for legal predictability—a key competitive advantage that has historically attracted financial services and technology companies.

Singapore's substantial financial investment in space research and development necessitates a more robust legal framework to maximise returns. The current fragmented regime creates commercial uncertainty that inflates insurance premiums for space ventures compared to jurisdictions with established space laws, erodes returns on Singapore's strategic space investments, and signals to international partners that Singapore may not be ready for large-scale space collaboration.

4.2. Principled Approach To Space Governance

The most viable path forward involves establishing foundational legislation that distinguishes between stable and evolving aspects of space regulation. While space technology and operational specifications evolve rapidly, fundamental commercial and legal considerations—such as liability principles, insurance requirements, licensing frameworks, and dispute resolution mechanisms—remain relatively constant across technological generations. This framework law would solidify enduring elements through primary legislation, while empowering the designated regulatory body to issue adaptable subsidiary legislation for technical specifications. This approach would address regulatory fragmentation while preserving operational flexibility.

Singapore's principled framework would enshrine fundamental tenets from international space law—such as the peaceful use of outer space, sustainability obligations, state responsibility, and liability frameworks—while signalling Singapore's progressive stance on commercial space activities, particularly space resource utilisation and innovative space services. This approach encompasses the inherent dynamism of the space sector, including new launch methods, in-orbit servicing, space tourism, mega-constellations, and space resource utilisation, without requiring constant legislative overhauls.

This signalling function serves multiple strategic purposes: legitimising Singapore's position in international space governance discussions, enhancing its soft power in global forums, and providing clarity to international partners and commercial operators regarding Singapore's regulatory philosophy. The legislation could explicitly recognise the commercial potential of space resources while establishing environmental stewardship obligations, positioning Singapore as both business-friendly and environmentally responsible.

4.3. Scope And Application Of The Proposed Act

4.3.1. Comprehensive Scope Definition

The proposed Space Activities Act would apply comprehensively to space activities, sub-orbital activities, and associated activities conducted under Singapore's jurisdiction. This broad scope is drawn from Section 2 of the UK Space Industry Act 2018.

The legislation would establish clear jurisdictional principles to address activities involving multiple jurisdictions or international cooperation. Following Luxembourg's approach in Article 1 of the Law of 20 July 2017 on the Exploration and Use of Space Resources, the Act would apply to activities carried out by entities established under Singapore law, activities conducted from Singapore territory, and activities conducted by Singapore citizens or residents regardless of location, subject to international law limitations.

4.3.2. Integration With Existing Regulatory Framework

The Act would complement rather than replace IMDA's existing powers under the Telecommunications Act 1999 and related regulations. IMDA would retain its authority over spectrum allocation and satellite orbital slot coordination under the Telecommunications Act 1999, while this legislation would address broader operational, safety, and liability aspects of space activities.

4.4. Core Legislative Objectives And Framework

4.4.1. Registration And State Oversight

Since Singapore has already ratified the Outer Space Treaty, the Rescue Agreement, and the Liability Convention, which primarily govern state-to-state relations, the primary legislative need concerns implementing the Registration Convention to establish domestic registration procedures in order to be compliant with the Registration Convention. While OSTIn's current guidelines already mandate the registration of satellite objects and launches, these requirements lack formal legislative backing, creating potential concerns regarding enforceability and regulatory uncertainty.

The proposed legislation would codify and strengthen these existing registration requirements, transforming administrative guidelines into statutory obligations with clear legal authority and enforcement mechanisms. The registration system would serve dual purposes: ensuring compliance with international obligations and providing comprehensive oversight of Singapore-flagged space activities.

A crucial component would be transfer and assignment mechanisms for space assets, addressing regulatory approval requirements and commercial law considerations. This includes provisions for cross-border transactions involving commercial space assets, such as their sale, lease, or transfer between entities or jurisdictions, ensuring clear jurisdiction and ownership tracking while accommodating international financing structures.

4.4.2. Authorisation Framework For Space Activities

The legislation should ideally require operators with a Singapore nexus to seek authorisation from OSTIn before carrying out any space activities. This follows the established practice implemented in many states, including Luxembourg and France. This ensures that Singapore can mitigate the risk of falling foul of the Outer Space Treaty and the Liability Convention as a launching state.

4.4.3. Exploration And Exploitation Of Space Resources

The statute should declare Singapore's position on space resource exploration and exploitation, aligning with the principles of the Artemis Accords while establishing space resource rights. This provision would position Singapore as an attractive jurisdiction for space resource companies while ensuring Outer Space Treaty compliance through authorisation requirements that demonstrate technical capability, financial capacity, and compliance with space sustainability principles.

4.4.4. Liability, Insurance, And Financial Security Framework

Given Singapore's position as a major financial hub, the proposed legislation should establish a comprehensive liability and financial security framework that addresses both international obligations and domestic commercial requirements—a critical element for the development of Singapore's space economy.

The framework would operate on two complementary fronts. First, mandatory insurance requirements for all authorised space activities would ensure adequate coverage for third-party liability, drawing on the UK Space Industry Act 2018 to require insurance that covers damage to persons or property, environmental damage, and business interruption losses resulting from space activities. Coverage levels would be determined through risk assessment based on mission characteristics and operational complexity.

Second, government indemnification provisions would address situations where commercial insurance markets cannot provide adequate coverage for activities deemed in Singapore's national interest. Following precedents from advanced space jurisdictions, this indemnification framework would strike a balance between public interest considerations and the allocation of risk between the government and commercial operators, ensuring that nationally strategic space activities remain commercially viable while protecting public resources.

The liability framework would address unique challenges inherent to space activities, including delayed manifestation of damage, cross-border impacts, and potential cascading effects from orbital debris or system failures. Clear procedures would govern liability determination, insurance claims processing, and coordination with international liability mechanisms under the Liability Convention, ensuring seamless integration between domestic and international legal frameworks.

4.4.5. Enforcement And Penalty Provisions

The proposed legislation would provide OSTIn with comprehensive enforcement powers, including the authority to suspend, modify, and revoke licenses, directly addressing one of the three critical gaps in Singapore's current framework identified earlier. Following graduated enforcement approaches demonstrated in the UK Space Industry Act 2018 and Luxembourg Law of 15 December 2020, the framework would emphasise compliance assistance and corrective action while maintaining meaningful deterrent effects.

The enforcement framework would establish a tiered penalty structure addressing violations of varying severity. Administrative penalties would resolve routine compliance issues through proportionate measures, while criminal sanctions would be applied to serious breaches that pose a threat to public safety or Singapore's international obligations.

Clear appeals procedures and judicial review mechanisms would ensure procedural fairness and regulatory accountability throughout the enforcement process.

Civil penalties would be calibrated based on the severity of the violation and its potential impact, with enhanced penalties for repeat offenders or violations that create significant safety or security risks. This penalty structure would provide a sufficient deterrent effect to ensure compliance while avoiding excessive regulatory burden that could stifle emerging commercial activities, supporting Singapore's goal of fostering a vibrant space economy.

4.4.6. Technology Transfer And Security Provisions

The proposed legislation would establish appropriate technology transfer controls and security provisions that protect Singapore's strategic interests while enabling legitimate commercial activities. These provisions would align with established international export control regimes without imposing unnecessarily restrictive measures that could impede commercial development or innovation.

The framework would establish clear, standardised procedures for security clearances and background checks for personnel engaged in sensitive space activities. To ensure fairness and regulatory predictability, the system would provide transparent qualification criteria, defined assessment timelines, and accessible appeals processes for adverse determinations.

5. PROPOSED SINGAPORE SPACE AGENCY

5.1. Institutional Framework For Space Regulation

5.1.1. Current Limitations Of Ostin's Structure

The optimal institutional structure for Singapore's space regulatory authority presents a central question in developing comprehensive space legislation. OSTIn currently operates as a specialised office within EDB, a statutory board under MTI focused on economic development. However, Singapore's transition toward a formal regulatory regime may require augmenting OSTIn's status and powers to ensure regulatory effectiveness.

While OSTIn benefits from EDB's statutory board framework, it lacks the dedicated institutional identity, sector-specific mandate, and direct regulatory authority essential for comprehensive space regulation. Operating as an office within EDB, OSTIn's space regulatory functions are subordinate to EDB's broader economic development mandate, potentially constraining its ability to develop specialised regulatory expertise, establish sector-specific enforcement mechanisms, and project the institutional authority required for effective space governance.

5.1.2. International Precedents For Space Regulatory Authorities

International precedents provide valuable insights into effective institutional arrangements. The United Kingdom's UK Space Agency operates as an executive agency under the Department for Business, Energy and Industrial Strategy, delivering regulatory oversight while maintaining alignment with economic development priorities. This model enables specialised expertise while ensuring coordination with broader governmental objectives. Similarly, the Canadian Space Agency functions as a departmental corporation, providing operational autonomy within a framework of ministerial accountability.

5.1.3. The Statutory Board Model: Singapore's Proven Approach

For Singapore's context, the statutory board model presents the most suitable institutional framework for transforming OSTIn into an effective space regulatory authority. The Singapore Public Service comprises Ministries and Statutory Boards that collaborate to deliver services to the public. Today, Ministries, which are led by Ministers, are responsible for setting policy directions, while statutory boards focus on implementation to achieve the policy outcomes (Ong, 2018).

5.1.3.1. Characteristics And Advantages Of Statutory Boards

Statutory boards represent a distinctive feature of Singapore's governance system, combining operational independence with clear accountability mechanisms. Each statutory board has a constituting Act that spells out its powers and functions, as well as the key governance requirements. These Acts provide for statutory boards to be separate legal entities from ministries and to be governed by their own Boards of Directors. This allows them greater autonomy over the day-to-day running of operations, ensuring greater responsiveness, efficiency, and effectiveness (Ong, 2018).

The statutory board structure offers several operational advantages, particularly relevant to space regulation. Statutory boards have broad discretion over operational issues, can exercise some flexibility in terms and conditions for hiring employees, and can own land and raise capital by issuing bonds. These capabilities are essential for regulating the space sector, which requires specialised technical expertise, flexible hiring practices to attract international talent, and the ability to establish sector-specific facilities and partnerships.

5.1.3.2. Proven Success In Complex Regulatory Domains

Statutory boards have played a crucial role in Singapore's economic development across various sectors, striking a balance between operational independence and clear accountability mechanisms. The Monetary Authority of Singapore ("MAS") exemplifies how statutory boards can effectively regulate complex, rapidly evolving sectors while maintaining both domestic credibility and international recognition. Similarly, IMDA, another statutory board under the Ministry of Digital Development and Information ("MDDI"), demonstrates how statutory boards can successfully oversee emerging technology sectors requiring both technical expertise and regulatory flexibility.

5.2. Proposed Transformation: OSTIn As A Standalone Statutory Board

5.2.1. The Case For Institutional Independence

While OSTIn currently benefits from EDB's statutory board status, establishing OSTIn as a separate statutory board would address fundamental limitations inherent in its current subordinate position. The transformation would provide several critical advantages that cannot be achieved within EDB's broader economic development framework.

5.2.2. Enhanced Regulatory Authority And Mandate

A standalone statutory board would possess dedicated regulatory authority with a singular focus on space activities. Unlike the current arrangement, where space regulation competes with EDB's diverse economic development priorities, an independent OSTIn would have space regulation as its primary constitutional mandate. This focused mandate would enable the development of specialised enforcement mechanisms, sector-specific penalties, and targeted regulatory responses that align with the unique characteristics of space activities.

The statutory board structure would provide clear regulatory authority through its constituting Act, complementing the earlier proposed Space Activities legislation, including powers to impose penalties for non-compliance with space activity requirements. This enforcement capability, combined with the board's ability to issue sector-specific subsidiary legislation, would create a comprehensive regulatory framework purpose-built for space activities, rather than adapting broader economic development tools.

5.2.3. Market Signalling And International Recognition

Establishing OSTIn as a separate statutory board would signal Singapore's strategic commitment to the development of the space sector, both domestically and internationally. Creating a dedicated space regulatory authority would demonstrate to the global space industry that Singapore is prepared to invest in specialised institutional infrastructure supporting sophisticated space activities. This institutional commitment would enhance Singapore's credibility as a regional space hub and attract international space companies seeking jurisdictions with dedicated regulatory expertise.

The signalling effect extends beyond market perception to practical regulatory outcomes. International space companies, satellite operators, and space service providers would recognise a dedicated statutory board as a more credible and specialised regulatory counterpart compared to an office within a broader economic development agency. This enhanced regulatory profile could facilitate international regulatory cooperation agreements and position Singapore as a preferred jurisdiction for space-related activities requiring regulatory approval.

5.2.4. Dedicated Resources And Expertise Development

A standalone statutory board would enable dedicated budget allocation and resource management specifically for space regulation. While EDB's current structure provides access to statutory board benefits, OSTIn's resource allocation must compete with EDB's broader economic development priorities. An independent statutory board would ensure that space regulatory activities receive appropriate funding and can develop specialised capabilities without being constrained by competing priorities within a multi-sector mandate.

The dedicated structure would also facilitate the recruitment and retention of specialised space sector expertise. International space regulation requires a high level of technical knowledge across multiple domains, including orbital mechanics, satellite communications, space debris mitigation, and international space law. A focused statutory board can develop specialised career tracks and expertise development programs that would be difficult to justify within EDB's broader mandate.

5.2.5. Governance And Accountability Framework

The statutory board model would ensure appropriate governance while maintaining operational autonomy, specifically tailored to the space regulation. Statutory boards are part of the government, governed centrally, but deliberately constituted as separate entities for operational flexibility (Ong, 2018). This structure would enable space regulation to benefit from centralised policy coordination while allowing for sector-specific implementation approaches focused solely on space activities.

The governance framework would incorporate standardised requirements applicable to all statutory boards, including ministerial direction powers, standardised personnel matters, conflict of interest disclosure requirements, and comprehensive financial accountability measures (Ong, 2018). However, unlike the current arrangement, these governance mechanisms would be specifically designed to support the objectives of the space industry's growth, rather than being adapted from broader economic development frameworks.

5.2.6. Inter-Agency Coordination And Regulatory Clarity

A dedicated space statutory board would enhance inter-agency coordination by providing a clear focal point for space-related regulatory matters. Recognising that complex challenges require multi-agency solutions, a standalone OSTIn would serve as the primary coordinator for space activities while collaborating with existing agencies within their respective domains.

The enhanced OSTIn would coordinate with existing agencies rather than duplicating their enforcement capabilities. IMDA would retain authority over satellite communications licensing, while the Civil Aviation Authority of Singapore ("CAAS") would continue regulating aviation-related space activities. The statutory board structure would provide OSTIn with institutional authority to effectively coordinate these diverse regulatory touchpoints and ensure comprehensive oversight of the entire space value chain.

6. PROPOSED ASEAN SPACE AGENCY

6.1. Strategic Alignment With ASEAN Community Vision 2045

The establishment of an ASEAN space agency represents a natural evolution of regional cooperation that aligns seamlessly with both Singapore's strategic objectives for space sector development and ASEAN's broader vision of creating a borderless, integrated community by 2045. As Singapore continues to develop its national space legal framework, regional coordination emerges as an essential component of the country's strategy to position itself as Southeast Asia's premier space hub. This initiative builds on a strong policy foundation established by Prime Minister Lawrence Wong's recent emphasis on strengthening multilateral cooperation and maintaining a rules-based international order, while directly supporting ASEAN's commitment to deeper economic integration and enhanced connectivity (Wong, 2025).

The ASEAN Economic Community ("AEC") Strategic Plan 2026-2030 provides compelling rationale for regional space coordination through its emphasis on regulatory harmonisation, enhanced connectivity, and improved mobility of human capital. The plan's six strategic goals and four foundational pillars of creating a single market, enhancing competitiveness, promoting equitable development, and facilitating global integration create a framework within which space cooperation can flourish. The space sector's inherently cross-border nature and high-technology requirements make it an ideal vehicle for advancing these strategic objectives while generating tangible benefits for all member states.

6.2. Existing Institutional Foundation And Natural Advantages

The institutional groundwork for enhanced space cooperation already exists across ASEAN member states. Indonesia's National Institute of Aeronautics and Space, Malaysia's Malaysian Space Agency, Thailand's Geo-Informatics and Space Technology Development Agency, the Philippines' Philippine Space Agency, and Vietnam's Vietnam National Space Agency represent substantial investments in space capabilities that could be leveraged collectively. This existing institutional capacity demonstrates the region's commitment to space development while highlighting opportunities for improved coordination and resource optimisation.

Furthermore, the equatorial advantage possessed by Southeast Asian nations provides a compelling economic rationale for regional coordination that aligns with ASEAN's competitiveness objectives. The geographic positioning along the equator offers optimal conditions for launching satellites into Low-Earth Orbit or Geostationary orbit, creating a natural competitive advantage in the global launch services market. However, the current absence of coordinated regional planning has prevented member states from fully capitalising on this natural competitive advantage in the global launch services market, resulting in fragmented approaches that reduce collective bargaining power and limit economies of scale.

6.3. Current Regional Framework And Limitations

ASEAN currently maintains the ASEAN Sub-Committee on Space Technology and Applications ("SCOSA"), established under the Committee on Science and Technology. While SCOSA has facilitated valuable scientific collaboration, information sharing, and capacity-building initiatives, this framework lacks the authority, resources, and mandate necessary for comprehensive coordination of the space sector.

The existing approach reflects ASEAN's traditional preference for non-interference and consensus-based decision-making, which has enabled cooperation in areas such as disaster management and environmental monitoring. However, it has proven insufficient for addressing complex challenges that require regulatory alignment and strategic coordination.

The limitations of the current framework become particularly apparent when examining the region's response to emerging commercial space opportunities. Individual member states pursue separate launch development initiatives, satellite procurement programs, and international partnerships without systematic coordination. This fragmented approach results in duplicated efforts, reduced bargaining power with global suppliers, and missed opportunities for synergistic development. A more structured regional approach could address these inefficiencies while maintaining respect for national sovereignty and autonomy in decision-making, directly supporting the AEC's single market objectives.

6.4. Regulatory Harmonisation And International Standards

An ASEAN space agency would provide the institutional framework necessary to develop harmonised space regulations that meet international best practices while reflecting regional characteristics and priorities, directly advancing the AEC Strategic Plan's regulatory harmonisation goals (ASEAN, 2025). The establishment of common regulatory standards across member states would create a unified market for space services and technologies, reducing compliance costs for international operators while ensuring consistent safety and environmental protection measures. This harmonisation would eliminate regulatory barriers that currently fragment the regional market and impede the free flow of space-related services and investments.

The regulatory harmonisation process would enable ASEAN to establish itself as a leader in responsible space governance, setting standards that could influence regulatory development in other emerging space regions worldwide. By adopting a stringent yet practical regulatory approach that balances innovation promotion with risk management, ASEAN can demonstrate that developing regions can maintain high governance standards while pursuing ambitious space development goals. This leadership would generate significant reputational benefits, attracting international space companies that seek stable and predictable operating environments.

The establishment of regional centres of regulatory excellence would position Southeast Asia as a preferred destination for space industry investment, competing effectively with established space hubs in North America and Europe. Companies would benefit from streamlined approval processes, common technical standards, and coordinated licensing procedures that reduce market entry barriers and operational complexity. This regulatory efficiency directly supports the AEC's competitiveness pillar while creating conditions for equitable participation across member states with varying levels of regulatory sophistication.

6.5. Economic Integration And Resource Mobilisation Benefits

The establishment of an ASEAN space agency would generate multiple categories of benefits that extend beyond traditional space activities to encompass broader economic and strategic advantages aligned with the ASEAN Community Vision 2045. The pooling of financial resources would enable member states to pursue ambitious projects that would be prohibitively expensive or politically restrictive for individual countries, including significant infrastructure developments such as regional launch facilities, satellite manufacturing capabilities, and advanced research institutions. This resource mobilisation directly supports the AEC's objective of creating economies of scale and enhancing regional competitiveness.

The coordination of industrial capabilities would create opportunities for technology development and knowledge transfer, thereby strengthening the entire regional space ecosystem in alignment with the AEC's single market vision. Regional specialisation could emerge naturally, with different member states developing expertise in specific areas such as satellite manufacturing, launch services, ground systems, or data analytics. This division of labour would maximise efficiency while ensuring that all participants benefit from the collective advancement of regional capabilities, supporting both competitiveness and equitable development objectives.

The establishment of common technical standards and procurement procedures would reduce costs and enhance interoperability across national space programs, thereby creating seamless connectivity that underpins the AEC Strategic Plan. Standardised approaches to satellite design, ground systems, and data formats would facilitate information sharing and joint operations while creating economies of scale for equipment procurement and maintenance. These efficiencies would be particularly valuable for smaller space programs that currently face high per-unit costs for specialised equipment and services, thereby promoting more equitable participation in space activities.

6.6. Human Capital Mobility And Capacity Development

The mobilisation of human capital across national boundaries represents another significant benefit of regional coordination. Already, the recently announced ASEAN Economic Community 2026-2030 strategic plans highlight "facilitat(ing) mobility of businesses and people" as a key objective (ASEAN, 2025). Young professionals and researchers currently face limited opportunities for cross-border collaboration and career development within the space sector, which constrains the region's ability to develop the skilled workforce necessary for the space sector's growth.

An ASEAN space agency could create pathways for talent mobility and knowledge exchange, accelerating innovation and capability development throughout the region and supporting the Community Vision 2045's aspiration to create a highly skilled and inclusive workforce. Regional training programs, exchange initiatives, and joint research projects would build the technical expertise necessary to support continued growth in the space sector, while ensuring that benefits are distributed equitably across member states. This human capital development would create spillover effects that benefit other high-technology industries, contributing to broader economic transformation objectives.

The establishment of regional centres of excellence in space education and research would provide platforms for collaborative learning and innovation that transcend national boundaries. These institutions could serve as focal points for developing specialised expertise while ensuring that knowledge and capabilities are shared across the region. The mobility of researchers, engineers, and technicians would create networks of professional relationships that support long-term collaboration and knowledge transfer, thereby building the human infrastructure necessary for sustained development of the space sector.

6.7. Implementation Challenges And Risk Mitigation

Despite substantial benefits, establishing an ASEAN space agency would confront significant challenges that could limit effectiveness or create unintended consequences. The diversity of governmental systems, regulatory approaches, and institutional capacities across member states presents a challenge to establishing unified governance structures. While Singapore and Malaysia have developed sophisticated space governance frameworks, others operate with less developed institutional structures, creating potential imbalances in participation and the distribution of benefits.

Governance deficits and corruption concerns within several national space agencies create particular risks for regional coordination. These issues could undermine credibility and effectiveness, particularly in managing substantial budgets and high-technology procurement processes. International investors and partners may be reluctant to engage with regional institutions that lack transparent accountability mechanisms or are perceived as vulnerable to political interference.

Strategic divisions among member states regarding relationships with major space powers present the most significant obstacle. Divergent positions on initiatives such as the Artemis Accords illustrate challenges of maintaining regional unity while accommodating different international partnerships. Member states with substantial investments in specific global partnerships may resist coordination efforts that compromise these relationships or limit strategic autonomy.

Economic disparities could create tensions regarding burden-sharing and benefit distribution, challenging AEC's equitable development objectives. The European Space Agency's "juste retour" principle requires sophisticated industrial capabilities and transparent procurement processes, which may not be uniformly available across ASEAN. Establishing equitable arrangements satisfying both advanced and developing members would require careful institutional design and ongoing political management.

For ASEAN, success would depend on creating tangible benefits for all member states while respecting national sovereignty principles. A modified approach must accommodate economic disparities, diverse governmental systems, and varying levels of space sector development through differentiated participation mechanisms. Core countries with advanced capabilities could pursue deeper integration, while other members participate in specific projects or benefit from capacity-building programs, mirroring ASEAN's successful variable geometry approach in various policy areas.

6.8. Pragmatic Implementation: A Phased Approach Through Soft Law Mechanisms

While establishing a comprehensive ASEAN space agency aligns with regional integration goals, practical implementation must acknowledge ASEAN's institutional characteristics and decision-making preferences. Despite the AEC Strategic Plan 2026-2030's emphasis on regulatory harmonisation, ASEAN's historical preference for soft law instruments and consensus-building suggests meaningful space cooperation must evolve incrementally rather than through immediate institutional transformation.

The ASEAN Way's emphasis on gradualism and respect for sovereignty creates both constraints and opportunities (Narine, 2008). Rather than establishing a fully-fledged space agency with binding regulatory authority, a realistic approach would involve implementing cooperation through developmental stages, building institutional capacity, trust, and practical collaboration before evolving toward formal arrangements.

Implementation would begin by expanding existing soft law instruments within the SCOSA framework, developing non-binding guidelines for space activities, information-sharing protocols, and voluntary coordination mechanisms for satellite procurement and launch services. Joint declarations on space debris mitigation and shared situational awareness capabilities would demonstrate the value of coordination while respecting national autonomy and creating practical benefits without requiring the formal surrender of regulatory sovereignty.

As trust and capacity develop through these foundational initiatives, more structured but voluntary coordination mechanisms would naturally emerge, including regional standards for space technologies, common training programs, and coordinated approaches to international space governance forums. Variable geometry arrangements would accommodate diverse development levels and strategic priorities through optional participation based on capabilities and interests. Meanwhile, regional working groups in specific technical areas would build expertise and institutional relationships, supporting deeper integration over time.

This evolutionary process would culminate in gradual movement toward binding commitments and formal institutional structures, as demonstrated benefits accumulate from earlier cooperation. Such a transition would require sustained political commitment across leadership changes and transparent governance mechanisms addressing corruption concerns while ensuring equitable benefit distribution. The shift from soft law to binding agreements would occur selectively, with technical standards and operational procedures preceding sensitive areas, such as regulatory harmonisation and resource allocation mechanisms.

This pragmatic approach recognises that meaningful regional space cooperation emerges through patient institutional development rather than ambitious declarations. A formal ASEAN space agency would represent the culmination of this evolutionary process, building the trust, capacity, and political consensus necessary for sustainable integration that enhances both national capabilities and collective regional influence in the global space economy. While this incremental path may appear less dramatic than immediate institutional creation, it offers a more realistic prospect for achieving durable regional space cooperation aligned with ASEAN's institutional preferences and decision-making culture.

7. CONCLUSION

Singapore stands at a pivotal juncture in the development of its space sector. Over the past three decades, it has built a robust foundation through targeted investments, inter-agency coordination, and adherence to international norms. Its pragmatic use of soft law instruments, coupled with regulatory clarity in areas such as satellite communications and strategic goods control, reflects the state's characteristic governance model: flexible, innovation-friendly, and grounded in international engagement.

However, as Singapore's space industry matures from an emergent sector into a serious commercial domain, the limitations of its current regulatory framework are becoming more pronounced. The lack of a unified legislative framework, fragmented regulatory authority, and the absence of clear liability and insurance requirements introduce uncertainty that could inhibit investment and operational growth. These are not abstract legal problems—they are tangible barriers to Singapore's aspiration to become a regional hub for space activities.

This paper has shown that reform is both necessary and feasible. A graduated path forward begins with a comprehensive Space Activities Act to consolidate existing guidelines into a coherent statutory framework. This should be complemented by the institutional transformation of OSTIn into a statutory board with regulatory authority and enforcement powers. Regionally, Singapore is well-positioned to catalyse deeper ASEAN cooperation by championing the establishment of a phased, multilateral space governance framework aligned with the ASEAN Community Vision 2045.

The policy recommendations advanced here reflect not only a legal imperative but a strategic opportunity. With its established strengths in governance, finance, and international diplomacy, Singapore can credibly lead in shaping the rules, norms, and infrastructure of Southeast Asia's emerging space economy. The decisions made now will determine whether Singapore merely participates in the global space economy or helps to shape it.

REFERENCES

Works Cited

OSTIn, 2025. *Singapore's Space Sector*. [Online]
Available at: https://drive.usercontent.google.com/download?id=1wtLp1NMVsll62rG8T7pJFhe5In-RgZL5&authuser=0&acrobatPromotionSource=GoogleDriveGridView

EDB, 2022. *Singapore's Space Ecosystem*. [Online]
Available at: https://www.edb.gov.sg/content/dam/edb-en/our-industries/aerospace/Singapore's%20Space%20Ecosystem.pdf

OSTIn, 2023. *TeLEOS 2 Launched Successfully on 22 Apr 2023*. [Online]
Available at: https://www.space.gov.sg/latest-news/latest-news/permalink/teleos-2/

ST Electronics, 2015. *TeLEOS-1 Fact Sheet*. [Online]
Available at: https://web.archive.org/web/20151226181113/http://www.stee.stengg.com/news/2015/12-02.pdf

EDB, 2025. *Singapore's National Space Office announces new initiatives to drive next bound of development for the space sector*. [Online]
Available at: https://www.edb.gov.sg/content/dam/edb-en/about-edb/media-releases/news/singapore-space-office-unveils-new-industry-initiatives/Media%20Release%20-%20Singapores%20national%20space%20office%20announces%20new%20initiatives%20to%20drive%20next%20bound%20of%2

OSTIn, n.d. *Introducing OSTIn*. [Online]
Available at: https://www.edb.gov.sg/content/dam/edb-japan/news-and-events/resources/corporate-publications/OSTIn-brochure.pdf

Gan, K. Y., 2025. *Speech by DPM and Minister for Trade and Industry Gan Kim Yong at the Global Space Technology Convention & Exhibition 2025*. [Online]
Available at: https://www.mti.gov.sg/Newsroom/Speeches/2022/02/Speech-by-Minister-Gan-Kim-Yong-at-the-14th-Global-Space-and-Technology-Convention

OSTIn, 2025. *Singapore Space Industry Directory (2025-2026)*. [Online]
Available at: https://www.space.gov.sg/files/Singapore_Space_Industry_Directory_2025_2026_Web_Version.pdf

IMDA, 2024. *IMDA's critical regulatory role in satellite communications and spectrum allocation*. [Online]
Available at: https://www.imda.gov.sg/regulations-and-licensing-listing/spectrum-management/frequency-allocation-and-assignment [Accessed 2025].

Lewis, A., Lim, E. & Tan, E., 2016. *International and ASEAN Law in the ASEAN 10 National Jurisdictions: The Reception of International Law in the Legal System of Singapore*. [Online]
Available at: https://cil.nus.edu.sg/wp-content/uploads/2016/08/SD_ES-ASEAN-10-Singapore-study.pdf

ITU, n.d. *List of Agreements for Singapore*. [Online]
Available at: https://www.itu.int/online/mm/scripts/gensel26?ctryid=1000100472 [Accessed 2025].

NASA, 2022. *Singapore Signs Artemis Accords*. [Online]
Available at: https://www.nasa.gov/humans-in-space/singapore-signs-artemis-accords/

OSTIn, 2024. *Guidelines For Singapore-related Space Activities*. [Online]
Available at: https://www.space.gov.sg/registration-guidelines/

Pedrazzi, M., 2024. Liability for Damage Caused by Space Objects: The Interplay between International and National Law. In: *Comparative Vision in Space Law*. s.l.:s.n., pp. 253-260.

IMDA, 2017. *Guidelines on the Submission of Application for the Grant of Licence for the Use of Satellite Orbital Slot*. [Online]
Available at: https://www.imda.gov.sg/-/media/imda/files/regulation-licensing-and-consultations/licensing/licenses/guidesatelliteorbitalslotlic.pdf

Cyber Security Agency of Singapore, 2022. *Cybersecurity Code of Practice for Critical Information Infrastructure Second Edition Revision One*. [Online]
Available at: https://isomer-user-content.by.gov.sg/36/2df750a7-a3bc-4d77-a492-d64f0ff4db5a/CCoP---Second-Edition_Revision-One.pdf

IMDA, n.d. *Licence for the Use of Satellite Orbital Slot*. [Online]
Available at: https://iris.imda.gov.sg/application/licence-for-the-use-of-satellite-orbital-slot [Accessed 30 June 2025].

IMDA, 2024. *Contraventions of Satellite Licences*. [Online]
Available at: https://www.imda.gov.sg/regulations-and-licensing-listing/competition-management/enforcement-decisions/contraventions-and-qoss/licence-conditions/satellite [Accessed 2025].

Gan, K. Y., 2024. *Second Reading of the Significant Investments Review Bill*. [Online]
Available at: https://sprs.parl.gov.sg/search/#/sprs3topic?reportid=bill-667

Office of Significant Investments Review, 2024. *Designated Entities*. [Online]
Available at: https://www.osir.gov.sg/designation/designated-entities/

Office of Significant Investment Review, 2024. *Guidelines on Criteria for Key Personnel*. [Online]
Available at: https://www.osir.gov.sg/files/Guidelines_on_Criteria_for_Key_Personnel_29_May_2024.pdf

Inter-Agency Space Debris Coordination Committee, 2025. *Space Debris Mitigation Guidelines of the Inter-Agency Space Debris Coordination Committee Revision 4*. [Online]
Available at: https://www.unoosa.org/res/oosadoc/data/documents/2025/aac_105c_12025crp/aac_105c_12025crp_9_0_html/AC105_C1_2025_CRP09E.pdf

United Nations Office for Outer Space Affairs, 2019. *Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space*. [Online]
Available at: https://www.unoosa.org/documents/pdf/PromotingSpaceSustainability/Publication_Final_English_June2021.pdf

OECD, 2021. *Evolving Public-Private Relations in the Space Sector*. [Online]
Available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2021/06/evolving-public-private-relations-in-the-space-sector_c865e704/b4eea6d7-en.pdf

Wong, L., 2025. *Speech by Prime Minister and Minister for Finance Lawrence Wong at the S Rajaratnam Lecture on 16 April 2025*. [Online]
Available at: https://www.pmo.gov.sg/Newsroom/PM-Lawrence-Wong-at-the-S-Rajaratnam-Lecture-2025

Ong, Y. K., 2018. *Speech on Public Sector (Governance) Bill*. [Online]
Available at: https://www.psd.gov.sg/press-room/speeches/public-sector-governance-bill-by-min-ong-ye-kung-at-parliament/

ASEAN, 2025. *ASEAN 2045: Our Shared Future*. [Online]
Available at: https://asean.org/wp-content/uploads/2025/05/ASEAN-2045-Our-Shared-Future.pdf

Narine, S., 2008. Forty years of ASEAN: a historical review. *The Pacific Review*, 21(4), pp. 411-429.

Committee on the Peaceful Uses of Outer Space, 2007. *Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space*. [Online]
Available at: https://www.unoosa.org/pdf/publications/st_space_49E.pdf

IMDA, 2022. *Satellite Communication Station Licence Application Guidelines*. [Online]
Available at: https://iris.imda.gov.sg/application/licence-for-the-use-of-satellite-orbital-slot

Legislation, Treaties, and Agreements

Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space (Rescue agreement) (1968). Available at: https://www.unoosa.org/pdf/gares/ARES_22_2345E.pdf..

Companies Act (1967). Available at: https://sso.agc.gov.sg/act/coa1967.

Computer Misuse Act (1993). Available at: https://sso.agc.gov.sg/Act/CMA1993.

Convention on international liability for damage caused by space objects (Liability convention) (1972). Available at: https://treaties.un.org/doc/Publication/UNTS/Volume%20961/volume-961-I-13810-English.pdf.

Convention on registration of objects launched into outer space (Registration convention) (1976). Available at: https://www.unoosa.org/pdf/gares/ARES_29_3235E.pdf.

Cybersecurity Act (2018). Available at: https://sso.agc.gov.sg/Acts-Supp/9-2018/.

Cybersecurity (Critical Information Infrastructure) Regulations (2018). Available at: https://sso.agc.gov.sg/SL/CA2018-S519-2018?DocDate=20180830&WholeDoc=1.

Law of December 15th 2020 on space activities (2022). Available at: http://space-agency.public.lu/en/agency/legal-framework/Lawspaceactivities.html.

Law of July 20th 2017 on the exploration and use of space resources (2017). Available at: https://space-agency.public.lu/en/agency/legal-framework/law_space_resources_english_translation.html.

LOI n° 2008-518 du 3 juin 2008 relative aux opérations spatiales (1) (2008). Available at: https://www.legifrance.gouv.fr/loda/id/JORFTEXT000018931380/2025-06-30/.

Law Personal Data Protection Act (2012). Available at: https://sso.agc.gov.sg/Act/PDPA2012.

Significant Investments Review Act (2024). Available at: https://sso.agc.gov.sg/Act/SIRA2024.

Significant Investments Review (Exemption – ExxonMobil Asia Pacific Pte. Ltd.) Order (2024). Available at: https://sso.agc.gov.sg/SL/SIRA2024-S468-2024?DocDate=20240531&WholeDoc=1.

Significant Investments Review (Exemption – Shell Singapore Pte. Ltd.) Order (2024). Available at: https://sso.agc.gov.sg/SL-Supp/S469-2024/Published/20240531?DocDate=20240531.

Strategic Goods (Control) Act (2002). Available at: https://sso.agc.gov.sg/Act/SGCA2002.

Strategic Goods (Control) Brokering Order (2019). Available at: https://sso.agc.gov.sg/SL/SGCA2002-S534-2019?DocDate=20240801&WholeDoc=1.

Strategic Goods (Control) Order (2024). Available at: https://sso.agc.gov.sg/SL/SGCA2002-S641-2024?DocDate=20240801&WholeDoc=1.

Telecommunications Act (1999). Available at: https://sso.agc.gov.sg/Act/TA1999.

The Artemis Accords: Principles for cooperation in the civil exploration, and use of the Moon, Mars, comets, and asteroids for peaceful purposes (2022). Available at: https://www.nasa.gov/wp-content/uploads/2022/11/Artemis-Accords-signed-13Oct2020.pdf.

Treaty on principles governing the activities of states in the exploration and use of outer space, including the moon and other celestial bodies (Outer space Treaty) (1967). Available at: https://www.unoosa.org/pdf/gares/ARES_21_2222E.pdf.

UK Space Industry Act (2018). Available at: https://www.legislation.gov.uk/ukpga/2018/5/contents.

INDIA

Table of Contents

About the Author

Ranjana Kaul

Ranjana Kaul is Partner, Dua Associates, a leading law firm in New Delhi, India, with specialization in the UN space treaties regime. Dr Kaul has established a space sector advisory on space security, military, civil and commercial use of outer space; on implementation of the treaties through national policy and statute pursuant to Space Reforms 2020 and on developments at the UN in context to regulatory dynamics of 21st century new-novel space activities. Dr Kaul provides comprehensive advice to institutions and to commercial entities on the entire regulatory ecosystem including policy, law, procedures, IPR, Transfer of Technology and funding, commercial arbitration, and litigation.

Dr Kaul received the IISL Distinguished Service Award 2017 " *... her contributions and her championing role in building awareness on development of national space legislation*" Dr Kaul is Vice President, International Institute of Space Law, Paris; Member, National Advisory Committee (Subject Expert), Indian Space Association (ISpA); Founding Member and Secretary-General Spaceport Sarabhai (S2), India's only independent space focused think tank She is member Supreme Bar Association; High Court of Delhi Bar Association; International Foundation For Aviation, Aerospace & Drones, Canada (IFAAD); Women in Aviation International (WIA India); and Satellite Professional International. Dr Kaul holds LLM from the Institute of Air & Space Law, Faculty of Law, McGill University, Canada and is an internationally and nationally published author. [ranjanakaul@duaassociates.com]

Dua Associates Law offices
202-206 Tolstoy Marg
15 Tolstoy House
New Delhi 110001, India
ranjanakaul@duaassociates.com

Abstract

The five years following 2020 Space Reforms has seen simultaneous implementation across four verticals – reimaging the national space program; leveraging the existing highly skilled commercial companies that have been foundational to government procurement ecosystem; opening opportunities for new space commercial companies, and undertaking methodical preparatory steps to establish 'authorization' and 'continuing supervision' matrix across commercial space verticals, penultimate to issuing a draft national space activities law. This essay evaluates the impact of the Space Reforms on the controlled national space program and on India's emerging commercial space sector, taking note of the unfinished agenda for completing the commercial space activities regulatory circle.

Keywords: IN_SPACe ; Indian Space Policy 2023; NGP for Authorization; Continuing Supervision; ISRO , NSIL, Anantha Technologies; L&T; HAL; TASL-1

I. INTRODUCTION

INDIA'S CIVIL SPACE AND COMMERCIAL SPACE SECTORS

Overview

India's national space program is now 53 years old. In the early years, after Independence in 1947, Indian leadership drew inspiration from achievements of the International Geophysical Year, 1957[1] , but also noted that following the 1957 launch of Sputnik-I, the first man made military communications satellite, the USA and USSR [Russia] had seen value establishing mutually agreed terms of engagement in outer space, at the United Nations where the institutional and regulatory mechanisms supported decision making processes that involved consensus based decisions in the permanent committees of the United Nations Assembly; and thereafter, a majority vote decision making process at the UN general Assembly. Ten years through 1957-1967, based on numerous resolutions adopted at the United Nations First Committee and at the Committee on the Peaceful Uses of Outer Space (COPUOS), resulted in the adoption of the extraordinary multilateral *Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. 1967*[2] [OST].

On its part, the Indian leadership was convinced about the importance of space capability for a developing country, in preference to a military space program. In Dr Vikram Sarabhai[3] words "*There are some who question the relevance of space activities in a developing nation. To us, there is no ambiguity of purpose. We do not have the fantasy of competing with the economically advanced nations in the exploration of the moon or the planets or manned space-flight. But, we are convinced that if we are to play a meaningful role nationally, and in the community of nations, we must be second to none in the application of advanced technologies to the real problems of man and society.*"

** B.A. (Bombay University); M.A., Ph.D. (University of Poona); LL.B. (University of Delhi); LL.M. (Institute of Air and Space Law, McGill University, Montreal, Canada); Partner, Dua Associates, (Advocates & Solicitors), New Delhi, India; Director International Institute of Space Law, Paris; and Secretary General Spaceport SARABHAI. ranjanakaul@duaassociates.com.

1 International Geophysical Year: https://en.wikipedia.org/wiki/International_Geophysical_Year.

2 Outer Space Treaty, 1967: *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, 1967; Entered into force on 10th October 1967. UNGA doc A/6431 [hereinafter referred to as 'OST' or ' Outer Space Treaty' or 'Treaty'] http://www.unoosa.org

3 Sarabhai, Dr Vikram Ambalal (1919-1971), Indian physicist and astronomer. Regarded as the Father of India's Space Program his was yeoman contribution to set India's national space program from 1963-1971. Sarabhai is regarded as the Father of the Indian Space Program. visit: https://www.isro.gov.in/sarabhaiformer.html.

Consequently, Government of India conceptualized the public funded, national civil space program for undertaking activities for peaceful use of outer space, including the Moon and other celestial bodies, that could be deployed as tools for governance to fulfil national development and societal objectives. To this end, it was inevitable that India should have used almost the initial two decades to achieve technology independence by developing indigenous capability to build orbit-class satellites and launch vehicles; as well as to develop satellite applications, especially satellite communications and remote sensing through active international collaborations. The national space program remains dedicated to socio-economic, inclusive national development, to furthering bi-lateral, multilateral and international cooperation and collaborations.

India's traditional space program pioneered and continues to nurture the technique and ability to execute missions successfully, with frugal engineering solutions and within budget constraints. Arguably, India has the world's most cost-effective space program. Indeed, in 2013 the Indian Space Research Organization surprised the global community by successfully undertaking the first inter-planetary space mission to Mars[4] deploying the indigenously built PSLV-X C25 launch vehicle; after thereafter in 2017 by launching 104 satellites on board the PSLV.

The economic reforms process initiated in 1990-91 partially deregulated several traditional sectors of the economy, including telecommunications. In 2000, for the first time the closely controlled space program was directed to provide transponder capacity on commercial basis, to commercial satellite telecommunications and broadcast service providers, through the agency the Antrix Corporation[5] (Antrix) a public sector entity under the Department of Space. Thereafter, Antrix started providing remote-sensing data products to users on a commercial basis, and finally in 2007 India entered the international commercial space launch market, with an offering of cost effective commercial space launch on the PSLV.

Seen from this perspective, the unexpected announcement of Space Reforms 2020 was a significant step ahead, because was in effect the partial de-regulation of the controlled space sector. The difference between 1990 and 2020 is that whereas 1990 addressed partial deregulation of the traditional sectors of the economy, as far as the space sector

4 India's private sector companies behind the Mangalyaan Mars Mission in 2013 https://gadgets360.com/others/news/meet-the-indian-companies-behind-isros-mars-mission-456395.

5 Antrix Corporation Limited : https://www.antrix.co.in/.

was concerned, it translated into limited commercial activities within the ambit of the controlled space program. Whereas, the Space Reforms 2020 authorized vertical expansion of India's presence in outer space, through the addition to the existing national space program, of the new commercial space activities vertical.

II. NATIONAL SPACE PROGRAM 1947-2000

II.1. The Genesis Of The Civil Space Program

The genesis of the civil space program was fueled by a convergence, between Prime Minister Jawaharlal Nehru's[6] belief in the merits of science, and the scientific temperament of two young men – Homi J Bhabha[7] and Vikram Sarabhai. It led to the establishment of national laboratories, institutes of technology and core scientific research, including universities

6 Nehru, Jawaharlal : Prime Minister of India 1947 to 1964.

See: Professor Yashpal : 'Memories of Jawaharlal Nehru' article in The Hindu dated 20th January 2015: "Nehru can talk to scientists with great ease. There were deep friendships with people like Homi Bhabha, Vikram Sarabhai, Hussain Zaheer and some others. He pioneered the scientific temperament movement. You do not have to be doing quantum mechanics or electromagnetic theory to have a scientific temperament, though it might help. It implies greater freedom to be different, less constrained and more freedom to fly. It also demands that all points of view might have ab initio rights, prejudice has less chance to reign and seniority need not always rule".

https://www.thehindu.com/opinion/op-ed/memories-of-jawaharlal-nehru/article6802549.ece.

Professor Yashpal (1926-2017): Eminent scientist and academician with specialization in high-energy physics, astrophysics, communication, science policy and space technology, had gained recognition because of his contribution in the study of cosmic rays. His distinguished careered included his tenure as professor at Tata Institute of Fundamental Research, Mumbai; Director at Space Applications Centre in Ahmedabad; member UN Advisory Committee on Science and Technology for Development; member Scientific Council, International Centre for Theoretical Physics; Vice-President of IUPAP; and INSA Council. https://indianexpress.com/article/who-is/who-is-professor-yash-pal-4765885/.

7 Bhabha, Dr. Homi J (1909-1966): was born in a wealthy and illustrious family with a long record of service to the country, Homi Bhabha was an Indian nuclear physicist, known colloquially as 'father of the Indian nuclear programme'. Home on vacation from Cambridge when the World War II broke out, Bhabha joined the Indian Institute of Science in Bangalore as reader in physics. There, with financial support from the Sir Dorabjee Tata Trust, he established the first institute in India which had the necessary facilities for original work in nuclear physics, cosmic rays, high energy physics, and other frontiers of knowledge in physics for the IIS – namely, Tata Institute of Fundamental Research (TIFR), in Mumbai, where he served as founding director and professor of physics. Bhabha also encouraged research in electronics, space sciences, radio astronomy and microbiology. Homi Bhabha played a key role in convincing senior leaders of the Congress Party, most notably Jawaharlal Nehru, to start the ambitious nuclear. In 1948 he established and served as the first Chairman of the Atomic Energy Commission (the governing body of the Department of Atomic Energy). In 1948 he got the support of the Bombay Government to establish a new laboratory devoted for technology development for the atomic energy programme – the Atomic Energy Establishment (AEET) at Trombay, now called the Bhabha Atomic Research Centre. TIFR and AEET were the cornerstone of Indian development of nuclear weapons which Bhabha also supervised as director. The Department of Atomic Energy, Government of India (DEA) which reports to the Prime Minister was also established in 1948. Bhabha died in 1966 in when Air India 101 crashed over the Mont Blanc. Homi Bhabha is one of India's most prominent scientists. https://www.atomicheritage.org/profile/homi-j-bhabha.

and institutions including for technical, medical and management studies. The Atomic Energy Commission (AEC) and Department of Atomic Energy (DEA) were established in 1948. Dr. Bhabha, the first Chairman reported directly to the Prime Minister. The DEA[8] initiated space activities under the leadership of Dr. Sarabhai. In 1962 the Indian National Committee for Space Research (INSCOPAR) and the Thumba Equatorial Rocket Launching Station (TERLS) were set up to undertake research and related activities to build capacity for undertaking space activities.

In 1969[9] INSCOPAR was subsumed into the newly established Indian Space Research Organization (ISRO). Dr Sarabhai continued as Chairman from 1962-1971, leading ISRO to develop national space activities program. Finally, in 1972 national space activities were institutionally separated under the newly constituted Department of Space (DoS). Additionally, ISRO was transferred to jurisdiction of the Department of Space.

II.2. Department Of Space 1972: *Authorization, UN Space Treaties, State Practice*

The Department of Space (DoS) was constituted on 18th July, 1972 under statutory provisions of the *Government of India Allocation of Business Rules 1961 for the Department of Space*[10] (AOBR) with the mandate to undertake activities in outer space, including the Moon and celestial bodies (space segment) and activities on ground (ground segment).

It may be noted that that Allocation of Business Rules for the Department of Space derive from the Constitution of India, Article 51[11] that enjoins the State to (a) promote international peace and security; (b) maintain just and honorable relations between nations; and (c) foster respect for international law and treaty obligations in the dealings of organized peoples with one another; and encourage settlement of international disputes by arbitration.

8 Department of Atomic Energy and Atomic Commission, under the Government of India, were established under the stewardship of Dr. Homi J Bhabha.

9 Indian Space Research Organization: for a detailed description of ISRO's history and current activities visit https://www.isro.gov.in/; See: https://www.wikiwand.com/en/Polar_Satellite_Launch_Vehicle.

10 Allocation of Business Rules, Government of India : Department of Space, S.O.498(E) 20/7/1972 dated 18 July 1972, pg.176; See : https://cabsec.gov.in/businessrules/allocationofbusinessrules/amendment/.

11 Constitution of India, 1949 -Part IV: Directive Principles of State Policy, Article 51 See : http://legislative.gov.in/sites/default/files/COI-updated.pdf.

As such, Allocation of Business Rules Para 4 (a) deals with international relations in matters connected with Space, including, *inter alia* '*international relations in matters connected with Space including matters relating to Space in the United Nations specialized agencies and in relation with other countries*[12]. Thus enabling DOS to discharge its principle purpose and function of undertaking activities in outer space in conformity with UN international space treaties, and such other related and incidental matters, including participation the UN Inter- Agency Meetings, as one of the thirteen member agencies; as Member of the Delegation of the Permanent Mission of India to the UN Committee on the Peaceful Use of Outer Space (COPOUS) in Vienna – including at the COPOUS Scientific & & Technical Sub Committee (STSC) and the COPOUS Legal Sub Committee (LSC).

India has ratified the four principal UN Treaties on Outer Space[13] and is Signatory to the Moon Agreement, 1979[14]. India undertakes national activities in outer space, in conformity with the principles of the international space treaties[15]. This is the basis and the foundation of India's state practice.

12 See ABOR Para 4 visit: https://cabsec.gov.in/writereaddata/allocationbusinessrule/completeaobrules/english/1_Upload_3159.pdf; and see AOBR Amendment 1972: Amendment dated 18th July 1972 vide S.O.498(E) 20/7/1972 related to Department of Space at sr.no.45 https://cabsec.gov.in/businessrules/allocationofbusinessrules/amendment/(accessed 12th February 2022).

13 'Outer Space Treaty, 1967' : *Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies*. UNGA Res 2222(XXI), 1966. https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html [OST].

'Rescue Agreement, 1968' : *Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space*. UN Resolution 2345 (XXII) 1967. https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introrescueagreement.html ['Rescue'].

'Liability Convention, 1972': *Convention on the international liability for damage caused by space objects*. UN Resolution 2777(XXVI) 1971 https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliabili.ty-convention.html ['Liability'].

'Registration Convention, 1975': *Convention on registration of objects launched into outer space*. UN Resolution 3235 (XXIV) 1974. https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/registration-convention.html [Registration'].

14 'Moon Agreement, 1979' : *Agreement governing the activities of states on the moon and other celestial bodies*'. UN Resolution 34/78 1979. https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/intromoon-agreement.html [Moon].

15 India's first satellite Aryabhatta was launched by USSR (Russia) on 19th April 1975 See: https://www.isro.gov.in/Spacecraft/aryabhata-1.

II.3. Department Of Space 1972 – *Authorization For Limited Commercial Activities 2000*

As the national space program expands, the ABOR are amended to grant further authorization to DoS for undertaking new space activities. For example, in 2007 ABOR Para 2 was amended to include commercial exploitation of space, to support India's entry in the international commercial space launch market and for EO data commercialization. Recently, on 7 February 2022, AOBR was further amended to allow Department of Space to procure use of space-based satellite systems that are required to support the Department of Telecommunications to roll out 5G broadband communications across India.

II.4. Early Years *Technology Independence, 1972-2000*

The focus in the early decades was on research in space sciences and on developing technology independence – for building launch vehicles, satellites and ground stations. The aim was to develop end to end capability to build orbit -class launch vehicles[16] and satellites for the full range of space applications including satellite telecommunications, remote sensing, satellite navigation, deep space explorations and scientific missions. India's traditional space program pioneered and continues to nurture the ability and techniques to execute space missions successfully, deploying frugal engineering solutions within Spartan budgets.

The early focus areas were satellite applications for telecommunications and remote sensing. In 1959 the first B&W experimental broadcasts were started, soon building up to daily 15 minutes news bulletin broadcasts in Delhi through *Doordarshan* ('DD'), the public service broadcaster. By 1966 the first Experimental Satellite Communication Earth Station (ESCES)[17] was established as a training centre where scientists and engineers from India and from other developing countries could receive training and first-hand experience in design, development and operations of an earth station for in satellite communication and broadcasting.

16 Launch vehicles: SLV (1980), PSLV (1993); GSLV (2001) See: https://www.isro.gov.in/.

17 For details of the history of genesis and development of space applications in India- visit https://www.isro.gov.in/applications; and https://www.isro.gov.in/indian-first-communication-satellite-%E2%80%93-apple.

II.5. Early Years – *International Collaborations*

Satellite Applications

India has benefitted from and continues to be engaged in international collaborations and cooperation. These relationships have been particularly critical in the early years. For example, NASA enabled the Department of Space (DOS) to undertake the Satellite Instruction Television Experiment (SITE) on the American Technology Satellite (ATS-6) in 1975-1976[18]. 1979 was a threshold year. First, the collaboration to undertake the Satellite Telecommunication Experiments Project (STEP) on Franco-German Symphonie satellite, for undertaking a system test for using geosynchronous satellites for domestic communications system test, to enhance capabilities and experience in the design, manufacture, installation, operation and maintenance of various ground segment facilities and to build up requisite indigenous competence for the proposed operational domestic satellite system, INSAT. The subsequent 1979 Ariane Passenger Payload Experiment (APPLE)' became the forerunner for future communication satellite systems. By 1982 India was able to inaugurate color TV nationwide with the live broadcast of the '*Asian Games*' in Delhi[19].

Satellites and Launch Vehicle

Following the bilateral space launch agreement 1972, between India and the Soviet Union, India was able to launch the first satellite *Aryabhatt* on the Soviet Kosmos- M3 rocket from Kasputin Yar on 19 April 1975. Similarly, in 1979, Soviet Union launched India's first indigenous remote sensing satellites -*Bhaskara I* and *Bhaskara II* on the Russian Inter-Kosmos launch vehicle.

Finally, July 1980 for the first time, India successfully launched the experimental remote sensing satellite Rohini on the indigenously built Satellite Launch Vehicle-3 (SLV-3). The success of Rohini/ SLV3 placed India among the elite group of nations that had capability

18 In the two years 1975-1976 during which NASA made available American Technology Satellite (ATS-6), DOS leadership managed to achieve its targets of connecting on ground with 200,000 citizens living in 2400 villages, which were located across six states of India and to train 50,000 primary school science teachers. This extraordinary experiment was the precursor to India's tele-education program See: https://www.sac.gov.in/Vyom/overview.jsp.

19 Asian Games 1982: visit https://thebridge.in/featured/1982-asian-games-how-sports-brought-colours-to-indian-television/.

to build satellites and launch them into orbit. Since then, India has continued to develop capability across the space infrastructure constituents including satellite communications, remote sensing, meteorology, navigation and the PSLV and GSLV launch vehicles[20].

The national objective has always been to undertake activities in outer space, including the Moon and other celestial bodies for peaceful purposes and to promote international security and peace as well as to expand international cooperation. Today, India is counted among the Big Six in Space, a term used to indicate the top six space agencies worldwide.[21] .

II.6. Early Years – *Limited Commercialization 2000-2020*

The economic reforms process initiated in 1990-91 accelerated new developments in technology and processes, adding new sub-sectors within traditional sectors of the economy. Inevitably, the partial deregulation of the traditional telecommunications and broadcasting sectors, resulted in India introducing satellite telecommunications and satellite broadcasting in the country in 2000. In furtherance of the New Telecom Policy 1999[22], Department of Space was authorized in 2000 to provide the required transponder capacity on a commercial basis, to commercial satellite telecommunications and satellite broadcasting service providers. In furtherance thereof, Antrix established a canalized mechanism for providing capacity on a commercial basis to the commercial service providers. In 2005, Antrix was authorized to commercialize remote sensing data products, followed in 2007 by India entered the commercial space launch services market with low-cost space launch.

20 India Satellite Launch Vehicles: visit https://www.isro.gov.in/SLV.html#:~:text=SLV&text=Satellite%20Launch%20Vehicle%2D3%20(SLV,satellite%20Launch%20Vehicle%20(GSLV).

21 Big Six in Space is a term used to indicate the six major space agencies worldwide. Each of them provides launch services (i.e. builds their own orbital-class rockets), builds their own satellites and scientific payloads, and has either achieved human space-flight or interplanetary robotic science missions or both. In alphabetical order: (i) China: CNSA China National Space Agency; (ii) EU: ESA European Space Agency, a consortium of national space agencies of several European countries; (iii) India: ISRO Indian Space Research Organization; (iv) Japan: JAXA the Japanese national space agency; (v) USA: NASA National Aeronautics and Space Administration; and (vi) Russia: ROSCOSMOS the Russian space agency.

22 New Telecom Policy 1999: visit https://usof.gov.in/assets/acts_policies_rules/1664281189_b1ec1b872a1c70ca4735.pdf.

III. THE SUO MOTO EMERGENCE OF INDIA'S NEW SPACE (2012-2019)

The earliest *space buzz* was created when Team Indus,[23] the only Indian team participating in the Google Lunar X prize competition (2007-2018), was adjudged one of the five finalists. *Albeit* since none of the five finalists were able to launch the lunar rover within the given time, none won the prize[24]. Unexpectedly, Team Indus enlivened the sense that ambitious entrepreneurs could also achieve outstanding success in outer space.

2012 marks the year when the first space company Dhruva[25] was incorporated, signaling the *suo moto* emergence of India's New Space. The event was unmarked and unnoticed by the Government and the media. In the following years, unconnected to nor dependent on the national space program, several ‘ space' start ups took birth including (i) *space transportation* (Skyroot[26] and Agnikul[27]); (ii) *satellite manufacturing* (Dhruva and AzistaBST[28]); (iii) *Advanced In-Space Mobility-Propulsion*-(Bellatrix Aerospace[29]); (iv) *EO data services* (Pixxel[30] and SatSure[31]); (v) *SSA/STM* (Digantara[32]); (vi) *MM-wave wireless network* (Astrome[33]); and (vii) *On-line global market place for the space industry* (SatSearch[34]). In the initial phase, these companies managed to raised combined funds of around US$ 800 mostly from private sources, angel investors and early- stage venture capitalists.

23 Bannerji Rishab, (16 September 2017) Indiatimes.com, See: India's Team Indus in the top three of Google Lunar XPrize, Could Send First Private Rover To The Moon, 16 September 2017 at https://www.indiatimes.com/technology/news/india-s-team-indus-in-the-top-three-of-google-lunar-xprize-could-send-first-private-rover-to-the-moon-261618.html.

24 Chappell Bill (24 January 2018) See: NRP Google's Space Race To The Moon Ends, And Nobody Wins Lunar X Prize https://www.npr.org/sections/thetwo-way/2018/01/24/580191165/googles-space-race-to-the-moon-ends-and-nobody-wins-lunar-x-prize.

25 Dhruva Space Pvt Limited: https://www.dhruvaspace.com/.

26 Skyroot: https://skyroot.in/.

27 Agnikul: https://agnikul.in/#/.

28 Azista BST: https://www.azistabst.com/.

29 Bellatrix Aerospace: https://bellatrix.aero/.

30 Pixxel: https://www.pixxel.space/.

31 SatSure: https://www.satsure.co/.

32 Digantara: https://www.digantara.co.in/.

33 Astrome: https://astrome.co/.

34 SatSearch: https://satsearch.co/.

The new space founders are self-motivated to create proprietary IP in space technologies, hoping to provide custom built solutions to commercial customers. The new space start-ups are independent and unconnected with the government procurement ecosystem that consisting of around 700 commercial companies providing products and services required for the national space programme.

Recognizing that institutionally the national space program did not offer opportunities, except through the government procurement route, new space chose to amplify their presence through blogs, set up the *New Space WhatsApp group* instantly connecting "space" professionals, scientists, media and enthusiasts globally, fixed up in-person meetings in the Space establishment and outside, with whoever was willing to meet them. They participated and won space challenges and competitions hosted by universities abroad, particularly in countries that had already identified *space as key to next phase of national economic development for their countries*. Newspaper articles started writing about these extraordinary companies and their young founders, until unexpectedly, new space was acknowledged in the Space Reforms 2020. In 2024 there were 200 space startups as per official records

IV. SPACE REFORMS 2020

On 24th June 2020, Prime Minister Modi announced the Space Reforms[35] emphasizing private sector participation *in the entire range of space activities*. The Cabinet decision, he said, was in line with the long-term mission to transform India into a technologically advanced, industrially robust and an *Atmanirbhar* (self-reliance) country. The objective was to leverage India's advanced space capabilities[36] by providing *a friendly regulatory environment and encouraging policies* to facilitate private sector participation. And, that the Indian National Space Promotion and Authorization Centre (IN_SPACe) had been established to facilitate non-government private enterprises (NGE) to participate in *all aspects of space activities* in furtherance of the reforms.

35 Space Reform 2020: visit https://www.isro.gov.in/UNLOCKING.html.

36 Indian Space program: backed by public funding for over five decades and developed by the Department of Space/ISRO for societal applications and to support commercial space activities.

V. INDIA SPACE PROGRAM – ORGANIZATION AND MANAGEMENT

V.1. Office Of The Prime Minister Of India (PMO)

The Department of Space functions under the direct oversight of the Prime Minister Office (PMO)[37]. The Minister of State (Space) in the PMO facilitates ongoing linkages with DoS.

The Minister of State (Space) also holds concurrent charge as Minister for Science and Technology[38] and as Minister for Earth Sciences[39] – facilitating institutional rationalization thereby assuring seamless implementation of reforms in three critical and intrinsically inter-dependent space sectors – satellite broadband communications; geospatial data systems; climate change and earth sciences. It has also facilitated initiatives in new and emerging technologies and in manufacturing. Additionally, although Ministry for Information Technology and Electronics (MeitY) which administers Information and Communication Technologies and ICT enabled service, does not function under the remit of the PMO, it is recognized as the critical fourth pillar because it is the umbilical link for delivering location- based digital transformation in India.

V.2. Department Of Space

(i) The Department of Space is in fact the National Space Administrator. The Secretary, Department of Space (DoS) is the Competent Authority for matters related to national space activities.

(ii) Space Commission of India formulates policies and oversees the implementation of the Indian space program to promote development and application of space science and technology for socio-economic development in the country; the establishment of space-based systems and their applications that are coordinated by the national

37 Department of Space and ISRO HQ : for detailed description of the national space missions and current activities visit https://www.isro.gov.in/about-isro/department-of-space-and-isro-hq. For details about Department of Space and ISRO Budget visit https://www.isro.gov.in/budget-glance.

38 Ministry of Science and Technology: See: https://most.gov.in/; and Department of Science and Technology (DS&T) now includes in its remit – remote sensing of the Earth, launch services, satellite communications, telemetry, space exploration and space law, and international cooperation for space projects and missions. See https://dst.gov.in/.

39 Ministry for Earth Sciences : See: https://www.moes.gov.in/.

level committees that include (a) INSAT Coordination Committee (ICC);(b) Planning Committee on National Natural Resources Management System (PC-NNRMS); and (c) Advisory Committee of on Space Sciences (ADCOS). Secretary, DoS is concurrent Chairman Space Commission.

(iii) The following downstream entities also function under the remit of the Department of Space : (a) Indian Space Research Organization, (Space Agency ISRO)[40]; (b) National Physical Research Laboratory (PRL); (c), National Atmospheric Research Laboratory (NARL); (d) North Eastern-Space Applications Centre (NE-SAC); (e) National Remote Sensing Centre (NRSC)[41]; (f) Antrix Corporation Limited (Antrix) [42] (g) New Space India Company of India Limited (NSIL)[43]; and (h) Indian Space Promotion and Authorization Centre (IN_SPACe) the space regulator for commercial space activities.

(iv) Compliance with Space Treaties: To date, ISRO has launched 127 Indian satellites, and 180 foreign satellites on commercial basis. In this regard, as a ratifying state of the Outer Space Treaty 1967, the Liability 1972 and the Registration Convention 1975, India fulfils the necessary requirements including (i) third party liability for Indian satellites; and (ii) timely submission of relevant information to the UN international registry of space objects as per UNGA Res 1721B. As far as commercial launch of foreign satellites, India follows international norms related to insurance during the 1st phase until on orbit delivery of the space object to the intended orbit, in addition to the fact that launch contracts are governed under the mutually agreed standard and special terms of contract.

40 Indian Space Research Organization: See: https://www.isro.gov.in/.

41 National Remote Sensing Centre: https://www.nrsc.gov.in/.

42 Antrix Corporation Limited: established in 1992 as the marketing arm of ISRO for promotion and commercial exploitation of space products, technical consultancy services and transfer of technologies developed by ISRO, including space related services like remote sensing data service, transponder lease service; launch services through the operational launch vehicles (PSLV and GSLV) and mission support services, among others. https://www.isro.gov.in/about-isro/antrix-corporation-limited.

43 New Space India Company Limited: established in 2019 with a business portfolio which includes the production of the PSLV and SSLV launch vehicles, launch services, satellite based services, satellite building and sub systems, among others.

https://www.isro.gov.in/about-isro/newspace-india-limited-nsil.

VI. REORIENTATION AND RECONFIGURATION OF THE NATIONAL SPACE PROGRAM POST 2020

Broadly, the reorientation and reconfiguration of national space program after 2020 has been along 4 principal verticals (1) national space programme – new phase activities in Earth orbit; (2) national space programme- new phase off Earth orbit activities; (3) NSIL scaling up existing commercial procurement ecosystem through transfer of technology and end to end manufacturing and (4) commercial space activities.

VI.1. National Space Program

In furtherance of the decision to expand the national space programme pursuant to Space Reforms 2020, in a significant institutional re-orientation, ISRO's routine operational functions were transferred to New Space India Limited, the national commercial space launch service provider[44] [NSIL]. This institutional rearrangement, immediately allows ISRO to lead the expansion of the national space program for which Research and Development to acquire required technology is imperative.

(1) In Earth Orbit (i) national human space flight program ' *Gagaanyaan*' mission; and (ii) establishing a manned Indian Space Station at around 400 km in Low Earth orbit '*Bharatiya Antariksh Station*[45] (BAS). The initial configuration of BAS is planned to host three crew members for 15-20 days. Towards this end ISRO has successfully conducted the on-orbit docking twin satellite experiment *SpaDeX* in January 2025[46]. Finally, that India proposes to land an astronaut on the Moon by 20[47].

 NB : When India undertakes the human spaceflight, India will automatically conform with both Outer Space Treaty Article V read with Rescue Agreement, India has ratified both the treaties.

44 New Space India Limited: https://www.nsilindia.co.in/.

45 Press Information Bureau (18 December, 2024) : Statement in Lok Sabha by Dr Jeetendra Singh, Minister of State for Space : https://www.pib.gov.in/PressReleasePage.aspx?PRID=2085592.

46 Press Information Bureau (16 January 2025) SpaDEX Mission Revolutionizing Space Exploration : https://www.pib.gov.in/PressReleasePage.aspx?PRID=2093369.

47 Press Information Bureau (19 March, 2025): Statement in Lok Sabha by Dr Jeetendra Singh, Minister for State for Space: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2112835.

(2) **Off Earth Orbit activities** (i) to advance the **national lunar program** building on the success of previous moon missions including, **Chandrayaan-1 in 2008**; **Chandrayaan-2 in 2019** and **Chandrayaan-3** that successfully landed the **lander** (Vikram) and **rover** (Pragyan) near the Moon's south pole on **August 23, 2023**. The mission included a propulsion module to carry the lander and rover to lunar orbit. The lander and rover carried various scientific instruments to study the lunar surface and environment. (ii) ISRO has proposed India's first **lunar sample return mission in 2027**, that will also demonstrate advanced docking technology – **Chandrayaan 447**; (iii) ISRO proposes to undertake studies and missions for *in situ utilization* of space resources, celestial prospecting and other aspects of extra-terrestrial habitation. Indeed, the Indian Space Policy 2023, Para 6 (ISP 23)[48] lists the ISRO workplan to achieve the stated objectives; and (iv) India will continue to build on the success of the 1st Mars mission- Mangalyaan in 2013 and continue with deep space missions.

NB. India has ratified the Outer Space Treaty and is Signatory to the Moon Agreement. India supports the Outer Space Treaty is the primary document for governance of outer space activities. It is stated that India's approach to on space resource utilization will be as per international law. It is well known, that the UNCOPOUS Legal Sub Committee Working Group on Legal Aspects of Space Resource Activities[49] is scheduled to submit its outcome report in 2027.

VI.2. International Collaborations[50]

(i) Currently, India has signed space cooperation documents with 61 countries and five multilateral bodies. The major areas of cooperation are satellite remote sensing, satellite navigation, satellite communication, space science and planetary exploration and capacity building.

48 Indian Space Policy 2023: (ISP) https://www.isro.gov.in/media_isro/pdf/IndianSpacePolicy2023.pdf.

49 UN COPOUS legal Sub Committee Working Group on Legal Aspects of Space Resource Activities visit: https://www.unoosa.org/oosa/en/ourwork/copuos/lsc/space-resources/index.html.

50 Press Information Bureau – Department of Space, Reply to Question in Parliament on ISRO collaboration with Other Space Agencies dated 25 March 2025. Visit file:///C:/Users/Ranjana%20Kaul/Documents/c%20data/SPACE%20ISRO%20Collaboratios%20PARLIAMENT%20QUESTION_%20ISRO%E2%80%99S%20COLLABORATION%20WITH%20OTHER%20SPACE%20AGENCIES.html.

(ii) **International cooperation in lunar missions** include (i) ISRO became signatory to the US NASA Artemis Accords in 2023; (ii) ISRO – US NASA joint satellite mission, named 'NISAR (NASA ISRO Synthetic Aperture Radar)' which is in the advanced stages of realization. (ii) ISRO is working with CNES (French National Space Agency) for realizing a joint satellite mission named 'TRISHNA (Thermal Infrared Imaging Satellite for High Resolution Natural Resource Assessment)', which is in the initial stages; and (iii) ISRO and JAXA (Japan Aerospace Exploration Agency) have carried out a feasibility study to realize a joint lunar polar exploration mission; (iv) India became.

VI.3. New Space India Limited: *Scaling Up Commercial End To End Manufacturing*

(i) In the next phase, Department of Space has proposed to leverage and scale up the participation of the existing highly skilled competent vendor base, that is capable of manufacturing and supplying hi-specs products and services required by ISRO for the national space program through the government procurement route since 1972. This vendor base consists of about 650 commercial companies both private companies and public sector companies. At the core of this unique ecosystem are about 150 companies, among which are some of India's iconic legacy companies including Larsen & Tubro,[51] Godrej & Boyce,[52] Hindustan Aeronautics,[53] Walchand Industries,[54] Tata Advanced Systems[55], Anantha Technologies[56] and Bharat Electronics[57] that have been helping ISRO build rockets and satellites. Before the Space Reforms 2020,

51 Larsen& Tubro (L&T) https://www.larsentoubro.com/ L&T Precision Manufacturing Division https://www.larsentoubro.com/corporate/about-lt-group/facilities/india/coimbatore- tamil-nadu/ (accessed 12th February 2022).

52 Godrej & Boyce Manufacturing Limited (Godrej) https://www.godrej.com/godrejandboyce/.

53 Hindustan Aeronautics Limited (HAL) https://hal-india.co.in/.

54 Walchand https://walchand.com/business-area/aerospace/.

55 Tata Advanced Systems Limited https://www.tataadvancedsystems.com/; https://www.tataadvancedsystems.com/satellite-integration.

56 Anantha Technologies: https://ananthtech.com/.

57 Bharat Electronics: https://bel-india.in/homepage/.

the procurement contracts involved technology transfer to build, without design component and without Assembly, Integration, Testing (AIT) functions that were retained by ISRO. These contracts were based on handholding entrepreneurs, with the safety net of buyback to ensure business survivability[58] and not designed to scale up.

VI.4. Transfer Of Technology With End-To-End Manufacturing Through Competitive Bidding

(i) Pursuant to transfer of ISRO operational functions to NISL in 2020 it was decided to establish a transfer of technology with end-to end- manufacturing ecosystem by industry consortiums through transparent competitive bidding process mechanism.

(ii) Consequently, NSIL issued Request for Proposals (RFP)[59] for end-to-end manufacturing of Polar Satellite Launch Vehicles (PSLVs). NSIL received three bids from industry consortia, that also include new space companies. On 6 April 2022 NSIL awarded contracts for manufacturing five PSLVs to the HAL-L&T consortium[60]. More recently, Hindustan Aeronautical Limited emerged won the competitive bid for a Transfer of Technology from ISRO to build, own and commercialize small satellite launch vehicles (SSLV) launches [61] , thus adding a third player – a Public Sector Undertaking – to the two existing commercial start-ups Skyroot and Agnikul. As much as HAL will benefit from Transfer of PSLV technology to build the SSLVs, Skyroot and Agnikul have each developed proprietary IPR for their SSLVs models.

58 Prasad, Narayan (2017) Traditional Space and NewSpace Industry in India- Current Outlook and Perspectives for the Future, See https://www.researchgate.net/publication/313818574_Traditional_Space_and_NewSpace_Industry_in_India-_Current_Outlook_and_Perspectives_for_the_Future.

59 IANS (16 September 2022), International Business Times See:HAL-L&T consortium bag Rs.860 crores contract to build five Polar Satellite Launch Vehicles https://www.ibtimes.co.in/hal-lt-consortium-bags-rs-860-crore-contract-five-polar-satellite-launch-vehicles-851996.

60 Times of India: HAL-L&T win over Rs. 824 crores contract for making 5 polar space launch vehicles See https://m.timesofindia.com/city/bengaluru/hal-lt-wins-over-824-cr-contract-for-making-5-pslvs/amp_articleshow/90736339.cms.

61 HAL wins INR 511 crore deal to build own and commercialize SSLV launches : https://www.thehindu.com/business/Industry/hal-outbids-adani-backed-firm-to-bag-transfer-of-technology-of-sslv-from-isro/article69717827.ece.

VI.5. Foreign Direct Investment In The Space Sector

(i) In February 2024 Government announced amendment to existing the foreign direct investment policy for the space sector[62] – (i) 74% FDI in satellite manufacturing and operations; satellite data products; ground segments & user segment; (ii) 100% FDI in manufacturing components and systems / sub-systems for satellite, ground segment and user segment; (iii) 49% FDI in launch vehicles and associated systems or sub systems; and in creating spaceports for launching and receiving spacecrafts. The larger objective is not only to make India a manufacturing hub for reliable hi-specs space products and also to encourage commercial satellite operators. The FDI policy has been further clarified/amended in 2025[63].

(ii) Early examples of international collaborations, following FDI reforms, include Anantha Technologies and Digantara consortium which is jointly executing a contract to provide end to end design and manufacturing of satellites and surveillance services to Australia under Mission for Australia-India Technology Research and Innovation Program. Similarly, Norway, Hungary, Poland and some countries in West Asia have also contracted several space companies, including Adani Defence and Aerospace and Alpha Design[64].

VII. IMPLEMENTING SPACE REFORMS 2020:

(1) It may be noted that in preparation of its functions per the Article VI mandate, the following institutional steps have been taken by Department of Space and IN_SPACe

(a) **The Catalogue of Indian Standards for Space Industry 2023**[65] prepared by Department of Space and Bureau of Indian Standards was issued by IN_SPACe. The Catalogue containing mandatory standards for various components/ parts

62 Press Information Bureau, 21 February 2024 FDI Policy for the space sector See: https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2007876.

63 Press Information Bureau (12 March, 2025) on FDI in space sector See: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2110835.

64 Magzter,27 June 2025: Worldwide race for eye in the sky spurs satellite orders for India at https://www.magzter.com/stories/newspaper/Hindustan-Times-Delhi/RACE-FOR-EYE-IN-SKY-SPURS-SATELLITE-ORDERS-FOR-INDIA?srsltid=AfmBOoojfGC8_H1b1kckdhasGB091E7syD38uSRWa0L4wJJ2VwWKoJua.

65 The Catalogue of Indian Standards for Space Industry 2023 : file:///C:/Users/Ranjana%20Kaul/Downloads/Catalogue-Indian%20Standards%20for%20space%20industry-1%20(5).pdf.

etc for spacecrafts that are imperative **for the safety of space operations**. The Catalogue aims to standardize processes and technologies within the Indian space industry, so as to ensure high quality and global competitiveness. It includes 15 standards covering areas including Space System Program Management, Systems Engineering principles, and Product Assurance Mechanisms. The standards apply to all sectors of space activities, including satellites, launch systems, and ground systems. The Catalogue Standards are mandatory for NGE to adopt to secure authorization.

(b) **The Indian Space Policy 2023**[66] **(ISP 23)** was issued by IN_SPACe. The Policy primarily aimed to provide Non-Government Entities – the commercial space companies- an exhaustive list of *space activities* that may be undertaken (para 4); the list authorizations that IN_SPACe would grant (para5); a list of activities that are the remit of ISRO (para6); activities that New Space India Limited will undertake (para7); and the overarching functions of the Department of Space (para 8).

(c) **2024 Norms, Guidelines, Procedures for implementation of the Indian Space Policy 2023**[67] **(NGP)**

(i) It may be noted that at this time, IN_SPACe has announced that authorization will be granted for the following (i) **authorization for establishing and operating** Ground Stations, subject to fulfilling ITU compliances requirements; and (ii) **authorization for establishing** space-based satellite communications satellite systems and space -based remote sensing satellite systems; and (iii) **authorization for <u>procuring the launching</u>** a commercial satellite from an overseas commercial space launch service provider.

(ii) The NGP require the NGE to obtain **third party liability insurance**, in an amount that is decided on case by case basis, in case of event of damage in outer space involving the NGE commercial satellite, thereby triggering liability under Outer Space Treaty Article VII read with the Liability Convention.

66 Indian Space Policy 2023: view https://www.isro.gov.in/media_isro/pdf/IndianSpacePolicy2023.pdf.

67 Norms, Guidelines and Procedures for Implementation of Indian Space Policy -2023 in respect of Authorization of Space Activities (NGP), issued by IN_SPACe in May 2024 – file:///C:/Users/Ranjana%20Kaul/Downloads/NGP_Authorization%20(6).pdf.

(2) **Application and national implementation of international space treaties:**

India is a space faring nation, and it is expected that in due course, Indian commercial satellites will be launched from India. In this view of the matter, the following provisions will be simultaneously applicable – (a) Outer Space Treaty Article VI; (b) OST Article VII read with Liability Convention; and (c) OST Article VIII read with Registration Convention.

(a) Pursuant to Space Reforms 2020, **IN-SPACE** become the repository of the India's National Register of Space Objects.

(b) As such, it is required that upon being granted **authorization to procure the launching of its space object by IN-SPACe**, after the NGE/commercial space company launches its satellite, thereafter upon application its in-orbit satellite will be allotted a **COSPAR International Designator (ID)**.

(c) The said commercial space company is required under terms of Authorization to submit to IN_SPACe (i) the COSPAR ID; and (ii) the ephemeris data for its in-orbit satellite.

(3) Thereafter, IN_SPACe shall enter said COSPAR ID in National Register of Space Objects.

Thereby confirming India is the State of Nationality, is the Launching State and is the State of Registry of such space object launched by an Indian commercial space company as such *capable of exercising jurisdiction and control over such commercial space object and exercise (as per OST Article VIII); and keep such in orbit satellite under continuing supervision (as per OST Article VI).*

(4) **Continuing Supervision of NGE space objects by ISRO/ISTRAC:**

Having entered said COSPAR ID in National Register of Space Objects, IN-SPACe is required to provides the (a)COSPAR ID and (b) ephemeris data of the specific Indian commercial satellite o the ISRO/ISTRAC[68] to place it under continuing supervision.

IN_SPACe provides updated ephemeris data to facilitate the continuing supervision function from time to time, on receiving the updated data from commercial space company at pre-determined intervals as per the terms of authorization.

68 ISTRAC – is the ISRO Telemetry Tracking and Command Network.

(5) **Additional compliance requirements under Authorization include but not limited to**:

Re: Space Debris, Collision Avoidance, SSA/STM

(i) **Design** – Failure Mode analysis to assess risks of on-orbit failure; (b) takes into consideration minimizing debris creation, during operational mission period and passivation; and (c) manoeuvring capability for satellites with largest face areas more than 0.1m2'

(ii) **On-Orbit Collision Risk Mitigation** – ISRO for Safe and Sustainable Space Operations Management [IS4OM] (a) Operators to work in close coordination with IS4OM to jointly arrive at a strategy regarding Collision Avoidance manoeuvre (CAM); (b) Perform conjunction assessment of their assets. Operators are encouraged to avail of SSA/STA services or seek assistance for ISRO; (c) Probability of Collision exceeds pre-defined threshold warranting mitigating risk, operator is required to execute CAM; (d) If the threat object is debris / non manoeuvrable the Operator is required to design and execute CAM;

(iii) If the threat object is another operational satellite, the Operator is required to coordinate with external operator, and to jointly decide the CAM strategy to decide which party will execute CAM; (a) the Operator is required to communicate in writing/email with IS4OM and IN_SPACe within 7 days of resolution of conjunction.

(iv) **Reporting Requirements** – Operator is required to identify a POC who will be responsible for coordinating responses for conjunction alerts and any other associates queries related to operations, including on orbit manoeuvres on 24/7 basis.

VIII. IN_SPACE : AUTHORIZATIONS GRANTED FOR SPACE SEGMENT (REPRESENTATIVE LIST)

(1) **Remote Sensing Satellite Systems [ISP Para 4 (5) and (6)]**

(a) Tata Advance Systems – was the first NGEs to be authorized to procure a commercial space launch for their remote sensing satellite system from Space X, USA in May 2024. The authorization required TAS to provide COSPAR International Designator (COSPAR ID) to IN_SPACe with the within one month after the launch[69]. As such, TASL-1 became the first Indian commercial remote sensing satellite to be entered in the Register of Space Objects maintained by IN_SPACe. TASL-1 is under continuing supervision by ISRO/ISTRAC.

(b) The Pixxel Firefly constellation of 3 hyperspectral remote satellite systems have received authorization to procure a launch from an overseas commercial launch service provider, the Firefly satellites will also be on the Indian Register of Space Objects once these satellites are launched.

(2) **Space – based Satellite Communication Satellite Systems [ISP 23 Para 4.1-4]**

The permits non-government entities to offer national and international space-based communications services through self-owned or leased GSO/NGSO communications satellites; use of Indian orbital resources or Non-Indian orbital resources authorized and to make new filings to ITU through the national spectrum regulator the 'Wireless Planning & Coordination Wing, Department of Telecommunications (WPC/DOT).

Pursuant thereto, IN_SPACe invited bids under the '*Announcement of Opportunity*' to leverage India's ITU filings in the Ka Band to develop throughput satellite "*to support communications needs in sectors like education and health and to India's digital infrastructure*".

In 2024 Anantha Technologies (ATL) won the bid and has been authorized to develop and operate GSO satellite in the Ka-band, including to oversee the entire project, including satellite design, launch, and operations, along with handling critical frequency coordination and ITU compliance. The satellite will feature multi-beam technology and aims to enhance connectivity across India. ATL will become the first commercial communications satellite operator.

On 5th July 2025 Anantha Technologies announced that it had received authorization from IN_SPACe to start broadband services by 2028[70].

69 NGP Chapter XI- Registration of Space Objects.

70 Rathee, Kiran (5 July 2025), Economic Times- Ananth Tech to offer Satcom via desi satellites – https://economictimes.indiatimes.com/industry/telecom/telecom-news/ananth-tech-to-offer-satcom-via-desi-satellites/articleshow/122256405.cms?from=mdr.

IX. NATIONAL SPACE LAW

IN_SPACe is mandated to draft a national space activities law, that must necessarily conform with the principles of the Outer Space Treaty. As may be abundantly clear from the previous paragraphs on authorization, it is self-evident that a national space activities law consists of two intrinsically inter-dependent and interlinked components:

(a) **Technical Regulations (TR) involving standards, terms and conditions of authorization**. **The TR** are foundational for assuring safety of space operations and for conducting activities in outer space safely, and **include mandatory technical and operational compliance requirements** that are imposed as part of authorization to NGE to conduct permitted activities in outer space;

(b) **Regulatory Framework (RF) is the second component**. It is the overarching textual part of the national space activities law that must properly establish through appropriate harmonizing the principles of the Outer Space Treaty (all of which are inevitably linked to the TRs) into national law through careful and accurate drafting of provisions in proposed space activities law. It is imperative for drafters to ensure that the provisions in proposed space activities law care capable of being nationally applied and implemented, thereby to fulfil India's international Treaty obligations.

X. PRESENT STATUS

The five years following 2020 Space Reforms has seen simultaneous implementation across four verticals – reimaging the national space program; leveraging the existing highly skilled commercial companies that are foundational to government procurement ecosystem; opening opportunities for new space commercial companies, and undertaking methodical preparatory steps to establish " authorization' and ' continuing supervision' matrix across commercial space verticals, early authorizations to assure that all systems and procedures are in order, penultimate to issuing a draft national space activities law.

REFERENCES

1. Catalogue Indian Standards for Space Industry 2023
2. Indian Space Policy 2023 https://www.isro.gov.in/media_isro/pdf/IndianSpacePolicy2023.pdf
3. Norms, Guidelines and Procedures for Implementation of Space Policy-2023 In respect of Authorization of Space Activities, 2024 : https://www.inspace.gov.in/inspace?id=inspace_ngp_update_page

Introduction: The Development of National Space Legislation in Europe

by Kai-Uwe Schrogl
Special Adviser for Political Affairs, European Space Agency (ESA); President, International Institute of Space Law (IISL)

To date, only 13 countries in Europe have a national space law, implementing the obligations from Art. VI of the Outer Space Treaty (OST) of 1967.[1] This is less than half of the 27 Member Stets of the European Union (EU) and slightly above half of the 23 Member States of the European Space Agency (ESA). The enactment of these laws spans from the 1980s to today. Out of these figures arise two major problems. The first is that there is still no regulatory level-playing field, since (too) many countries have not addressed their international obligation from the OST to authorize and continuously supervise private space activities, providing them with competitive advantages for their private actors. The second is that since the period of enactment of national space laws now covers four decades, the approach and content of the laws so far enacted vary considerably, responding to needs and requirements of their time of drafting.

1 Lists at https://www.esa.int/About_Us/ECSL_-_European_Centre_for_Space_Law/National_Space_Legislations and https://astro.unoosa.org/astro/national-space-law-landing-page.html

The half century of national space law making in Europe can be divided into roughly three phases. Before 2000, we see early laws not yet fully elaborate since the privatisation of space activities has not yet started. Some of these are the Norwegian, the Swedish and the UK laws. Then a phase of orientation and also conflicting approaches during the 2000s happened with in particular the Dutch and the Belgian laws with different scopes. Since the 2010s, we see a high-time with shared understanding of how to implement the obligations, where also smaller countries enacted solid, well-crafted laws, like Austria, Finland or most recently on 1 February 2025 Slovakia. Regarding today and the near future as a fourth phase, we have to point at countries as Spain, Italy and Germany, who are only now in the governmental or parliamentary process of adopting such laws, taking up their obligations in a mismatch with their privatisation policies. The advantage of such late-coming however is to include requirements as for sustainability or space traffic coordination/management, which are not yet contained in the previously enacted national laws.

European national space laws are therefore lacking coherence and harmonisation through their differing approaches and comprehensiveness. This was already apparent in the 2010s, when efforts were undertaken in the ESA frame (specifically in the ESA International Relations Committee at the time when I chaired this delegate body). While this led to a good understanding of the areas and the necessity for harmonisation, it did have an impact only at the following legislations and not on the already existing one. A strong impetus was also given by the Working Group in the Legal Subcommittee of UNCOPUOS on National Space Legislation, which led to the respective UN General Assembly Resolution 68/74 of 11 December 2013. It was further assisted by coordination efforts and advice from ESA's Legal Department and the non-governmental European Centre for Space Law (ECSL).

And today, the UN Office for Outer Space Affairs through its various initiatives in this field also show to Europe that many countries in other world regions with less space activities than their European counterparts nevertheless enact national space legislation, while those in Europe still hesitate. In this context, it can be noted that Europe has always been leading in the academic and diplomatic debates on national space legislation (for example in the Project 2001 of Cologne University, or the UNCOPUOS LSC Working Group on the legal concept of the "launching State", which I chaired in the early 2000s, leading it to UN General Assembly Resolution 59/115 of 10 December 2004). A breakthrough was actually achieved by Irmgard Marboe from Vienna University, who did not only successfully chair the LSC Working Group on National Space Legislation but also is the author of the Austrian national space law, being a model for numerous following national space laws, not only in Europe.

But why do European countries not simply harmonise their national space legislations, a question frequently posed from outside Europe? The first answer is that competitive advantages with no or less strict legislation are as attractive on a European as they are on a global level. The other is that the EU so far is explicitly prevented by the Treaty on the Functioning of the European Union, Art. 189,2 by enact harmonisation and has thus been in difficulties of scoping what is now foreseen as the EU Space Act. This is now intent to be a common market legislation, providing guidelines for standards, sustainability, safety and security throughout Europe, consolidating in particular an industrial and services level-playing field, until now prevented by the slow and incoherent development of national space legislation in less than half of the Member States.

The following selection of national space legislation mirrors this development in Europe. It also points at legislation apart from the implementation of Art. VI of the OST, like registration, data security or frequency management. Starting with the UK, it shows an early legislation already understanding the potential of private, commercial space activities. Then the French legislation is presented, which has a very specific requirement by operating Europe's space port in Kourou. Luxemburg prepared already a more current legislation but holds the specificity of having also enacted a dedicated, somewhat contested, legislation on space resources. Italy is only now in the parliamentary process of establishing its national space law, while Germany actually does not have one yet, while previously having enacted dedicated legislation on satellite Earth observation.

In summary the selection and the general consideration shows that the ideal to follow for Europe is: 1) that all European States shall enact national space legislation implementing their obligations from Art. VI of the OST, 2) that these national space legislations shall be fully harmonised in order to provide a level-playing field for private space activities, 3) that these legislations shall also take into account the current developments and requirements as sustainability and Space Traffic Management, 4) that the European Union can play a role in setting appropriate framework and common market conditions. With this fulfilled, Europe can also communicate on eye-level with other countries and regions on a harmonised implementation of obligations from the OST and the rule of law in outer space.

THE UNITED KINGDOM

Table of Contents

About the Author

Darcy Beamer-Downie

Darcy completed her legal training as a Barrister in England, and she then obtained her LL.M in Air and Space law from McGill University, Montreal, Canada. Darcy has extensive aviation and aerospace experience gained from being General Counsel at Airclaims (Aerospace loss adjusters) and from being an associate at Beaumont & Son (a boutique London aviation law firm) that merged with Clyde & Co in 2003.

In her career, Darcy has dealt with, on behalf of insurers, reinsurers, and private clients, various space claims. Including in respect of policy coverage issues, failed rocket launches, defective satellites and issues relating to environmental remediation of crash sites.

In addition, she has given lectures on space law at the Royal Aeronautical Society, University of Leiden, Bath, and Cranfield and presented papers at various bar association conferences around the world and at the International Astronautical Congress. She has dual British and Canadian citizenship.

darcy.beamer-downie@clydeco.com

Gabriella Mifsud

Gabriella is an Associate in Clyde & Co London's Aviation and Aerospace team, having qualified to practice in Malta and England and Wales. Gabriella is a graduate of the Advanced LLM in Air and Space Law at Leiden University. Her practice at Clyde & Co focuses on aviation regulatory, commercial and insurance matters and space insurance. Gabriella has also given lectures on space law at various universities in Europe and presented papers on space law at various international conferences.

gabriella.mifsud2@clydeco.com

Inês Afonso Mousinho

Inês has an LLM (Adv.) from the International Institute for Air and Space Law at Leiden University, the Netherlands. Inês is an associate in Clyde & Co London's aerospace team. Her practice covers a wide range of both contentious and non-contentious matters for a range of airlines, maintenance and repair organisations, UAS manufacturers and operators and other aviation and space stakeholders. Her non-contentious practice includes regulatory and commercial advice. Inês has given various space law lectures at European universities and is a member of Space Law Research Centre (SPARC) of Nova School of Law in Lisbon.

ines.afonsomousinho@clydeco.com

Abstract

In this chapter, we discuss the United Kingdom's (UK) rich space heritage including its research and rocket programmes starting in the 1950s. We then move on to the late 1960s and early 1970s, when the UK signed and subsequently ratified various United Nations declarations and treaties setting out the legal rules, principles, and guidelines governing activities, exploration, and uses of outer space.

We also discuss how these international law instruments then influenced UK domestic space policy and its law making to ensure that the UK remains in compliance with its international treaty obligations. We explain that up until the mid-1980s, UK commercial space activities were relatively modest. But by the mid-2000s, UK space policy was changing to take advantage of the opening-up of space to private commercial entities. Accordingly, the UK updated it space ambitions which were set out in its 2018 Space Industry Act. The UK has continued to develop its national space strategy and recognises that its space industry will benefit from policies that are both adaptable and promote innovation with balancing safety and sustainability. By way of example, the UK has created the policy foundations and regulations to promote the development of UK spaceports.

We also discuss the UK space licensing regime and point the reader to the various UK government on-line guidance for applicants seeking space licences and insurance. Finally, we discuss the post Brexit impact on the UK space industry and provide some commentary as to how the UK policy might usually proceed going forward.

Keywords List:

- Civil Aviation Authority (CAA)
- Space Insurance
- Space Licensing
- Space Policy
- Spaceports
- United Kingdom

1. INTRODUCTION

1.1

The United Kingdom has a rich and long space heritage ranging from astronomy to space exploration. For example, the British Interplanetary Society (BIS) was founded in 1933 (Arthur C Clarke being one of the founding members) its mission statement being that it is dedicated to "*promoting and disseminating*" information about "*space flight and astronautics*".[1] The BIS is still active today and claims to be the "*world's longest established organisation devoted to supporting and promoting the exploration of space and astronautics*".

1.2

The United Kingdom was also an early and key contributor in respect of research and development of rocket technology that ultimately benefited space research more generally. For example, the Skylark Rocket programme was a "*pioneering*" rocket research endeavor, which commenced in the 1950s and ran for approximately 50 years thereafter. Skylark was a research programme designed to assist in the development of ballistic missiles. In 1957 the first Skylark rocket was launched from Australia. The Skylark missile could fly at high-altitude, to the edge of space, and deliver small payloads for scientific research. In particular, it gathered data about the Earth, sun and deep space. In the 1970s Skylark provided some of the earliest ultraviolet images of space and successfully laid the groundwork for today's larger rocket programmes.[2]

1 See The Society – The British Interplanetary Society. (accessed on 2 July 2025).

2 Skylark: Britain's Pioneering Space Rocket – Science Museum Blog (accessed 2 July 2025).

1.3

The UK space sector today has a good international reputation for innovation, in particular with respect to satellite research development, and satellite construction. The UK is also very active in supporting various international global initiatives such as future missions to the Moon, Mars and the International Space Station. Whilst it is beyond the scope of this chapter to go into detail regarding historical UK space initiatives and accomplishments, the table below sets out in brief some key UK space events:[3]

Year	Event
1933	British Interplanetary Society is founded.
1943	Suborbital flight funding proposal for crewed space flight using adapted V2 rockets. The proposal was rejected.
1952	British Space Programme officially launched.
1950s	British Space Rocket Programme commenced, development of Skylark sounding rocket which operated for 50 years.
1957	13 November Skylark first launched and was the UK contribution to the International Geophysical Year.
1962	Ariel 1 satellite – the first British designed Satellite launched by NASA on 26 April. The UK is the third nation to have an operational satellite in orbit.
1971	Black Arrow – "*Britian officially enters the space race*".
1975	European Space Agency (ESA) founded (UK along with nine other nations).
1985	British National Space Centre established to coordinate national and international space activities.
1991	First British Astronaut, Helen Sharman (Soyuz).
2003	Beagle 2 the Mars rover is launched.
2004	X-prize is won by Scaled Composites/Mojave Aerospace Ventures which was partially funded by Sir Richard Branson's Virgin Galactic.
2015	First ESA Astronaut, UK's Major Tim Peake first British astronaut to visit the ISS.
2018	UK government passes Space Industry Act.
2021	Virgin Galactic – *VSS Unity*, suborbital space plane tourist flight with Sir Richard Branson on board.
2021	Space Hub Sutherland and Cornwall established and designed to service smallsat delivery to LEO.

2. HISTORY OF THE UK SPACE LAW MAKING PROCESS

Early Foundations Of Space Law

2.1

The United Kingdom's domestic space law, like many countries, can trace its roots back to various public international law declarations and treaties – sponsored by the United Nations, and which the UK subsequently signed and ratified (discussed below). The first of five being the 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 (the "1963 Declaration"). From this 1963 Declaration came the suite of United Nations Space Treaties[4] all of which, save and except for the Moon Agreement, have had good State take up and are often described as the *pillars* or *foundations* of international space law. The first foundational treaty is the Outer Space Treaty 1967 ("OST") which was followed by the Rescue Agreement 1968[5] , the Liability Convention 1972,[6] and the Registration Convention 1976[7] . The least successful of this suite of treaties was the Moon Agreement 1984[8] which has had poor uptake, including by the UK, who did not sign it. Some states that did ratify the Moon Agreement have since given notice that they will withdraw from it, possibly on the basis that the Moon Agreement, is arguably in conflict with the Artemis Accords[9] .

3 Reaching For The Stars: The UK's History In Space (accessed 2 July 2025). See also: The Most Important Milestones in the British Space History & the Future Potential – Orbital Today (accessed 2 July 2025).

4 Treaty on Principles Governing the Activities of States in the Exploration and Use of outer Space, including the Moon and Other Celestial Bodies (adopted on 19 December 1966, entered into force October 1967).

5 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (adopted 19 December 1967 and entered into force on 3 December 1968).

6 Convention on International Liability for Damage Caused by Space Objects (adopted on 29 November 1971 and entered into force on 1 September 1972).

7 Convention on Registration of Objects Launched into Outer Space (adopted on 12 November 1974 and entered into force on 15 September 1976).

8 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (adopted on 5 December 1979 and entered into force on 11 July 1984). This suite of treaties and principles were established by the UN Committee on the Peaceful Uses of Outer Space (COPOUS) which was established in the later 1950's following the launch of Sputnik but before the US landed on the Moon. The 1962 Declaration of Legal Principles was the first to set out space principles drafted by COPOUS.

9 For example, it is believed that the Kingdom of Saudi Arabia has withdrawn from the Moon Agreement on 5 January 2023 to avoid conflict with the Artemis Accords. Interestingly, Australia has signed both the Accords and the Moon agreement.

The Public International Space Law Framework

2.2

The suite of public international law UN Space treaties were agreed within about a 10-year time span.[10] At the time, many space nations, including those less advanced than countries like the Russian Federation or the United States, such as the UK, saw the benefit of agreeing international binding legal rules and principles governing access and exploitation of space which was deemed as the new frontier. These rules and principles more importantly served as a form of arms control – with outer space being designated to be used for peaceful purposes.

2.3

Moving forward to the present, there are sometimes rumblings that the treaties are no longer well-suited to the present realities of space exploration and use.[11] It is true to say that the treaties were drafted on the presumption that states would be undertaking the bulk of any exploration and exploitation activities rather than the private sector. However this is not the reality anymore, as the private sector works closely with government sponsored programmes whilst companies also undertake their own privately funded space activities, with the UK being a leading example in this respect. Nevertheless, the UK policy position remains that the UN Space treaties are the globally agreed framework and principles governing international space activities.

10 Brierly J.L. (1963), The Law of Nations (New York, Oxford University Press). Public International Law is defined as "*the Body of rules and principles of action which are binding upon civilized states in their relations with one another*".

11 See for instance: Tomorrow for which we are not prepared. Why is the Outer Space Treaty opposed to the idea of colonizing Mars? | Harvard International Law Journal (accessed 2 July 2025).

UK Initiatives In space

2.4

In 1975, the United Kingdom was one of the founding members of the European Space Agency (ESA)[12] which is an intergovernmental organization mandated to support space science and exploration by pooling resources. As an aside, the UK's membership of ESA is not affected by Brexit (shorthand for UK's departure from the European Union) because ESA is not a European Union organisation and it operates independent of the EU.[13] The UK continues to invest and participate in ESA programs and activities.

In January 1998, the UK and various other countries signed the International Space Station (ISS) Partners Agreement, which is a private non-exclusive agreement, the aim of which was to "*promote the commercial utilisation of the International Space Station (ISS) in Europe*".

2.5

The UK continues to be a pioneer in space to date. In October 2020, the United Kingdom was one of the founding signatories to the Artemis Accords which is a private non-binding multilateral agreement drafted by NASA[14] (entry by invitation only) and the "Accords represent a [Governments] *political commitment*" to their principles[15] . The main aim of the Accords is the creation "*of a uniform set of guidelines for countries to avoid potential*

12 ESA – History of Europe in space (accessed 2 July 2025).

13 ESA operates independently of the EU, thus allowing the UK to continue its membership and participation in ESA activities post-Brexit. However, the departure has resulted in the need to renegotiate terms, on decision making and access to certain projects may be limited. Collaboration remains critical as it seeks to assert its expertise in satellite technology and contribute to Europe's security interests through ESA endeavours. How Brexit Affects the UK Space Industry and European Collaboration: Impacts and Future Prospects – Space Voyage Ventures (accessed 2 July 2025).

14 With the US Department of State and the National Space Council. The final draft was announced in May 2020 following a government consultation process. The Artemis Accords were originally signed in October 2020, by Australia, Canada, Italy, Japan, Luxemburg, the UAE, the UK and the United States. As of 15 May 2025, 55 countries have signed the Accords.

15 The Artemis Accords, Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets. And Asteroids, Section 1 – Purpose and Scope. Dated 13 October 2020.

conflict or misunderstanding in future space endeavours".[16] Governments that sign the Accords may formally take part in the Artemis Program which has a focus on sustainable "civil" space exploration and of outer space[17] . The Artemis Accords purport to establish "*a political understanding regarding mutually beneficial practices for the future exploration of space...*". [18]

2.6

Between 2021 and 2023, the UK also agreed bilateral space agreements with Australia and New Zealand to promote space sciences, sustainability and new technologies such as on-orbit servicing and space debris removal.

3. UNITED KINGDOM DOMESTIC SPACE LAW

Harmonisation With International Space Law

3.1

The UK's regulatory framework is designed to align with both its space policy aspirations and its international obligations. The international obligations arise first and foremost from the UN Space Law Treaties and, in this regard, the UK guidance to its space regulators is that they must be mindful of these "*salient*" treaty principles[19] when considering license applications.

16 NASA Administrator Mr. Bridenstine.

17 The Artemis Accords Section 1 (paragraph 2) – Purpose and Scope: "*The principles set out in these Accords are intended to apply to civil space activities conducted by the civil space agencies of each Signatory. These activities may take place on the Moon, Mars, comets, and asteroids, including their surfaces and subsurfaces, as well as in orbit of the Moon or Mars, in the Lagrangian points for the Earth-Moon system, and in transit between these celestial bodies and locations*." Also see Section 11 – Deconfliction of Space Activities.

18 The Artemis Accords were originally signed in October 2020, by Australia, Canada, Italy, Japan, Luxemburg, the UAE, the UK and the United States. As of 15 May 2025, 55 countries have signed the Accords.

19 For regulators, the most salient points of the UN space treaties are that: the use of space must be exclusively for peaceful purposes; space must be accessible to all countries and used for the benefit of all countries; each state is internationally responsible and liable for its space activities, including activities carried out by non-governmental entities of that state; each state must authorise and continuously supervise the space activities of its non-governmental entities; each state must maintain a register of space objects it launches and furnish details regarding the orbital parameters and basic function of the space object to the UN; each state must, in conducting, authorising, or supervising its space. Spaceflight legislation and guidance – GOV.UK (accessed 2 July 2025).

3.2

In addition to the UN Space treaties, the UK is also subject to other international obligations such as: overflight agreements, the Convention on the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) (regulating dumping at sea), Space debris mitigation guidelines as set out in the Inter-Agency Space Debris Coordination Committee, the UK-US Technology Safeguards Agreement (TSA),Trade Agreements (TAA), and International Traffic in Arms Regulations (ITAR).

Registration Of Space Objects:

3.3

In compliance with its international treaty obligations, as per the Registration Convention, the UK Government mandated the UK CAA to maintain two space object registries. The first registers space objects when the UK is the launching state in accordance with the Outer Space Treaty VII and the Registration Convention.

3.4

The second registry relates to space objects launched that are not operated by the UK or UK government entity and where it has been determined that the UK is not the launching state. In this scenario, the UK will still approve that launch but the registration of the space object will be for the launching state.

Space Law – Keeping Pace With Technological Advancements

3.5

Overall, the UK's space policy and law-making process has been harmonized with its international technological advancements, geostrategic interests, and specific national needs, ensuring a comprehensive and forward-looking regulatory framework.

3.6

For example, the UK's space policy has evolved to keep pace with commercial space technological developments with a view to stimulating growth in the sector. In pursuit of this, the UK supports innovation by encouraging collaboration with industry and academia. In turn, the Space Industry Act 2018 (SIA) was developed to support emerging technologies such as satellite constellations, in-space manufacturing, on-orbit activities, debris removal, space situational awareness, space exploration and space tourism. The UK appears to understand the need to ensure that its regulatory framework is both flexible and adaptable to take advantage of new technological developments. It is a feature of the UK legislative law-making process that Parliament passes the laws of the land. In legislating for space activities, the UK has adopted the approach of setting out the key principles in a statute with accompanying regulations then setting out the relevant specificities. This approach permits UK rulemaking to be more flexible and to adapt to changing situations without the need to go back to Parliament to pass further updating legislation each time.

Geostrategic Interests

3.7

The UK's space law also aligns with its geostrategic interests. For example, the UK established the National Space Operations Centre (NSpOC) in 2024[20] with the specific aim to protect "*UK interests in space and on Earth and works with international partners to ensure space remains safe*". The work of the NSpOC is to deal with things such as the monitoring of uncontrolled re-entries of space objects, collision avoidance systems and space weather monitoring.

20 National Space Operations Centre – How we protected the UK and space in July 2024 – GOV.UK (accessed 2 July 2025).

Specific Needs

3.8

The UK's space law has been tailored to meet specific national needs. The SIA and its supporting regulations seek to deal with and address these key needs that fall broadly into three categories, namely: environmental considerations, safety standards, and public safety.[21]

UK Space Agency

3.9

On 1 April 2010, the UK Space Agency ("UKSA") was established, its *raison d'être* being to both develop UK space policy and centralize and oversee that policy. In this regard, the UK does not follow most other countries, in the sense that the UK Space Agency is an executive agency which provides support to the government and industry to boost the space sector. However, it does not act as a regulator, with that function falling to the UK Civil Aviation Authority ("CAA"). To date, the UK Space Agency has been instrumental in leading the UK's civilian efforts in space within the UK as well as encouraging external relations with entities such as ESA.

UK CAA

3.10

In July 2021, the UK CAA was appointed as the UK's regulator for space with responsibility for issuing licenses both under OSA and the SIA for operators and spaceports, and for ensuring compliance with both domestic and international rules[22]. As of 2023 it was announced that around 350 licences had been granted by the CAA since its appointment as regulator, a number which is thought to have increased since and which signifies the rapid growth of the UK space industry.

21 Space Industrial Plan: from ambition to action – advancing UK space industry – GOV.UK (accessed 2 July 2025).

22 The Space Industry Regulations 2021, Part 2 Appointment of regulator – Article 3.

Change In UK Space Policy And Advent Of NewSpace

3.11

A key impetus of change in the UK was brought about by the passing of the US Commercial Space Law Act 2004[23] which legalised US private space flight. In parallel to this, national space programmes were coming under increasing budgetary scrutiny. Historically, private space companies contracted on the profitable and less risky cost-plus basis, this changed when smaller players were able to contract with the likes of NASA on a fixed-price basis. The result was the opening up of the commercial space market to notable companies such as SpaceX. In short, private companies could now competitively compete and participate in national space programmes, alongside the big beasts.

3.12

This and other changes brought about the era known as "NewSpace"[24] and UK space policy sought to take advantage of this opportunity. According to a recent UK government policy paper, the UK Government recognizes the importance of delivering national space objectives, and accepts that this requires "*new ways of government and the private sector working together...This plan builds on our commitments [UK government] from our National Space Strategy which laid robust foundations for the ambitious journey ahead to embed space as a fundamental driver of industrial growth and we are prioritizing activity out to 2030 with clear timed missions and actions that we want to see backed and run by UK industry*[25] . The evolution of UK Space law and policy is discussed further below.

23 Public law 108-492, December 23, 2004. *Commercial Space Launch Amendments Act* of 2004. Updated by the 2015 *Space Resource Exploration and Utilization Act of 2015, spurring competitiveness and entrepreneurship*.".

24 The term NewSpace is used in this context to differentiate between the old space order in which the private sector contracted on the less risky cost-plus type of basis rather than a fixed price. NewSpace also speaks to the new era of a large variety of space activities in addition to reusable launch vehicles, other activities such as suborbital flights, space tourism, space ports, in-orbit services, exploration, mining, small sats, etc.

25 Policy Paper – Space Industrial Plan: from ambition to action – advancing UK space industry (https://www.gov.uk/government/publications/space-industrial-plan/space-industrial-plan-from-ambition-to-action (accessed 2 July 2025).

UK Policy – The Transition To Newspace

3.13

In 2021, the UK National Space Strategy Department for Science Innovation and Technology (DSIT) along with the Ministry of Defence jointly published the UK's National Space Strategy[26] and set the ambitious goal of making "*the UK one of the world's most innovative and attractive space economies*". The UK strategic review identified that the space sector is a complex one and, to achieve its ambitious goal, it was determined that partnerships between defence, commercial and science/academic sectors will be required. Devolved governments, such as Scotland, also published their own Policy Strategy in October 2021.[27]

3.14

In July 2022, the UKSA [28] published its strategy and the work it expects to deliver between 2022 and 2025 along with targets and milestones. In May 2024, an update was published in which the UKSA discussed how it "*will work towards*" delivery of its 8 planned priorities, namely: launching, space sustainability, exploration/discovery, Earth observation, inspiration, innovation, low Earth orbit capabilities and levelling-up and, as part of this initiative, the UKSA increased staff and opened offices in Scotland and Wales.

2024 Space Regulatory Review

3.15

The Space Regulatory Review [29] was published in May 2024 as a collaborative effort with input from key sectors: defence, finance, insurance, government and independent regulators. The Space Regulatory Review notes that the UK regulatory framework should "provide clarity and certainty" at a time of innovation and change in the UK space sector.

26 2021 Policy Paper – National Space Strategy 27 September 2021 National space strategy – GOV.UK (accessed 2 July 2025).Defence Space Strategy: Operationalising the Space Domain – GOV.UK (accessed 2 July 2025).

27 2021 Scottish Space Strategy strategy (accessed 2 July 2025).

28 UK Space Agency Corporate Plan 2022-25 – GOV.UK (accessed 2 July 2025).

29 Space Regulatory Review 2024 – GOV.UK (accessed 2 July 2025).

CURRENT LEGISLATIVE FRAMEWORK IN THE UK

Outer Space Act 1986

3.16

The United Kingdom's space activities were modest from the late 1960's until the mid-1980's and primarily consisted of rocket and satellite research, development and launching (via third party launch providers outside the UK). However, by the mid-1980's the British National Space Council (BNSC) was established as a department within the UK Department of Trade and Industry (DTI) tasked with reviewing space policy and making recommendations.[30] The result of the DTI review was that the Parliament adopted the Outer Space Act 1986[31] (OSA) which was the UK's first major piece of UK domestic space legislation. This was followed by the UK Space Industry Act 2018 (SIA) which came into force in July 2021.

3.17

The OSA formed the original basis for the regulation of UK outer space activities carried out in or from the UK or its overseas territories, or Crown dependencies. OSA required entities registered in the UK and UK nationals, involved in space activities, to obtain a license which in turn ensured that the UK Government complied with its international space treaty obligations, including liability for damage caused by space objects and the registration of space objects.

30 In 1985 the DTI established a committee which became the British National Space Centre (BNSC) to review current and future UK space activities and make their recommendations regarding UK space policy. The BNSC was replaced in 2010 with the UK Space Agency. Both the BNSC and now the UKSA mandate is to coordinate UK Space policy.

31 The Outer Space Act 1986, like most UK acts, sets out the basic principles and is a relatively short document running to about 10 pages. The detailed rules and regulations are then supplemented by way of statutory instrument.

Space Industry Act 2018

3.18

The Space Industry Act 2018[32] is a critical piece of UK legislation with the express aim of supporting the UK's ambitions in the commercial space sector. For example, the UK Space law via the SIA, provides the necessary framework to enable the UK to launch spacecraft and satellites in its own territory. It also defines spaceports and sets out the requirements for licensing and regulation of spaceflight activities. For example, in 2023, Virgin Orbit had an unsuccessful launch from Newquay, Southwest of England[33]. Further launches are being planned from the Scottish spaceport at SaxaVord[34] with a view to launching small satellite systems in the near future.

3.19

The SIA operates in conjunction with the OSA. The OSA governs overseas space activities undertaken by UK entities outside the UK, whereas the SIA is applicable to space activities carried out in or from the United Kingdom,[35] such as the following:

- launch (space or sub-orbital) and return;[36]
- procurement of a UK launch (space or sub-orbital);

32 This piece of primary legislation sets out a high-level enabling framework for commercial spaceflight operations, and the Space Industry Regulations 2021, the Spaceflight Activities (Investigation of Spaceflight Accidents) Regulations 2021; the Space Industry (Appeals) Regulations 2021; and the associated guidance documents and Regulator's Licensing Rules all provide the detailed provisions required to implement the Act.

33 The 747 "Cosmic Girl" carried the rocket over the Atlantic. The first stage was fine, and the second stage failed. UK space launch: Premature shutdown behind Cornwall rocket launch failure (accessed 2 July 2025).

34 Saxavord Spaceport and West of Scotland Space Cluster announce strategic partnership to turbocharge Scottish space economy – SaxaVord (accessed 2 July 2025).

35 Space Industry Act 2018, s.1. *The UK Guidance states that the Space Industry Act 2018 regulates all spaceflight activities taking place from the United Kingdom, and associated activities. Spaceflight activities are space activities and sub-orbital activities. The Act requires any person or organisation wishing to launch a launch vehicle from the UK, return a launch vehicle launched elsewhere than the UK to the UK landmass or the UK's territorial waters, operate a satellite from the UK, conduct sub-orbital activities, operate a spaceport or provide range control services, to obtain the relevant licence. It is supported by The Space Industry Regulations (the Regulations), that set out in more detail the requirements for each licence, and the Regulator's Licensing Rules, which contain procedural matters such as which application form to use to apply for a licence and what information the regulator will require in support of an application*. Guidance for range control licence applicants and licensees (accessed 2 July 2025).

36 Please note that the 2016 Air Navigation order may also be applicable if the proposed launch is in respect of a vehicle that cannot exceed the altitude of 50km.

- operation of a satellite in orbit from a UK facility;
- operation of a spaceport in the UK;
- provision of range control services in the UK.

SIA And OSA Key Space Activity Licence Requirements:

3.20

It is beyond the scope of this chapter to go into detail regarding the OSA and SIA licence application requirements and processes. We provide instead a brief overview below.

3.21

UK space licensing is primarily predicated on three main legal instruments: the OSA 1986 (as amended by the Deregulation Act 2025), the SIA 2018 which applies to everyone seeking to carry out space activities[37] (including suborbital activities), in and from the UK, and the Air Navigation Order 2016 (Article 96) as amended by the Air Navigation Order 2021 (ANO).

3.22

The UK government, primarily via the UK Space Agency, takes a proactive approach in ensuring information is available to applicants online, with various detailed guidance covering the licensing process relating to launch, return, orbital operators, spectrum filing requirements[38] , spaceport operations and range control being published. The CAA, who is the regulator mandated to oversee and process space licences, also publishes guidance which goes into more granular details regarding the licencing process.[39]

37 Various statutory instruments to the SIA are relevant for the licensing process namely the Space Industry Regulations 2021, Spaceflight Activities (Investigations of Spaceflight Accidents) Regulations 2021, the Space Industry (Appeals) Regulations 2021, and the Regulator's Licensing Rules.

38 Applicants for a CAA satellite launch license, are required to evidence that they comply with the ITU spectrum frequency requirements as per the requirements of the Secretary of State for Science, Innovation and Technology Section 22 of the Communications Act 2003 which represents the UK at the ITU.

39 CAA Regulation Space licensing in the UK Space licensing in the UK.

3.23

The burden is on the applicant to provide the UK regulator in writing with the necessary information, in the specified form, and within the specified time, following which the regulator will consider the application. The regulator has the power to ask for further documentation and has powers of inspection. In the event of any procedural irregularities, the applicant will be permitted the opportunity to rectify such irregularities within in a time period stipulated by the regulator. If a licence is granted or refused, the regulator is required to inform the applicant in writing. In the event of approval, the applicant must be given written notice of any conditions on the licence , while, in case of refusal, the regulator must provide written reasons. The Space Industry (Appeals) Regulations 2021 allows for appeals from applicants or licence holders unhappy with CAA licensing decisions.

Licensing Between The UK And United States

3.24

The Space Industry Regulations 2021, also implement regulations on how commercial space business is licensed between the United Sates and the UK. The two nations have agreed on the US-UK Technology Safeguards Agreement (TSA), which sets out the principles by which US spaceflight technology may be licensed for export by the US authorities.

UK Spaceport Licensing – An Overview

3.25

The SIA also deals with licensing of spaceports on UK soil. Section 3.2 of the SIA defines a spaceport "… as a site from which spacecraft or carrier aircraft are launched or are to be launched … or a site at which controlled landings or spacecraft take place…or are to take place". This is a broad definition taking in a potential wide variety of activities as can be seen below:

> "1.2 A spaceport is a site that is used for:
>
> - vertical launches of rockets that are intended to go above the stratosphere
> - horizontal launches, using aerodrome runways, of spaceplanes or carrier aircraft from which a space object will be released.

- launches of high-altitude balloons for space experience, experiments or air launch of rockets
- planned landings of spacecraft, including launch vehicles.

1.3 Spaceports can be licensed for vertical or horizontal launches, or potentially both. If you want to host horizontal launches, *the spaceport must be located at an aerodrome that is already either licensed or certified by the Civil Aviation Authority (CAA)* and directed under the National Aviation Security Programme (NASP)." [emphasis added]

1.4 Whatever type of launches or landings you want to host, you must follow the same core application process. The differences are in the amount and type of information you will be required to provide in your application."[40]

3.6

In addition to the licensing of the launch vehicle itself, spaceport operators must also demonstrate, to the satisfaction of the regulator, that their launch/operational facilities are safe.[41] A prospective licensee is required, by the Space Industry Regulations 2021, to demonstrate that they have employed people to fill the "prescribed roles" (such as safety manager) all of which are roles that demonstrate that the spaceport will be operated safely and in accordance with all legal requirements.[42] It will be a breach of a spaceport licence, if a licensee fails to advise the regulator of any changes to the individuals appointed to the prescribed roles and such a breach could lead to a fine, summary conviction and/or imprisonment depending on where in the UK the spaceport is located.[43] This approach is very much reminiscent of similar requirements in relation to aviation, which space regulations often seek to model, given aviation's historic track-record when it comes to safety.

40 The UK CAA, CAP 2212 Guidance for spaceport licence applicants and spaceport licenses. Dated May 2024 Guidance for spaceport licence applicants and spaceport licensees (accessed 2 July 2025).

41 *Ibid*.

42 According to the Space Industry Regulations 2021, section 7 there are specific "Prescribed roles" that any prospective licensee must demonstrate have been filled namely: accountable manager, safety manager, security manager. 7 (3) The spaceport licensee "may appoint the same individual to undertake more than one of the roles prescribed". The Regulation sets out the duties of the various prescribed roles.

43 Space Industry Regulations 2021, s. 14.

Range Control Licence

3.27

Range control, in a nutshell, is the suite of risk management and safety planning tools adopted and deployed by operators to ensure that their launches are safe for people, property and the environment, including appropriate emergency response procedures.

3.28

Section 6 of the SIA requires licensees to deal with a wide variety of issues that fall to be defined within range control before a licence will be granted:

"(a) identifying an appropriate range for particular spaceflight activities;

(b) co-ordinating arrangements for the activation and operation of the range;

(c) obtaining all necessary information for identifying the range and for co-ordinating its activation and operation;

(d) ensuring that notifications are issued for the protection of persons who might be put at risk by spacecraft or carrier aircraft within the range or in the vicinity of it;

(e) monitoring the range, and the spacecraft or carrier aircraft for which it is provided, to ascertain (i) whether the restrictions or exclusions to which the range is subject are complied with; (ii) whether planned trajectories are adhered to;

(f) communicating any failure to comply with those restrictions or exclusions, or to adhere to those trajectories, for the purpose of enabling any appropriate actions to be taken in response;

(g) any prescribed services provided for the purposes of, or in connection with, services within any of paragraphs (a) to (f)."

On-Going Duty To Report

3.29

Importantly, the CAA requires that any licensee provides sufficient information so that the regulator has the confidence that the licensed mission will comply with both UK domestic law and international treaty obligations (as relevant). The licensee is therefore under an ongoing duty to report any changes that may put it out of compliance. In addition, operators are required to keep the regulator updated with proof of insurance renewal and provide post launch and orbital status reports.[44]

INDEMNITY AND LIABILITY INSURANCE UNDER THE OSA AND SIA:

UK Space Insurance

3.30

The UK Government has both international treaty and domestic obligations that impose upon it a duty to risk-manage space activities undertaken either by UK citizens (outside the UK) or within/from UK territory.

3.31

The types of space activities very broadly fall into three categories: (i) satellite operations (launch and operational), (ii) UK spaceport, and (iii) orbital activities, such as on-orbit activities and exploration.

3.32

As part of its risk mitigation strategy, the UK government requires that such space activities have sufficient insurance to ensure that the UK Government and relevant people/organisations will be indemnified against any third-party loss or damage up to a pre-determined limit. This is a common feature in most domestic space laws given the provisions of the Liability Convention and the generally recognised approach when it comes to liability under international law for space activities.

There are different indemnity requirements depending on whether the applicant is seeking a licence pursuant to the OSA (missions outside the UK) or the SIA (missions within/to from the UK).

44 Guidance for spaceport licence applicants and spaceport licensees page 21.

3.33

The current position is that if a licence is sought pursuant to the SIA, the licensee will be required to indemnify the UK Government up to the agreed limit[45] which is currently set at EUR 60 million (per licence) for any third-party damage their activities may cause. If damages exceed the stipulated liability limit, and the licensee has conducted its activities in accordance with their licence conditions and the SIA, then the UK Government will step in and cover the damages, in excess of the EUR 60 million policy limit. A consultation was published in late 2023 by the UK Government seeking, amongst other things, views on the possibility of introducing a scoring mechanism, whereby lower risk activities have a £0 baseline insurance requirement.[46] At the time of writing this chapter, it is not yet known what the outcome of the consultation is.

3.34

If the application is made under the OSA and the UK government will also be considered a Launching State (pursuant to Article 1 of the Liability Convention Article[47]), then the UK Government will be internationally liable[48] for any third-party damage caused by the space activity. Historically, the OSA (Article 10 (1A)) required the licensee to provide an unlimited indemnity for such damage. This position has since changed however, as section 10 (1A) has been amended and provides that the liability limit is: "*… any limit on the amount of a person's liability that is specified in a licence …*".[49]

3.35

The UK's position is currently that it will not be "*specifying the level of launch operator liability limits in regulations*", because to do so would be to set a single limit which would "*not be suitable for every launch …*". Liability limits will therefore be determined on a case-by-case basis, using the risk modelling basis of Modelled Insurance Requirements (MIR) (discussed below). A MIR approach may "*lead to lower insurance requirements …*".[50] MIR

45 There is some confusion in respect of the drafting of the SIA. Section 36.1 says that a licensee must indemnify the UK Government against "any claims brought against the government". Thus, implying unlimited liability. However, this "must" appears to be a drafting error when read in conjunction with section 12.2 of the SIA which provides that "operator's licences "may" include a limit of liability. Additionally, regulation 220 specifies that "*all operator licences must include a limit of operator liability under section 34*" of the SIA. https://www.gov.uk/government/publications/commercial-spaceflight-launch (accessed 2 July 2025).

46 See Consultation on Orbital Liabilities, Insurance, Charging and Space Sustainability – GOV.UK. (accessed 2 July 2025).

47 Article I Liability Convention.

48 Article II Liability Convention.

49 Deregulation Act 2015, s.12.

50 Commercial spaceflight: launch liabilities and insurance – GOV.UK. (accessed 2 July 2025), page 4.

is similar to the Maximum Probable Loss[51] approach adopted by the United States, which should mean there is some consistency across jurisdictions regarding the assessment of risks and the setting of policy limits.

Risk Assessment In Respect Of Third Party Liability Insurance

3.36

The indemnity and insurance regimes are well established in respect of satellite activities. The UK manages potential risk, as most (if not all) countries do, by way of a licensing process that considers the operational/technical aspects of a proposed mission to determine the level of risk. The licence holder must provide an indemnity for the launch and in-orbit aspects of the mission in the form of third-party liability insurance (TPL). As said above, for standard missions, satellite operators must obtain TPL in the amount of EUR 60 million. The UK government must also be named as an additional insured on the policy.

3.37

Briefly, the MIR basis of assessing the risk of a mission is to "*take into account a full range of reasonably foreseeable accidents*" so things like the reliability of the launch vehicle, assessment of the mission phases, and the geographic location of the launch are all considered. This information is then fed into the model to identify major hazards and the applicant's safety case for each launch phase. If the CAA, in its discretion, assesses the proposed mission as high risk (rather than standard), then they will set a commensurate policy limit above EUR 60 million for standard rates missions.

51 Commercial spaceflight: launch liabilities and insurance – GOV.UK (accessed 2 July 2025), How launch insurance requirements and limits will be set: "*The UK Government position is also that as safety is at the heart of the Space Industry Act. A flexible liability limit encourages and rewards operators for reducing the risk associated with their launch activities we currently do not have any evidence to justify placing an upper limit on the MIR or at which level such a limit should be set. We will consider whether an upper limit of liability is justified and, if so, the level at which such a limit should be set after the first launches have taken place from the UK when suitable evidence will be available*".

Insurance In Respect Of Multiple Satellites

3.38

The SIA has anticipated the fact that some licensees operate multiple standard satellite missions, at the same time. As a result, the CAA has been granted the discretion to consider and approve the TPL policy on an any one occurrence (which is usual) or aggregate basis.[52]

3.39

In respect of multiple satellites, the operator may therefore request that the CAA exercises its discretion to allow an operator the option to obtain an aggregate policy limit in an amount that the CAA determines.[53]

Alternatives To Insurance

3.40

However, the issue of whether insurance is the most effective form of securing the necessary indemnity is the subject of continued discussions between the UK Government and operators. With the advent of commercial space companies, varied and novel commercial space activities are being considered for example: on-orbit servicing, debris removal, space situational awareness, space exploration, to name a few, are all the subject of active UK research and development.

52 Any one occurrence policy basis permits the party claiming to seek the full limit of the indemnity for each claim made. Whereas "*in the aggregate*" means that the costs of each claim made in the policy period is deducted from the total limit available. So once that policy limit is reached then the cover is exhausted.

53 In respect of small/micro satellite missions (deemed low risk) that will operate below an altitude of approximately 35 Kilometres the CAA can waive the TPL insurance requirement. But the indemnity of GBP 60 million on an as per each licence basis is not waived.

4. CURRENT CHALLENGES – CURRENT CHALLENGES TO UK SPACE LAW

BREXIT – United Kingdom Withdrawal From The European Union 31 January 2021

4.1

Brexit has impacted the UK's participation in certain EU space programs. For example, the UK no longer has full access to the Galileo and Copernicus programs, which are critical for satellite navigation and Earth observation.

4.2

Brexit has also compelled the UK to make adjustments[54] to mitigate their losses, and to amend its regulatory framework in order to ensure that it remains aligned with international standards while being independent of EU regulations. The UK Space Agency and the UK CAA both have been tasked with updating and implementing these regulations.[55]

4.3

Following the EU's announcement that it would be proposing an 'EU Space Act',[56] it is also likely that the UK and the various EU Member States may now have diverging approaches and policies, with the EU bloc having to adopt a unified position. This is likely to be favourable to the UK in that it will be able to continue demonstrating flexibility and a commercial approach in its licensing process and remain competitive across other jurisdictions.

54 UKspaces-Brexit-lines-to-take.pdf (accessed 2 July 2025).

55 Brexit's changes to the UK constitution – UK in a changing Europe (accessed 2 July 2025).

56 Commission proposes EU Space Act to boost market access and strengthen space safety (accessed 2 July 2025).

4.4

Indeed, whilst Brexit has created uncertainty around trade agreements, in particular the lack of access to the single market, lack of access to EU research and funding programs to which the UK is no longer eligible the UK's space policy and law has pivoted in order to focus on promoting more international cooperation by cultivating post-Brexit strategic alliances and collaborating with countries such as the United States, Japan, and Australia.[57]

Domestic Challenges

4.5

UK Space law and its implementing regulations are comprehensive, but they are also complex and feedback to the CAA has shown that they can be difficult to navigate, which can be a bar to innovation and consequently slow growth.

Funding And Investment:

4.6

Access to capital remains a significant challenge for space-related businesses in the UK. The high level of investment and long lead times associated with space activities makes securing funding a challenge, in particular for startups and smaller companies.

Promoting Sustainable Space

4.7

Both low and medium earth orbits are becoming highly congested, the effect of which means that operating in these orbits is likely to become increasingly risky – on the basis that collisions will become more likely and space debris will accumulate. The UK understands

57 4 June 2024, How Brexit Affects the UK Space Industry and European Collaboration: Impacts and Future Prospects – Space Voyage Ventures (accessed 2 July 2025).

the need to take measures both at a domestic and international law level to develop, implement and enforce space traffic management system, debris mitigation and removal and sustainability measures, in order to ensure that these orbits remain operationally viable.[58]

5. NEXT STEPS TO MAKE THE LAW EVOLVE IN THE FUTURE

Next Steps For Evolving UK Space Law

The UK regulatory regime remains well placed to deal with the challenges and innovations that are expected to accompany the growth of the space sector in the coming years. The UK government has also continued to demonstrate its willingness to engage with the industry and tackle issues such as space sustainability, access to capital and workforce constraints.

At the same time, it is acknowledged that the licensing regime in the UK could benefit from further streamlining and that as more and more countries continue to enact domestic space legislation, the UK will need to remain ahead of the curve if it wants to remain competitive. We therefore expect that the UK government will continue engaging with the existing space sector and seek to enact further initiatives to draw in further talent and innovation to its shores, whilst maintaining its balance between commercial thinking and promotion of safety and sustainability.

58 14 March 2025, M.Ormsbee – "*Autonomy has Outpaced International Space Law*" Autonomy Has Outpaced International Space Law – War on the Rocks (accessed 2July 2025).

REFERENCES

Legislation

- Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (adopted on 5 December 1979 and entered into force on 11 July 1984).
- Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (adopted 19 December 1967 and entered into force on 3 December 1968).
- Commercial Space Launch Amendments Act of 2004, updated by the 2015 Space Resource Exploration and Utilization Act of 2015 (UK).
- Convention on International Liability for Damage Caused by Space Objects (adopted 29 November 1971 and entered into force on 1 September 1972).
- Convention on Registration of Objects Launched into Outer Space (adopted on 12 November 1974 and entered into force on 15 September 1976).
- Deregulation Act 2015 (UK).
- Outer Space Act 1986 (UK).
- Space Industry Act 2018 (UK).
- The Air Navigation Order 2016 No. 765 (UK).
- The Artemis Accords, Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets. And Asteroids, Section 1 – Purpose and Scope. Dated 13 October 2020.
- The Spaceflight Activities (Investigation of Spaceflight Accidents) Regulations 2021 No. 793 (UK).
- The Space Industry (Appeals) Regulations 2021 No. 816 (UK).
- The Space Industry Regulations 2021 No. 792 (UK).
- Treaty on Principles Governing the Activities of States in the Exploration and Use of outer Space, including the Moon and Other Celestial Bodies (adopted on 19 December 1966, entered into force 10 October 1967).

Books

- Brierly, James Leslie (1963), The Law of Nations (New York, Oxford University Press).

Online Sources

- BBC (2023) UK space launch: *Premature shutdown behind Cornwall rocket launch failure*. Available at UK space launch: Premature shutdown behind Cornwall rocket launch failure – BBC News (Accessed: 2 July 2025).
- Chambers Ros Moore, K. (2019) *Reaching For The Stars: The UK's History In Space*. Available at Reaching For The Stars: The UK's History In Space (Accessed: 2 July 2025).
- Department for Science, Innovation and Technology and Ministry of Defence (2024) *Policy Paper: Space Industrial Plan: from ambition to action – advancing UK space industry*. Available at: Space Industrial Plan: from ambition to action – advancing UK space industry – GOV.UK (Accessed: 2 July 2025).
- Department for Transport (2021) *Commercial spaceflight: launch liabilities and insurance*. Available at Commercial spaceflight: launch liabilities and insurance – GOV.UK (Accessed: 2 July 2025).
- Department for Science, Innovation and Technology, Department for Transport, Department for Business and Trade and Ministry of Defence (2024) *Space Regulatory Review 2024*. Available at Space Regulatory Review 2024 – GOV.UK (Accessed: 2 July 2025).
- European Commission (2025) *Commission proposes EU Space Act to boost market access and strengthen space safety (Press Release)*. Available at Commission proposes EU Space Act to boost market access and strengthen space safety (Accessed: 2 July 2025).
- European Space Agency *History of Europe in Space*. Available at ESA – History of Europe in space (Accessed: 2 July 2025).
- Harris, S.L. (2018) *Brexit's changes to the UK constitution*. Available at Brexit's changes to the UK constitution – UK in a changing Europe (Accessed: 2 July 2025).
- Millard, D. (2017) *Skylark: Britain's Pioneering Space Rocket*. Available at Skylark: Britain's Pioneering Space Rocket – Science Museum Blog (Accessed: 2 July 2025).
- Ministry of Defence (2022) *Policy paper Defence Space Strategy: Operationalising the Space Domain*. Available at Defence Space Strategy: Operationalising the Space Domain – GOV.UK (Accessed: 2 July 2025).

- National Space Operations Centre and UK Space Agency *How we protected the UK and space in July 2024*. Available at How we protected the UK and space in July 2024 – GOV.UK (Accessed: 2 July 2025).
- Ormsbee, M. (2025) *Autonomy Has Outpaced International Space Law*. Available at Autonomy Has Outpaced International Space Law – War on the Rocks (Accessed: 2 July 2025).
- Parkita, P.F. (2025) *Tomorrow for which we are not prepared. Why is the Outer Space Treaty opposed to the idea of colonizing Mars*. Available at Tomorrow for which we are not prepared. Why is the Outer Space Treaty opposed to the idea of colonizing Mars? | Harvard International Law Journal (Accessed 2 July 2025).
- Saxavord UK Space Port (2025) *Saxavord Spaceport and West of Scotland Space Cluster announce strategic partnership to turbocharge Scottish space economy*. Available at Saxavord Spaceport and West of Scotland Space Cluster announce strategic partnership to turbocharge Scottish space economy – SaxaVord (Accessed: 2 July 2025).
- Space Scotland, Scottish Space Academic Forum, The Scottish Government (2021) *A Strategy for Space in Scotland*. Available at strategy (Accessed: 2 July 2025).
- Space Voyage Ventures (2024) *How Brexit Affects the UK Space Industry and European Collaboration: Impacts and Future Prospects*. Available at How Brexit Affects the UK Space Industry and European Collaboration: Impacts and Future Prospects – Space Voyage Ventures (Accessed: 2 July 2025).
- The British Interplanetary Society *Our Society*. Available at The Society – The British Interplanetary Society (Accessed: 2 July 2025).
- The Royal Society *History of the Royal Society*. Available at History of the Royal Society | Royal Society (Accessed: 2 July 2025).
- Thorpe, E. (2024) *The Most Important Milestones in the British Space History & the Future Potential*. Available at The Most Important Milestones in the British Space History & the Future Potential – Orbital Today (Accessed: 2 July 2025).
- UK Civil Aviation Authority (2024) *Guidance for range control licence applicants and licensees*. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904472/guidance-for-range-control-licence-applicants-and-licensees.pdf (Accessed: 2 July 2025).
- UK Civil Aviation Authority (2024) *Guidance for spaceport licence applicants and spaceport licensees*. Available at Guidance for spaceport licence applicants and spaceport licensees (Accessed: 2 July 2025).

- UK Civil Aviation Authority (2023) *Space licensing in the UK*. Available at Space licensing in the UK (Accessed: 2 July 2025).
- UK Space Agency (2024) *Consultation on Orbital Liabilities, Insurance, Charging and Space Sustainability*. Available at Consultation on Orbital Liabilities, Insurance, Charging and Space Sustainability – GOV.UK (Accessed: 2 July 2025).
- UK Space Agency, Department for Science, Innovation and Technology, Ministry of Defence and Department for Business, Energy & Industrial Strategy (2022) *Policy paper: National space strategy*. Available at National space strategy – GOV.UK (Accessed: 2 July 2025).
- UK Space Agency (2022) *Spaceflight legislation and guidance*. Available at Spaceflight legislation and guidance – GOV.UK (Accessed: 2 July 2025).
- UK Space Agency (2024) *UK Space Agency Corporate Plan 2022-25*. Available at UK Space Agency Corporate Plan 2022-25 – GOV.UK (Accessed 2 July 2025).
- UKspace *Brexit lines to take*. Available at UKspaces-Brexit-lines-to-take.pdf (Accessed: 2 July 2025).

FRANCE

Table of Contents

About the Author

Clémence Lambrecht

Clémence Lambrecht is a graduate of the University of Paris-Saclay and holds a Master's degree in Space and Telecommunication Law. She started her career as being in charge with regulatory affairs at Eutelsat, the satellites operator. In 2016, she joined CNES legal department. As referent expert in the field of space law, she works in particular on the process of implementation of the French Space Operation Act and on its update. She also participates to the legal sub-committee of the UNCOPUOS, in order to assist the French Ministry for Europe and Foreign Affairs on space law matters.

clemence.lambrecht@cnes.fr

Hugo Lopez

Hugo Lopez is legal advisor at CNES since 2022 where he is in charge of international and European affairs as well as space law. Hugo hold a master degree in Space and Telecommunications law from Paris Saclay University. He is specialized in national and international public law, including space and telecommunications law. Hugo is a member of the French delegation to the Legal Subcommittee of the COPUOS and to the Administrative and Financial Committee of the ESA.

hugo.lopez@cnes.fr

Abstract

This article gives an overview of the French legal and regulatory framework for space operations. To that end, it focuses on three aspects. Firstly, it addresses the context of the elaboration of this framework, from the early stages of space operations to the adoption of a law dedicated to space operations, the French space operations act (FSOA), and implementation texts. This part of the article has required to investigate the historical context at the time of the development of space activities, both in France and at the international level, but also to look at the preparatory works of the FSOA. Then, this article proposes a description and an analysis of the provisions of the FSOA. In this part, the authors intend, in particular, to explain the choices made by the French legislator. In order to have a better understanding of the consequences of these choices, this parts includes also a description on how this law is implemented in practice. Finally, this Chapter provides more prospective thoughts regarding the current challenges faced by the FSOA and how French space authorities answer them, in particular by making the FSOA and implementation texts, living documents subjects to successive evolutions.

Keywords: Authorization regime – CNES – France – Liability – National space law – Registration – Safety – Space based data – Sustainability

1. INTRODUCTION

France has a long tradition of exploration, and the name of some of its protagonists still resonate today. Very early, France has sent its navigators all around the world, in order to map unexplored areas, to discover peoples and to catalog species and as such, contributing to its scientific, diplomatic and commercial reach. Land, sea, seabed and polar zones – there are few Earth areas that haven't been the focus of attention of French explorers and scientists. When the development of space technologies opened up the prospect of a new world to explore, France took the opportunity to begin its conquests. Gradually, France has developed a space program which enable it to become, in 1965, the third State to enter the inner circle of the space faring nations by placing a French object into orbit, with a French launcher and from the French territory[1].

On the strength of its experience in space activities, France has been involved, from an early stage, in various international organizations developing and implementing space programs and international discussion fora where legal and technical rules relating to space activities are debated. With regard to programmatic international organizations, France participated to the creation of European Launchers Development Organization (ELDO) and European Space Research Organization (ESRO) – which were later merged to become the European Space Agency (ESA) – Eumetsat, EUTELSAT (privatized in 2001), Intelsat, Cospas-Sarsat and others. Its participation in the various programs of these organizations has enabled it, thanks to the substantial financial and technical resources pooled, to take part in large-scale projects while contributing, and continuing to develop, its technical expertise. At the same time, France, notably through the Centre National d'Études Spatiales (CNES), was involved in various technical organizations, such as Inter-Agency Space Debris Coordination Committee (IADC), Committee on Space Research (COSPAR) and International Standardization Organization (ISO), in order to promote and improve its practices in terms of safety and sustainability of space operations. Finally, from a legal perspective, France was active in the creation of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) in 1958, of which it was one

1 The first French satellite Asterix was launched on 25th november 1965 from the Centre interarmées d'essais d'engins spéciaux in Hammagir (Algeria – which was a French colony at that time) with the Diamant-A rocket.

of the 24 original members States, and ratified four of the five international treaties adopted within this framework : the Treaty on principles governing the activities of States in the exploration and use of outer space, including the Moon and other celestial bodies[2] (Outer Space Treaty), the Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space[3] (Rescue Agreement), the Convention on international liability for damage caused by space objects[4] (Liability Convention) and the Convention on registration of objects launched into outer space[5] (Registration Convention). France has also signed but not ratified the Agreement governing the activities of States on the Moon and other celestial bodies[6] (Moon Agreement).

Paradoxically, despite these multiple commitments, France only adopted its Space Operations Act in 2008, making it a relatively young law compared to other national space legislations[7]. Nevertheless, it currently constitutes a reference framework recognized for its maturity both nationally and internationally. Indeed, its implementation benefited from the knowledge and expertise of an entire ecosystem already familiar with space operations, each stakeholder of which was involved in its drafting: industry actors, institutions, academia, international partners, and others. More than a decade was necessary to achieve a comprehensive legal framework reflecting the state of the art of French space activities. Accordingly, the Act does not merely transpose France's various international obligations under the UN treaties (including authorization and continuous supervision regimes, registration, State liability, etc.), but also provides legal recognition of certain pre-existing factual situations. In this regard, the law incorporates provisions and mechanisms stemming from international agreements concluded between France and

2 *Treaty on the principles governing the activities of States in the exploration and use of outer space, including the Moon and other celestial bodies*, opened for signature on January 27, 1967, U.N.T.S. 205, p.205.

3 *Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space*, opened for signature on April 22, 1968, U.N.T.S. 672, p.119.

4 *Convention on the international liability for damage caused by space objects*, opened for signature on March 29, 1972, U.N.T.S. 961, pp.187.

5 *Convention on registration of objects launched into outer space*, opened for signature on September 15, 1976, U.N.T.S. 1023, p.15.

6 *Agreement governing the activities of States on the Moon and other celestial bodies*, opened for signature on July 11, 1984, U.N.T.S. 1363, p.3.

7 See e.g. the Norwegian Act n°38 on launching objects from Norwegian territory in outer space, of 13 June 1969, the Sweden Act on space activities of 18 November 1982 or the United Kingdom Outer Space Act of 1986.

ESA, clarifies the role of the CNES in matters of registration, among others. Finally, and above all, the Act relies on a concrete regulatory framework, implementing French and international best practices ensuring the safety of goods and persons and the protection of public health and the environment.

One of the strengths of the French Space Operations Act[8] (FSOA) lies in the balance it strikes between providing a secure and predictable legal framework for space operators, while retaining a certain degree of flexibility to keep pace with technological innovations and the emergence of new needs. In this Chapter, we propose to examine the history and foundations of the FSOA (2), analyze its mechanisms and provisions (3), identify the challenges it faces (4) and, finally, open up avenues of reflection on its prospects for evolution in the light of the transformations underway in the space sector (5).

2. HISTORICAL BACKGROUND OF THE FRENCH SPACE OPERATIONS ACT

2.1. The Emergence Of A French Space Program

The French space program, like those of other major contemporary space faring nations, originated in the aftermath of the Second World War. At that time, the Allied powers engaged in a race to recruit German engineers and scientists and to acquire their knowledge and expertise. One of the main object of desire was the new ballistic technology developed by the German military, notably the V-2 surface-to-surface missile, which was first deployed in 1944 against a target located in the suburbs of Paris. The United States, the USSR, and the United Kingdom succeeded in obtaining V-2 missiles, spare parts, technical documentation, and German scientists and engineers. France, having no access to German territory during the initial post-war phase, implemented a talent-attraction policy[9]. The ballistic engineers recruited were stationed in Vernon and

8 Loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales.

9 See e.g. : Varnoteaux, Philippe (2003), « La naissance de la politique spatiale française », in Vingtième siècle. Revue d'histoire, vol.77(1), pp.59-68 ; Huwart, Olivier (1997), « Du V2 à Véronique : les premières recherches spatiales militaires françaises », in Revue historique des Armées, vol.208, , pp.113-126 ; Veillon, Philippe, Quand la France a recruté des scientifiques nazis, Lesdonnéesde39-45.fr :https://www.lesdonneesde39-45.fr/post/quand-la-france-a-recruté-des-scientifiques-nazis (last access on 26th June 2025).

henceforth contributed to advancing this technology for the benefit of France, initially for military purposes and, shortly thereafter, for dual-use purposes. Several types of launch vehicles were subsequently developed and tested, initially in metropolitan France, then at the Centre interarmées d'essais des engins spatiaux in Hammaguir, in the Algerian Sahara, and finally, from 1968 onwards, at the Guiana Space Centre[10].

It was only from 1959, with the establishment of the Comité de Recherches Spatiales (CRS), tasked with advising the government on space matters and coordinating its stakeholders, that General de Gaulle laid the foundations of a genuine French space program. The CRS was subsequently replaced in 1961 by the CNES[11], the French space agency, a public industrial and commercial establishment whose mission is "to develop and direct scientific and technical research conducted in the field of space research."[12] Its activities were then organized into three divisions, which would later contribute to France's prominence as a full-fledged space power: the satellite division, the ground equipment division, and the sounding rocket division. Early successes, notably the 1965 launch of the French satellite Astérix into orbit from French soil using a French launcher, led CNES to also focus on space applications such as Earth observation, meteorology, telecommunications, and broadcasting. In each of these domains, France, through CNES, relied on a carefully studied and constructed institutional and industrial network to successfully carry out programs of national interest while developing its expertise. At the institutional level, France participated in the creation and development of European organizations in the space sector, thus enabling the pooling of technical and financial resources for the development of programs and competencies that would otherwise have been beyond reach. At the industrial level, CNES, both as a design authority and as an economic actor, supported the French industry by entrusting private companies (often created or controlled by CNES itself, such as Arianespace or Spot Image) with the execution of certain programs, in whole

10 After the decolonization process in Algeria in 1962, France had to find a new place for the development and launch of rockets. For an overview of the choice of the French Guyana for the establishment of its spaceport, see : https://centrespatialguyanais.cnes.fr/en/algerie (last access on 26th June 2025).

11 Loi n°61-1382 du 19 décembre 1961 instituant un centre national d'études spatiales.

12 Article 2, *Ibid*.

or in part, either national or European. This policy of "spinning off" led to the gradual creation of a genuine French space sector, whose actors remain standing today. Thanks to this organization, France has been able to develop and participate in the largest space projects, whether independently or in cooperation with other States and space agencies, while maintaining its autonomy in this strategic domain[13].

2.2. The Regulation Of Space Operations Before The French Space Operations Act

Although the FSOA was only enacted in 2008, French space operations, or those conducted from French territory, were not until then carried out in a complete legal vacuum. Indeed, even in the absence of a dedicated national law, France remained a State Party to the principal international space treaties and was therefore bound to uphold its international commitments. The lack of a specific domestic legal framework was primarily due to the fact that the organization of the French space sector, briefly described above, did not at that time necessitate the establishment of a distinct system of State control over space operations conducted by French nationals. Indeed, the State was considered the "alpha and omega"[14] of space activities, and all such operations fell directly or indirectly under its control, either through state-led initiatives or via affiliated entities, particularly the CNES and its subsidiaries (such as Arianespace, Spot Image, etc.). As a result, since space operations were ultimately carried out by or under the control of the French State, there was little practical value in requiring the State to authorize its own activities. Furthermore, through specific ad hoc contractual practices, the State and CNES were able to impose certain technical standards and obligations on French actors to ensure their operations were adequately regulated and in compliance with France international commitments[15].

13 For a more detailed overview of the establishment of a national space program see also: Conseil d'Etat, Pour une politique juridique des activités spatiales, La Documentation française, Paris, 2006, 207p., p. 11-43.

14 Conseil d'Etat, *Ibid*, p.7.

15 Conseil d'Etat, *Ibid*, p.8.

With regard to the safety of space operations, CNES and the European Space Agency (ESA) had developed, prior to 2008, stringent standards covering safety, protection measures, quality control, product assurance, and certification[16]. These operational norms, grounded in practice rather than legislation, applied to all areas of the space sector (launchers, satellites, ground segments, etc.), from development through to end-of-life. CNES had also developed a safety doctrine and regulatory framework applicable to launches conducted from the CSG. Additionally, technical standards were adopted by entities such as the European Cooperation for Space Standardization (ECSS) and the Inter-Agency Space Debris Coordination Committee (IADC). While these requirements lacked binding legal force, they were contractually imposed by CNES or ESA upon industry participants involved in entrusted programs. Over time, the industrial actors themselves adopted and implemented these standards in their own commercial space programs.

Liability for damage caused by space objects was likewise addressed entirely through international agreements and contractual arrangements. For purely national programs in which France was the sole launching State under the Liability Convention, liability issues were contractually allocated in agreements between the State or CNES and industrial entity. Regarding launches conducted from the CSG, France and ESA[17] had, from an early stage, concluded various international legal instruments allocating responsibility between the parties for launches conducted from French territory using ESA infrastructure or in connection with ESA-led programs and activities. These international agreements were subsequently supplemented by bilateral agreements between CNES, Arianespace, ESA, and the governments of the relevant States, in order to ultimately organize the sharing of liability[18].

16 Ministère délégué à la recherche et aux nouvelles technologies, L'évolution du droit de l'espace en France, 2002, 148p., p.34-35.

17 ESA has declared its acceptance of the rights and obligations provided in the Liability Convention in 1975.

18 For a good overview of pre-existing agreement between France and ESA related to the launches from a CSG, see : Lafferranderie, Gabriel, "Responsabilité juridique internationale et activités de lancement d'objets spatiaux au CSG" : https://www.esa.int/esapub/bulletin/bullet80/laff80.htm.

As for France's obligations concerning the registration and continuous supervision of space operations, these were subject to administrative measures of varying degrees of comprehensiveness. In practice, registration was performed by CNES, which, in the absence of clearly designated statutory authority, acted as a coordinating body. However, there was no formal national registry of space objects as such. With respect to the supervision of French space operations, Decree n°75-930, as amended by Decree n°222 of 18 March 1994, assigned the interministerial mission of space surveillance (situational awareness and alerting) to the Air Defence and Air Operations Command (Commandement de la Défense Aérienne et des Opérations Aériennes, CDAOA), reporting to the Chief of Staff of the French Air Force. The CDAOA was responsible for "providing government authorities with information on the space and air situation enabling them to make informed decisions."[19]. In operational terms, this mission relied on the expertise and resources of CNES located at the Toulouse Space Centre (Centre Spatial de Toulouse, CST).

2.3. The Emerging Needs For A Dedicated Legal Framework For Space Operations In France

From the 1990s, certain developments impacted the organization of French space operations, thereby necessitating the establishment of dedicated national legislation[20]. First, the European Community legal framework, and the gradual establishment of a European single market, led to the liberalization of the European space sector. Consequently, the French State and CNES withdrew from the shareholding of companies previously created due to the earlier policy of spin-offs. The State could no longer exercise the same degree of control over their activities. The second significant event, a direct consequence of the first, was the emergence of new space actors, both French and international. The reduction of State involvement and the opening to increased competition enabled certain entities to develop in specific segments of the French space sector, while also fostering the growth of the space market and its applications.

19 Article 1, Decret n°75-930 du 10 octobre 1975 relatif à la défense aérienne et aux opérations aériennes classiques menées au dessus et à partir du territoire métropolitain.

20 For a better overview of the needs to have a dedicated legilsation for space operations, see : Conseil d'Etat, op.cit., p. 50-62.

While the aforementioned legal regime was sufficient for a period when space operations were primarily the province of the State, its weaknesses soon became apparent with the prospect of liberalizing space activities. Indeed, the entirety of this framework – except for the international conventions governing the liability of France and ESA – was largely based on specific agreements negotiated between the State and the industrial entity responsible for implementing its programs. This resulted in a legal framework that offered limited visibility, security, and guarantees of equal treatment. Additionally, there were practical difficulties arising from the application of general law to space operations. For example, in the event of damage caused to a victim by a space object, if the victim brought an action before a French court, such court would be bound by general liability law, i.e., tort law principles[21].

2.4. The Adoption Process Of The Legal Framework Of The French Space Operations Act

As a consequence of the reasons set forth above, the French Prime Minister addressed, on 29 July 2004, a letter to the Vice-President of the Conseil d'Etat[22] (the supreme court for administrative justice), inviting him to consider the possibility and utility of establishing a coherent regime governing the authorization of space object launches and their registration, as well as the continuous supervision of activities related to launchers and satellites. The scope of the study was subsequently extended to include necessary adaptations of domestic law, such as the regimes governing property and securities ("sûretés"), civil and contractual liability, intellectual property, insurance law, and so forth.

The study conducted by the Conseil d'Etat followed a methodical and inclusive approach. A working group, composed of academics, relevant administrations and companies, and CNES, was established. This group relied on numerous works, including a substantial 2002 study published by the Ministry of Research on the evolution of space law in France[23], and conducted multiple hearings with the various stakeholders involved. Concurrently, a comparative study of existing space legislations was commissioned by the Ministry of

21 Conseil d'Etat, *Ibid*, p. 55.

22 The letter is reproduced in : Conseil d'Etat, *Ibid*, Annex 1, p.133-134.

23 Ministère délégué à la recherche et aux nouvelles technologies, op. cit., 2002, 148p.

Economy, Finance and Industry, and carried out with the support of its officials posted in various States. The Conseil d'Etat's report, "Pour une politique juridique des activités spatiales" was published on 6 April 2006 and notably contained a detailed draft bill, setting out the framework and fundamental principles underlying the FSOA. This draft bill thus recommended the adoption of a law, in preference to other types of legal instruments, insofar as an authorization regime for space operations, as a restriction on freedom of commerce and industry, falls primarily within the legislative domain[24]. Consequently, the entire bill was conceived around a framework instrument at the legislative level, complemented by implementation instruments defining the practical modalities of application (procedural and technical), adopted at the regulatory level.

2.4.1. Adoption Process For The French Space Operations Act

The draft bill proposed by the Conseil d'Etat was, between February and April 2007, supplemented with certain provisions by the Government: introduction of the regime relating to space-origin data, exemption from authorization for the benefit of CNES, controls and sanctions, etc. The bill was then transmitted to the Senate, and subsequently to the National Assembly, each of which introduced various modifications and additions[25]. Concurrently with this legislative process, France was also required to fulfill certain formalities in light of its European commitments. Indeed, insofar as the draft bill provided for a State guarantee for damages caused to third parties in the context of space operations, France had to notify this new State aid to the European Commission pursuant to Article 88.3 of the Treaty establishing the European Community, in order to ensure that it was not incompatible with Community law. On 23 October 2007, the Commission, noting that the aid was designed to achieve objectives of common interest and did not adversely affect trading conditions to a degree contrary to the common interest, recognized the aid as compatible with the EC Treaty[26].

The FSOA was definitively enacted on 3 June 2008.

24 Conseil d'Etat, Assemblée., 22juin 1951, Sieur Daudignac, Rec.,p. 362.

25 For a good overview of the modifications made by the Government, the National Assembly and the Senate, see: Clerc, Philippe (2018), Space law in the European context, national architecture, legislation and policy in France, Essential air and space law, n°20, eleven international publishing, The Hague, 598p., p.130-136.

26 Commission Européenne, Aide d'Etat n°208/2007 – France, Garantie de l'Etat pour des dommages causés à des tiers dans le cadre d'opérations spatiales, C(2007)5093 final, 2007.

2.4.2. Adoption Of Other Legal Instruments For The Implementation Of The French Space Operations Act

Following the adoption of the law, various other legislative amendments were required[27]. First, amendments foreseen by the FSOA itself: modification of the Code of Intellectual Property to confirm the applicability of its provisions relating to patents on inventions made or used in space[28] , and modification of the Research Code to incorporate the new rights and obligations of CNES concerning space operations[29]. Subsequently, other legislative modifications were necessary to better integrate space operations within the existing legal framework: amendment of the Finance Act to introduce the conditions and thresholds triggering the State guarantee[30] , and amendment of the Insurance Code to include a dedicated chapter concerning civil liability in relation to space operations[31].

The FSOA, establishing the general framework for space operations, refers to regulatory texts of lower legal value, which set out the modalities for applying certain of its principles. Accordingly, the law refers to a decree of the Conseil d'Etat for various aspects: definitions of conditions for granting authorizations and licenses, modalities of insurance and financial guarantees, procedures for the empowerment and swearing-in of certain competent agents responsible for conducting necessary inspections to ensure compliance with the FSOA, the nature and conditions for transmitting information to CNES for the purpose of registration of space objects, and technical conditions related to the exploitation of space-origin data. Three decrees of the Conseil d'Etat were thus adopted on 9 June 2009 addressing these matters: Decree n°2009-643 concerning authorizations issued under the FSOA, Decree n° 2009-644 amending Decree n°85-510 of 28 June 1984 relating to CNES, and Decree n°2009-640 implementing the provisions under Title VII of Law n°2008-518 of 3 June 2008 relating to space operations. Finally, the FSOA also refers to technical regulations enacted notably in the interest of the safety of persons and goods and the

27 For a good overview of the legislative modifications made due to the on-going adoption of the FSOA see: Clerc, Philippe (2018), op. cit., p.137-162.

28 See Articles L611-1 and L613-6 of the Code of Intellectual Property.

29 See Articles L331-6 to L331-8 of the Code of Research.

30 Article 119, Loi n° 2008-1443 du 30 décembre 2008 de finances rectificative pour 2008.

31 Articles L176-1 to L176-5, Assurance Code.

protection of public health and the environment, which all applicants must comply with in order to obtain authorization for conducting a space operation. This technical regulation was enacted by an Order dated 31 March 2011[32] , following lengthy discussions in close coordination with space operators and based on technical standards adopted by various organizations such as CNES, IADC, and ISO.

3. THE FRENCH SPACE OPERATIONS ACT: DESCRIPTION AND EXPLANATIONS OF THE CHOICES MADE BY THE FRENCH LEGISLATOR

The content of the FSOA may be divided in four main topics. Firstly, the FSOA creates an authorization regime for French space operations. Secondly, it establishes a liability regime for French space operations consistent with the liability principles provided by the international treaties related to space law, in particular the Outer Space Treaty and the Liability Convention. Then FSOA also grants missions to CNES, the French Space Agency, regarding the registration of space objects and safety aspects, including at the Guiana Space Center. Finally, FSOA creates a space-based data regime.

3.1. The Authorization Regime For French Space Operations

The decision to include an authorization regime for space operations in the FSOA is France's answer to the obligation, set out in article VI of the Outer Space Treaty, for the appropriate State, to authorize and continuously supervise space activities of its non-governmental entities. This authorization regime is established by the Title II of the FSOA which is supplemented with FSOA's implementation texts. It provides the cases where an authorization is required, how to obtain such authorization, what happen when such authorization is granted and sanctions associated to this authorization regime.

32 Arrêté du 31 mars 2011 relatif à la réglementation technique en application du décrêt 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.

3.1.1. The Scope Of The French Space Operations Act: Who Has To Apply For An Authorization?

The authorization regime established by the FSOA is mainly addressed to the operators conducting space operations. An operator is defined in article 1 of the FSOA as follows: "any natural or juridical person carrying out a space operation under its responsibility and independently". In practice, and to reflect the notion of "independency". It is considered that the operator under the FSOA is the entity which takes all the main decisions related to the life of the space object, such as end of life related decisions. The operator may not be the entity that directly performs the maneuvers of its space object during the operation.

The list of the space operations for which an authorization has to be obtained is provided in the Chapter 1 of the title II of the FSOA. It covers a wide scope of operations and includes various types of authorizations, then illustrating the will of the French legislator to provide a frame for all space operations under France's responsibility according to article VI of the Outer Space Treaty and for which it may be held liable as a launching State according to article VII of the Outer Space Treaty and the Liability Convention. As such, it ensures that such operations are performed safely and in compliance with France's international commitments.

Article 2 of the FSOA provides three types of authorizations. Firstly, the paragraphs 1° and 2° of this article address cases where an authorization for launch or return has to be obtained. Request for an authorization has to be done by any operator, having French nationality of not, that intends to proceed to a launch or a return from or to the French territory, or from or to facilities under French jurisdiction. A launch or return authorization has also to be obtained by any French operator that intends to proceed to a launch or a return from or to a foreign territory or facilities or form or to a territory or facilities without the jurisdiction of any State. Then, paragraph 3° of article 2 of the FSOA provides that shall obtain an authorization to procure a launch, any French entity, operator or not, that intends to procure the launch of a space object. It corresponds, according to the French interpretation, to the entity that concludes the launch contract with the launch operator. Paragraph 3° of article 2 of the FSOA also provides that any French operator that intends to control a space object or a group of coordinated space objects has to obtained an authorization. This authorization is called "in-orbit control authorization".

In addition to these three types of authorizations, and in order to cover all the scenario, the French legislator has also provided in article 3 of the FSOA another type of authorization called "transfer authorization". This authorization shall be requested by any French operator, that have already been authorized under article 2 of the FSOA to control a space object or a group of coordinated space objects in outer space, when it intends to transfer to another operator, French or not, the control of the said space object or group of coordinated space objects. This enable the regulator to verify that such transfer of control does not jeopardize France's interests or its international commitments, but also that some procedures, in particular regarding the modification of the State of registration of the space objects, will be performed properly. Article 3 of the FSOA provides also that a French operator that intends to take the control of a space object or of a group of coordinated space objects already in outer space, shall apply for an authorization before taking the effective control of the space object. The process will then be similar to an application for an in-orbit control authorization under paragraph 3° of article 2 of the FSOA.

It should be noted that the FSOA does not currently include, unlike other national space laws, an authorization to build or to operate a space port. The legislator's choice has been to have specific rules, which will be detailed hereinafter, for the only current space port in France, the Guiana Space Center (CSG) instead of general rules.

Moreover, it is important to note that unlike other sectors, such as aeronautics, where a vehicle is usually certified in order to proceed to multiple operations, the FSOA provides that an authorization has to be obtained for each operation. For instance, each launch carried out at CSG, by the same operator and with the same launcher, will require a specific launch authorization. Also, an operator who submit a request for an in-orbit control authorization for a space object will have, in most cases, also to submit a request for an authorization to procure the launch of that space object.

The FSOA provides, in its article 11-1, some exemptions to the authorization regime. According to these exemption, no authorization is needed for space operations (launch, in-orbit control of a space object or a group of coordinated space objects in outer space, transfer of control) when they are conducted by CNES or by the State for national defense interests. However, the FSOA provides that the State, when it conducts such kind of operations, must respect the technical regulation and be subject to a CNES control of conformity. CNES has impose to itself, through its internal policy on the safety of space operations, the compliance of its activities with the same safety rules.

3.1.2. The Authorization Process: How To Obtain An Authorization Under The French Space Operations Act?

Any authorization required under the FSOA must be obtained prior to the beginning of the operation. The process to be followed in order to obtain such authorization is the same, whether it is for a launch operation, a return operation or an in-orbit control operation. The Chapter II of the Title II of the FSOA established the conditions under which these authorizations are granted. It provides that these authorizations are granted after verification, by the administrative authority, of the moral, financial and professional guarantees of the applicant, and the compliance of the systems and procedures that this one intends to implement with a dedicated technical regulation. Finally, this article specifies that authorization may be granted only if the operation is not "likely to jeopardize national defense interests or the respect by France of its international commitments"[33].

This process is detailed in the Decree n°2009-643 of the 9th of June 2009 related to authorizations granted in application of the Law n°2008-518 related to space operation. Firstly, this decree identifies the administrative authority who grants the authorizations under articles 2 and 3 of the FSOA. It is the Ministry in charge of Space[34]. Then, it describes the process to be followed by the applicant to obtain its authorization, as follows. The applicant has to submit its application to the Ministry in charge of space. The application for an authorization shall be composed of three parts: an administrative part enabling the verification of the moral, financial and professional guarantees of the applicant, a technical part enabling the verification of the compliance of the systems and procedures that the operator intends to implement with a set of requirements fixed in a regulation named "Technical Regulation" or "RT"[35] and, since 2022, a payload (or defense) part enabling the verification that the operation for which the authorization is requested, does not jeopardize national security interests or France's international commitments.

33 Article 4, Loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales.

34 Currently in France, and since 2025, two Ministries are jointly in charge of space: The Ministry of Research and Higher Education and the Ministry of Economy.

35 Arrêté du 31 mars 2011 relatif à la réglementation technique, op.cit.

The list of the information and documentation to be provided by the applicant for each of the above-mentioned part of the application is detailed in the Order of the 23rd of February 2022 named “Composition order”[36]. Once the application has been submitted by the applicant, the Ministry in charge of space controls, with the support of CNES and of the Ministry of Defense, that the application file is complete. When the application is complete, the Ministry in charge of space proceed to its registration. It has one month from the submission of the application to proceed to this registration. This phase of the process is called the “completeness”. From the date of the registration of the application, the Ministry has four months to grant or refuse the authorization[37]. After this deadline, and without response of the Ministry in charge of space, the authorization is deemed refused. The Ministry may, by motivated decision, extend this four months’ period by a maximum of two additional months. Once the application has been registered, the Ministry in charge of space is responsible for analyzing the administrative part of the file. It transfers the technical part and the payload (or defense) part, respectively to CNES and to the Ministry of Defense. The latter have two months to perform their analysis. At the end of this period, CNES and the Ministry of Defense each issue a notice to the Ministry un charge of space. On the basis of these two notice and of its own analysis of the administrative part, the Ministry in charge of space has two months to decide to grant or not the authorization. If the Ministry estimates that the operation meets all the requirements it issue an order authorizing the operation. This authorization is granted for one operation under the conditions described in the application file only and for a clearly defined duration. The Decree n°2009-643 provides the possibility for the operator to ask for the extension of the duration of its operation (article 5-1) or to make its authorization evolve in the event of modification, voluntary or involuntary, of the conditions of the operation as it has been authorized (article 7).

36 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.

37 Article 5, 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.

It has to be specified that this authorization process, in particular the control performed by CNES of the compliance of the operation with the Technical Regulation, aims at ensuring the security of persons and goods and the protection of public health and the environment. Indeed, it enable the French Government to impose to all operators under the FSOA, the compliance with a minimum set of technical and security rules (space debris mitigation, reliability of the operation, realization of the end of life maneuvers, level of risks, etc.), and then to ensure that the operation under its responsibility or for which it may be held liable are conducted safely.

In order to ensure the smooth running of this authorization process, and in particular to ensure as much as possible in advance that the space operations will be compliant with the expected technical requirements at the time of the submission for authorization, CNES provides support to the operators and to entities that develop space systems. This support takes many forms. Firstly, article 11 of the Decree n°2009-643 established a mechanism called "preliminary conformity". This mechanism enables any entity developing a space system to submit a file to CNES at the different stages of development of this system thus CNES can verify that it is compliant with the Technical Regulation. CNES can then issue a preliminary conformity certificate, which has not the value of an authorization, but which can help the entity developing the space system to ensure that it will not encounter any difficulties related to system design when the operator applies for authorization. In addition, CNES make available to the operators two guides of good practices, one for launch systems and the other for orbital systems. These guides aim at helping the operators to have a good understanding of technical requirements, and propose some technical solutions, not mandatory, to the operators in order to comply with them. Finally, CNES makes software available to operators in order to help them to comply with some technical requirements (realization of atmospheric reentry calculations, etc.).

Article 4 of the FSOA provides also the possibility for operators to apply for licenses. This aims at simplify the administrative procedures by reducing the number of documents required for authorization applications. Firstly, the administrative licenses and the technical licenses enable to an entity that intends to carry out several space operations to provide, only once, all or part of the requested documentation respectively under the administrative part and under technical part of the application. For example, the applicant that holds an administrative license will not have to provide the documentation under the administrative part for each new application for an authorization for a space operation, except the documentation dedicated to the said operation that the administrative authority could ask (ex: insurance, etc.). The third type of license established by the FSOA is the license equivalent to an authorization. This allows an operator to carry out several operations under strictly identical conditions for the duration of the license, without having to reapply for authorization, subject to having informed the Ministry in charge of space of the intend to conduct such operations. Licenses are granted by the Ministry in charge of space for a maximum duration of ten years.

3.1.3. Operator's Post Authorization's Granting Obligations And Continuing Supervision

Once authorization has been granted, the operator is subject to various obligations. These obligations are provided by the Chapter III of the Title II of the FSOA and are supplemented with article 7 of the Decree n°2009-643 and by some provisions of the French Research Code.

Firstly, article 6 of the FSOA set up an obligation for the operator to "have and maintain [...] insurance or another financial guarantee approved by the competent authority" for damage caused to third parties in the frame of its space operation. This obligation is linked to the liability regime created by the FSOA which identifies the operator as the only one liable for damage cause to third parties in the frame of its operation. This liability regime is described in detail in the paragraph 3.2 of this Chapter.

The obligations relying on the operators aim mainly at enabling the Ministry in charge of space to ensure, with the support of CNES and of the Ministry of Defense, a continuing supervision of authorized space operations, in accordance with the provisions of article VI of the Outer Space Treaty. The continuing supervision enable to guarantee the security of the operations while ensuring the compliance with technical requirements for the duration of the authorized operation. In this respect and first of all, article 5 of the FSOA provides that authorizations and licenses may include requirements "set forth for the safety of persons and goods, protection of public health and the environment" or whose purpose is to "protect the national defense interests or to ensure the respect by France of its international commitments". The upholding of the authorization is thus subject to the fulfilment, by the operator, of these requirements, before or during the space operation. These requirements may be for example the provision of information following a specific maneuver, in particular when such maneuver is risky, or following a specific review organized by the operator. Indeed, if, after formal notice, the operator does not fulfill these requirements, it may see its authorization suspended or revoked and/or receive a 200 000 euros fine. Article 7 of the FSOA provides that on-site and documentary inspections may be conducted by empowered agents, among which CNES' agents, in order to verify the respect by the operator of its obligations. Finally, and always with the objective of ensuring the safety of space operations, article 8 of the FSOA provides that the administrative authority, or empowered agent by delegation, may "give instructions and require any measures they consider necessary for the safety of persons and goods, the protection of public health and the environment" and "to protect national defense interests or to ensure the respect by France of its international commitments". The operator has the obligation to comply and, as the case may be, to implement these instructions and measures.

The operators' obligations under the FSOA are supplemented by article 7 of the Decree n°2009-643 that establishes an obligation for the operator to declare any evolution, voluntary or involuntary, of the authorized operation. Under article 7.I, the operator has firstly the obligation to inform the Ministry in charge of space, without delay, in the following cases: 1/ if it intends to modify significantly the conditions under which the operation has been authorized. It is the case, for example, if the operator intends to change the launcher to launch its space object, if it intends to change the injection orbit or intends to change the center of operations, etc. 2/ if it intends to proceed to an in-orbit servicing activity or to beneficiate of such activity which were not planned when the authorization was granted. 3/ In case of substantial change of the information provided by the operator under the administrative part of the application (i.e. change of shareholder, etc.). The objective of such obligation of declaration by the operator is to enable the Ministry in charge of space to ensure that despite the evolution of the operation, this one remains compliant with the safety objectives of the Technical Regulation, but also to check that these evolutions do not affect the moral, financial and professional guarantees of the operator nor jeopardize France's national defense interests or international commitments. When it receives the information, the Ministry in charge of space forward it to the Ministry of Defense and, if needed, to CNES. Depending on the impact of the modifications, the

Ministry of Defense may decide to modify its initial notice. CNES may, for its part, propose corrective measures to the authorization. On the basis of these elements, the Ministry in charge of space may decide to modify the initial authorization.

Also, according to article 7.II the operator shall inform the CNES, without delay, in case of event not foreseen by the initial authorization or of a technical failure affecting the conditions of the space operations as authorized. There again, CNES may, on the basis of this information, propose to the Ministry in charge of space corrective measures to the initial authorization such as the modification of the duration of the authorization, the addition of new conditions or requirements, or even, if necessary, the anticipated end of life of the space object.

As such, the FSOA and its implementation texts, ensure the supervision of space operations for the duration of the operations.

Finally, article R331-23 of the French Research Code imposes to any space operator under the FSOA to provide to CNES the necessary information to identify its space object within sixty days following the launch of the space object. The list of the information to be provided is given in a dedicated order[38]. Any modification of this information during the operation shall be communicated to CNES.

3.1.4. The Sanctions For Non-Compliance With The French Space Operations Act's Authorization Regime

The compliance with the obligations under the authorization regime created by the FSOA is also ensured by the establishment of an associated system of sanctions. It is provided by the Chapter IV of the Title II of the FSOA. This system provides several type of sanctions.

Firstly, article 9 of the FSOA provides the possibility to revoke or to suspend authorization that have been granted. Such revocation or suspension may be decided in case the operator "contravene to its obligations", as presented above, or "when the operations for which [the authorizations] were sought are likely to jeopardize the national defense interests or

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

the respect by France of its international commitments". When such a sanction is decided for space object already into outer space, the Ministry in charge of space may impose the implementation of measures by the operator, at its own costs, in order to limit the risks and damage associated to the space objects (i.e. realization of the end of life maneuvers such as passivation).

Article 11 of the FSOA provides the possibility to impose a 200 000€ fines to any entity that does not comply with the FSOA authorization regime. Is punishable by such fine the conduct of space operations described in articles 2 and 3 of the FSOA, when they are conducted without previous authorization. Is also punishable by a fine of 200 000€ the fact to pursue a space operation despite a decision to revoke or to suspend the associated authorization, or if the operator pursue this operation without comply with a formal notice to comply with a requirement (article 5 FSOA) or to a measure which is impose in order to ensure the safety of persons and goods, and the protection of public health and the environment (article 8 FSOA). Finally, the fact, for an operator under FSOA, to prevent controls under article 7 of the FSOA may also lead to a fine of 200 000€. Article 11 of the FSOA provides also a heavier sanction when the abovementioned reasons why a fine is pronounced are, in addition, likely to jeopardize nation defense interests. In this case, the sanction is three years' imprisonment and a fine of 300 000€.

3.2. Liability Regime Established By The French Space Operations Act

By establishing a liability regime for space operations, in particular for damage that could be caused to third parties, the French legislator has sought to address two objectives. The first objective was to transfer, at least to a certain extent, the liability it bears under the Outer space treaty and the Liability Convention to the operators for their operations. The second objective was to transpose, at the national level, the liability regime established at the international level, which is particularly protective of the victims. The FSOA provides this liability regime in its Title IV.

Regarding the transfer of liability from the State toward the space operator, it has to be reminded that according to article VII of the Outer Space Treaty and the Liability Convention, in particular its articles II, III and IV, the launching States of a space object are internationally liable for the damage caused by the said space object to a third party.

As a reminder, is regarded as a “launching State” according to the international treaties, any “State which launches or procures the launching of space object” and any “State from whose territory or facility a space object is launched”. Based on this definition, it is clear that France, considering its national space activities and in particular its space port in French Guiana, is often launching State and then has a relatively important risk to be held internationally liable. The creation of the authorization regime as described above in the paragraph 3.1 of this Chapterlimits this risk by ensuring that the operations that may engage the France’s liability are performed safely. In addition, the French legislator wanted that the operator under the FSOA assume, at least partly, the liability of the damage caused by their operations. To that end, article 13 of the FSOA provides that “the operator shall be solely liable for damage caused to third parties by the space operations it conducts”. This principle applies to all space operations, whether it is a launch operation or an in-orbit control operation for a space object or a group of coordinated space object. The FSOA only provides one exception to this principle where the unique liability of the operator may be arranged. It is when the operator provides services on behalf of the State for national defense interests[39]. In such case, a convention can be concluded between the State and the operator to detail the sharing of the liability. In addition to the provisions of article 13 of the FSOA, and with the same logic of transferring the liability to the operator, the French legislator has put in place, through article 14 of the FSOA, a recourse mechanism from the French State against the operator. It means that if, in the application of the Liability Convention or the Outer space treaty, the French State has to indemnify a third party for a damage, it can then claim reimbursement from the operator whose space operation caused the damage. In connection with the mechanism of State guarantee described hereinafter, the French State’s right of recourse is limited to a maximum amount set by the Finance Act[40] , and cannot be exercised when the operation in question involved French State interests. Thus, the combination of articles 13 and 14 of the LOS ensures that regardless of the remedy used – whether the victim seeks compensation directly from the operator, or the victim’s State activates the Liability Convention – it is the operator who will be held liable for the operations it carries out.

39 Article 13-1, Loi n°2008-518 du 3 juin 2008 relative aux opérations spatiales.

40 According to Article 119 of the 2008 rectificative act n°2008-1443n the maximum amount is decided by the Ministry in charge of space in each authorization for space operation and shall be comprised between 50 and 70 million euros. Generally, the amount is establishing at 60 million euros.

This liability of the operator is however limited. Firstly, in terms of duration, the liability of the operator is limited in time even if its space object is still in outer space and then likely to cause a damage to third parties. Indeed, article 13 of the FSOA provides that the liability of the operators ends "when all the obligations set out in the authorization or the license are fulfilled" – it means when the end of life maneuvers have been completed – or, when it is not possible (e.g. loss of communication with the space object) "one year after the date on which these obligations should have been fulfilled". When the liability of the operator ends, the French States becomes the only entity liable in case of damage caused by the space object and cannot no longer claim any reimbursement to the operator in the case its liability is engaged. Moreover, the French legislator has also decided to limit the part of the indemnification to be supported by the operator in case of damage cause to a third party. One of the reason for this is that the amount of indemnification for a damage caused by a space object may be very high and not always supportable for private entities and there was a risk for the victims to not be fully compensated. To that end, the French legislator has established, through article 15 of the FSOA, a mechanism of state guarantee. Under this mechanism, when an operator subject to the FSOA has to indemnify a third party for damage caused by its space object, it bears the cost of this indemnification only up to a certain amount. Above this amount the French State supersedes the operator's obligation to indemnify the victim. This amount is set by the Finance Act as a range between 50 and 70 million euros, both for damage caused during the launch phase (article 16 LOS) and after the launch phase (article 17 LOS). The precise amount is set out in the authorization decree for the space operation concerned. It is usually of 60 million euros. The operator cannot benefit from this French State guarantee in the event of intentional fault, when the damage is caused in outer space after the launch phase, or if the operation is not carried out from French territory, the territory of another member state of the European Union or the territory of a State party to the Agreement on the European Economic Area, or from facilities under the jurisdiction of one of these states. This state guarantee mechanism is found in many other national space laws[41].

41 See e.g. : For Denmark, Article 6 of the Act no. 409 of 11 May 2016; for Belgium : Article 15 of the Loi du 17 septembre 2005 relative aux activités de lancement, d'opération de vol ou de guidage d'objets spatiaux; Finland : Section 7 of the Act on Space Activities of 2018.

Regarding the second objective of the liability regime created by the FSOA, i.e. the transposition in national law of the liability regime established by the international treaties, it must be recalled that, considering the risky nature of space activities, it was decided, when the treaties were drafted, to have a liability regime very protective of the victims to which the damage is caused, in particular when such victims were not involved in the space activity. Article II of the Liability Convention provides that the 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". It means that it shall indemnify the victim for the damage without the need to prove its fault. Article III of the Liability Convention provides that in case of damage caused elsewhere than on the surface of the Earth, the launching State is liable "only if the damage is due to its fault or the fault of the persons of whom it is responsible". Indeed, it is considered that between space actors, the protection has not to be as strong as for entity not involved in space activities. The FSOA confirms these principles in its article 13. This article provides that the operator is "absolutely liable for damage caused on the ground or in the airspace" and "shall be liable only due to his fault for damage caused elsewhere than on the ground or in the airspace". Moreover, the possibility of limiting or exonerating the operator from liability is very limited. It can be done only if the fault of the victim can be proven, but it is extremely unlikely considering the case of a victim on the ground or in an aircraft suffering the damage due to a space object.

The clear identification, in the FSOA, of the operator as the only one liable bring legal certainty, by facilitating the procedures for the victims which would ask for indemnification. In particular, this prevents the various entities involved (operator, manufacturer, subcontractor) from passing the buck, especially as in space operations, the exact cause of the damage may be difficult to identify.

Finally, it should be pointed out that, by combining the space operator's insurance obligation under article 6 of the FSOA and the State guarantee mechanism under article 15 of the FSOA, the French legislator has ensured that a third party who suffers from a damage caused by a space object will be fully indemnified.

The FSOA provides also in its Chapter II of its Title IV provisions regarding the participants to a space operation. Among these provisions, it provides in particular that when the operator or the French State, thought the State guarantee, had indemnified a third party for a damage caused by a space object, they cannot do a recourse against the other participants to the said space operation. In addition, the chapter II of the Title IV of the FSOA limits the possibilities for a participant to a space operation or to the production of a space object suffering a damage cause by the space object during the operation, to ask for compensation to the other participants.

3.3. CNES's Missions According To The French Space Operations Act

The adoption of the FSOA has also led to legislative and regulatory amendments to the legal status of CNES, both in the legislative part of the Research Code and in the decree outlining its functions (which, as of 2023, is incorporated into the regulatory part of the Research Code[42]). These amendments primarily allowed the codification of CNES's role in the registration of space objects and, subsequently, the enhancement of its responsibilities in space operations safety, by assigning it new missions.

With regard to registration, CNES had, until 2008, only an informal role in the registration of space objects. The FSOA formally recognized this role under Article 12, which establishes, on the one hand, the obligation to register space objects and, on the other hand, the creation of a national register maintained by CNES on behalf of the State. This new responsibility was thus conferred upon CNES through Article L.331-2(h) of the Research Code, and the Decree relating to CNES was amended accordingly to incorporate the principles governing the management of the national register. In this respect, any space operator subject to the FSOA is required to submit to CNES, within 60 days after the launch, the information necessary to identify the space object. The list of required information is specified in the Order of 12 August 2011[43] , which includes, among other: the designation of the space object, its general purpose, the name of the manufacturer, the date and place of launch, and the parameters of the final orbit[44]. CNES assigns a registration number to each object and

42 Décret n°2023-1321 du 27 décembre 2023 portant partie réglementaire du code de la recherche.

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

44 Are also required to be provided the general function of the object, the historic of the property and real or personal securities on this object, the mode of control of the object in orbit and the eventual technical events that the object has encountered during the orbital injection or during the launch in case of a launcher or its component.

enters it into the register. This register is public and may be consulted upon request to CNES. Finally, CNES is required to transmit the information recorded in the register to the Ministry for Europe and Foreign Affairs for onward transmission to the Secretary-General of the United Nations, in accordance with Article IV of the Registration Convention.

As for CNES's enhanced role in ensuring the safety of space operations, the FSOA and the related legislative and regulatory changes have granted CNES and its President a broad range of new powers, effectively making CNES the operational arm of the State in this domain. These new responsibilities and powers pertain both to general space operations and to the specific role CNES plays at the CSG.

In the field of space operations, CNES has, since the adoption of the FSOA, been tasked with assisting the State in developing technical regulations for space operations[45] , and with performing compliance monitoring under delegation from the Minister responsible for space, as part of the authorization process previously described[46]. Pursuant to Article L.331-7 of the Research Code and Article 8 of the FSOA, the President of CNES is also granted delegated authority to take any measures necessary to ensure the safety of persons and goods, and to protect public health and the environment.

With respect to operations conducted at the Guiana Space Centre, Article 21 of the FSOA created Article L.331-6 of the Research Code, which assigns two new missions to the President of CNES. The first is a general safeguard mission aimed at managing technical risks related to the preparation and execution of space operations at the CSG[47] , in order to protect individuals, goods, public health, and the environment—both on the ground and in flight. For this purpose, the President is vested with special police powers enabling him to enact the necessary safety measures, ensure their implementation, and sanction any breach thereof. In this context, the President of CNES adopted, on 9 December 2010, CNES Order N° CNES/P 2010-1 regulating the exploitation of CSG facilities, which sets out all safety measures required for the proper conduct of launch operations. This Order covers

45 Article L331-2 f).

46 Article L331-2 g).

47 Initially, the Code of research provided only a general safeguard mission to CNES President for the preparation and execution of launches from CSG. In 2023, the Code of research was modified to extend the scope of this mission to all space operations in order to include return of space objects on site at the CSG.

a wide scope and regulates access and movement within the CSG, the establishment of facilities, and safety measures for both ground and flight operations, including procedures for the neutralization of launch vehicles.

The second mission assigned to the President of CNES under Article L.331-6 of the Research Code is a coordination one, alongside the State's representative in French Guiana (the "Prefet"), for the implementation by the entities operating at the CSG of the various legal regimes designed to ensure the safety and security of installations and activities. In other words, the President of CNES ensures, in close coordination with local authorities, compliance with all regulations not falling directly under his special police authority, including those relating to classified facilities for environmental protection (ICPE), the rules of the road, environmental law, critical infrastructure security, and air traffic regulations.

3.4. The Space-Based Data Regime Established By The French Space Operations Act

Title VII of the FSOA establishes a legal framework governing the exploitation of space-based data. This regime was not included in the initial draft prepared by the Conseil d'État, which focused solely on space operations rather than space activities. It was subsequently added by the General Secretariat for National Defense and Security (SGDSN) prior to the bill's submission to Parliament. The purpose of this title is to enable the French Government to ensure that primary operators of space-based data do not, in the course of their activities, pose a threat to the fundamental interests of France – particularly national defense, foreign policy, and international commitments. Such risks may arise, for example, through the dissemination of Earth observation data pertaining to strategic French or foreign sites. Consequently, any primary operator of space-based data carrying out its activity in France, and whose data meet specific technical criteria, is required to submit a prior declaration to the SGDSN. Depending on the circumstances, the SGDSN may impose specific restrictive measures. The procedures for implementing this obligation are defined by a dedicated decree and ministerial order, which specify the categories of space-based data subject to declaration requirements (such as type of data, resolution, etc.). Failure to submit the required prior declaration, or non-compliance with the conditions imposed by the SGDSN, is punishable by a fine of up to €300,000 and a term of imprisonment of up to three years. However, the CNES, when conducting its space programs, and the French State, when acting in the interest of national defense, are exempted from the prior declaration requirement.

4. CURRENT CHALLENGES RELATED TO THE IMPLEMENTATION OF THE FRENCH SPACE OPERATIONS ACT

The last few years, we faced a large development of space activities. We assisted to the emergence of new space technologies, to a diversification of space activities, but also to an augmentation of the number of space actors. This led notably to an augmentation of the number of objects in outer space.

These evolutions are not without impact on national laws and regulation related to space activities, that need to face new challenges. Among them, there is first the need to adapt such law and regulation to the news form of operations and activities. Indeed, with the emergence of new activities, it is necessary to make the scope of the legislations evolve in order to best cover all type of space operations. Furthermore, as mentioned above, one of the main objectives of these regulations is to ensure the safety of space operations, by imposing that they comply with a set of minimum technical requirements. In order to maintain the effectiveness and relevance of a national space law, it is essential that these technical requirements evolve to ensure these safety objectives.

In addition to adapt to new activities, national space regulations shall also take into account the sharp rise in space traffic and the associated issues, such as the increased risk of collisions, resulting in particular from the growing number of space debris, or the risk of saturation of certain orbits. The challenge here is to ensure the long-term sustainability of space activities. In this frame, actions have been taken at an international scale, notably with the adoption, in the frame of the COPUOS, of the Guidelines for the long-term sustainability of outer space activities in 2019, but their full implementation can only be possible through national mechanisms.

Regarding these challenges, a number of new space laws have been enacted in recent years, and many States that already have one have embarked on work to make it evolve. The FSOA is not an exemption to this principle. In 2019, a working group, coordinated by the Ministry of research and higher education, then Ministry in charge of space, and by the Ministry of Defense, was established in order to identify the evolution to bring to the FSOA and its implementing texts (such as the Decree n°2009-643 and the Technical Regulation). This working group was composed by many experts, including ones from CNES. In 2020, the working group issued a report containing numerous recommendations for evolution of the texts. This led to a first update of the FSOA in February 2022, aimed in particular at taking better account of national defense interests in the authorization process. In 2023, the FSOA was updated a second time to cover new activities. Among other, this update incorporated provisions on returns of launcher stage in the FSOA, as well as authorization to control not just a single space object in outer space, but also a group of coordinated space objects. This latest addition aims at taking into account the case of constellations and associated issues. Finally, in 2024, the texts implementing the FSOA were updated, first in order to implement the modifications of the FSOA and, second, to introduce new topics that did not require modifications of the law. Therefore, the Decree n°2009-643 added new procedural elements, notably concerning the extension of the duration of space operations, or to cover cases where an operator wishes to provide of benefit from an in-orbit service activity that was not provided for in its initial authorization. The Technical Regulation has also been extensively updated. First, this update has made it possible to strengthen existing requirements by taking into account the feedback from more than ten years of implementation of the FSOA and the evolutions of space technologies. It also adds two new chapters dedicated to new activities, one establishing the technical requirements for the constellations and mega-constellations, and, the other, for the in-orbit servicing. As such, this update has in particular enabled to improve the long-term sustainability of space activities.

Now that these updates have been adopted, the work is far from being finished. The new challenge is now to insure the good implementation of these new rules and technical requirements. For this purpose, a good communication is necessary between all the actors of the French space sector, and notably the ones subject to the authorization regime. In order to facilitate this work, CNES updated the guide of good practices, aiming to explain the technical requirements and to propose solutions for being in conformity with them. Finally, since space activities are constantly evolving, it is needed to keep a watch on any future developments in order to timely react for always being able to answer to the challenges they raise.

5. NEXT STEPS FOR THE EVOLUTION OF THE FRENCH SPACE OPERATIONS ACT

As part of the 2019 working group's report on the evolution of the FSOA, a number of issues were identified that would require legislative or regulatory updates over the medium to long term. Not all of these matters could be addressed in the updates mentioned above, due to the need to prioritize certain topics based on short-term needs or the maturity of the subjects concerned.

The ministries in charge of space, with the support of CNES, will need to continue closely monitoring developments in the space sector in order to anticipate, as far as possible, the emergence of new space activities and the evolving needs of operators. This is necessary not only to avoid hindering the development of such activities due to the absence of an appropriate legal framework, but also to encourage and facilitate such development. It is important that this work begins without delay in order to prepare future legislative and regulatory evolutions in a field where developments are occurring rapidly.

Lastly, future amendments to the FSOA and its implementing texts must also take into account changes in international and, in particular, European norms and regulations. This is essential not only to enable France to comply with its international commitments, but also to ensure greater sustainability of outer space activities and overall consistency in the conduct of space operations, given that outer space is inherently an international domain. To this end, ongoing monitoring is in place within international and standard-setting bodies (such as COPUOS, IADC, and ISO) to remain informed of developments that may need to be implemented at the national level. On the European Union front, with the announcement of a forthcoming "European Union Space Act", negotiations for which are expected to begin shortly, it will be essential to ensure consistency between the respective legal frameworks.

REFERENCES

INTERNATIONAL AGREEMENTS

- Agreement governing the activities of States on the Moon and other celestial bodies, opened for signature on July 11, 1984, U.N.T.S. 1363, p.3.
- Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space, opened for signature on April 22, 1968, U.N.T.S. 672, p.119
- Convention on registration of objects launched into outer space, opened for signature on September 15, 1976, U.N.T.S. 1023, p.15.
- Convention on the international liability for damage caused by space objects, opened for signature on March 29, 1972, U.N.T.S. 961, pp.187.
- Treaty on the principles governing the activities of States in the exploration and use of outer space, including the Moon and other celestial bodies, opened for signature on January 27, 1967, U.N.T.S. 205, p.205.

LEGISLATION

French legislation

- Code de la recherche
- Code des assurances
- Code de la propriété intellectuelle
- Loi n°61-1382 du 19 décembre 1961 instituant un centre national d'études spatiales.
- Décret n°75-930 du 10 octobre 1975 relatif à la défense aérienne et aux opérations aériennes classiques menées au-dessus et à partir du territoire métropolitain.
- Loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales.
- Loi n° 2008-1443 du 30 décembre 2008 de finances rectificative pour 2008.
- 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.
- Arrêté du 31 mars 2011 relatif à la réglementation technique en application du décrêt 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.

- Arrêté du 12 août 2011 fixant la liste des informations nécessaires à l'identification d'un objet spatial en application du titre II du décret n°84-510 du 28 juin 1984 relatif au Centre national d'études spatiales.
- 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.
- Décret n°2023-1321 du 27 décembre 2023 portant partie réglementaire du code de la recherche.

Other legislation

- Norway: Act n°38 on launching objects from Norwegian territory in outer space, of 13 June 1969.
- United Kingdom: Outer Space Act of 1986.
- Belgium : Loi du 17 septembre 2005 relative aux activités de lancement, d'opération de vol ou de guidage d'objets spatiaux.
- Finland: Act on Space Activities of 2018.
- Sweden: Act on space activities of 18 November 1982.
- Denmark: Act no. 409 of 11 May 2016.

CASE LAW

Conseil d'Etat, Assemblée., 22 juin 1951, Sieur Daudignac, Rec.,p. 362.

BOOKS

- Clerc, Philippe (2018), Space law in the European context, national architecture, legislation and policy in France, Essential air and space law, n°20, eleven international publishing, The Hague, 598p.,

OFFICIAL DOCUMENTS

- Commission Européenne, Aide d'Etat n°208/2007 - France, Garantie de l'Etat pour des dommages causés à des tiers dans le cadre d'opérations spatiales, C(2007)5093 final, 2007.
- Conseil d'Etat, Pour une politique juridique des activités spatiales, La Documentation française, Paris, 2006, 207p.
- Ministère délégué à la recherche et aux nouvelles technologies, L'évolution du droit de l'espace en France, 2002, 148p., p.34-35.

ARTICLES

- Huwart, Olivier (1997), « Du V2 à Véronique : les premières recherches spatiales militaires françaises », in Revue historique des Armées, vol.208, pp.113-126.

- Varnoteaux, Philippe (2003), « La naissance de la politique spatiale française », in Vingtième siècle. Revue d'histoire, vol.77(1), pp.59-68.

ONLINE SOURCES

- Lafferranderie, Gabriel, "Responsabilité juridique internationale et activités de lancement d'objets spatiaux au CSG" : https://www.esa.int/esapub/bulletin/bullet80/laff80.htm (last access on 26th June 2025)

- Veillon, Philippe, Quand la France a recruté des scientifiques nazis, Lesdonnéesde39-45.fr :https://www.lesdonneesde39-45.fr/post/quand-la-france-a-recruté-des-scientifiques-nazis (last access on 26th June 2025).

LUXEMBOURG

Table of Contents

About the Author

Güneş Ünüvar

Güneş Ünüvar is a Senior Researcher at the Luxembourg Centre for European Law at the University of Luxembourg and an Associate Fellow at the Academy of International Affairs Nordrhein-Westfalen in Bonn, Germany. He also serves as the Managing Editor of the Journal of World Investment & Trade and as Legal Advisor to the Moon Village Association. He is an Individual Member of the International Institute for Space Law, and part of its Manfred Lachs Space Law Moot Court organising committee. He obtained his LL.M. in international and European law from the Institute for European Studies (now the Brussels School of Governance) at Vrije Universiteit Brussel and his Ph.D. in international investment law from the Centre of Excellence for International Courts (iCourts), University of Copenhagen. Before his current position, he was a Senior Research Fellow at the Max Planck Institute for European, International and Regulatory Procedural Law in Luxembourg, and a Carlsberg Foundation postdoctoral researcher at iCourts. He was also a visiting researcher at Columbia University and the Energy Charter Secretariat during his PhD. His research interests include international economic law, international investment law and dispute resolution, as well as international space law and the role of private capital in outer space activities.

5 Rue des Girondins 1626 Luxembourg
+352 621 406 777
gunesunuvar@gmail.com

Abstract

This chapter examines the national space legislation of Luxembourg. Through a deliberate legislative and policy strategy, Luxembourg has positioned itself as a preferred European jurisdiction for private space operators. The chapter traces the evolution of its legal framework, beginning with the 1991 Electronic Media Law, which facilitated the growth of satellite broadcasting through SES. This early foundation set the stage for more targeted legislation, including the landmark 2017 Law on the Exploration and Use of Space Resources, the first in Europe to recognise property rights in extracted space materials. Building on this momentum, Luxembourg adopted the 2020 Law on Space Activities to regulate a broader array of space operations. The chapter analyses the legal content, institutional context, and implementation challenges of these laws. While both the 2017 and 2020 laws adopt licensing and supervisory mechanisms inspired by Luxembourg's financial sector regulation, the former governs commercial space resource activities, the latter all other space activities. Together, they form a dual-track framework that has attracted international attention for its legal innovation but also prompted criticism for definitional ambiguity and a lack of environmental safeguards. The final sections address gaps in the current system, particularly the absence of preventive environmental rules and structured mechanisms to distinguish between operators of different scale or risk. The chapter concludes by identifying key reforms, including definitional clarity, regulatory tiering, an informed balancing of detailed regulation and ministerial discretion, and proactive alignment with the forthcoming EU Space Act.

Keywords: Luxembourg, Space, Resource, SES, Moon, EU, Satellite, Law, Autorisation, Environment, SMEs

1. INTRODUCTION

Despite being a small European nation with a population of just over 670,000 (as of 2024; luxembourg.public.lu), the Grand Duchy of Luxembourg (hereinafter "Luxembourg") is one of the most prominent European nations in space policy and innovation globally. In recent decades, Luxembourg has made deliberate use of legal and institutional tools to establish itself as a jurisdiction of choice for commercial space operators. Its approach has been marked by a willingness to legislate in areas of international legal uncertainty, to develop national capacity in regulatory oversight, and to support the growth of a domestic space economy through targeted legal and policy frameworks. As a result, Luxembourg has come to occupy an increasingly influential position in the governance of space activities at both the European and international levels with remarkable speed.

Luxembourg's trajectory in the development of national space legislation offers a compelling case study of how smaller states can assert themselves in the governance of complex, high-stakes global arenas like outer space. Luxembourg has leveraged, *inter alia*, legal innovation as a strategic instrument to attract investment and foster technological advancement, which has resulted in hundreds of small and medium-size enterprises (SMEs) to move to, or form within, its borders (LSA Space Directory). In addition, it has attracted key commercial actors, such as the Japanese company *ispace*~~, within its borders~~ (Gouvernement.lu 2017). Its evolving legislative framework illustrates the growing intersection between national policymaking and global space governance, particularly in areas where international (space) law remains frozen in perpetual political and normative gridlock, such as space resource utilisation (Ünüvar and Su 2024).

Luxembourg's engagement with space regulation began with the 1991 Electronic Media Law (*Loi du 27 juillet 1991*, "1991 law"), which, although primarily aimed at liberalising the satellite broadcasting sector, served as a precursor to more targeted space legislation. It established an enabling legal environment that facilitated the rapid expansion of satellite operators under Luxembourgish jurisdiction, which also amplified its media and telecommunications flag-bearer company SES established earlier in 1985 (then *Société Européenne des Satellites*). This law provided an early model for how a concrete regulatory framework could support the growth of a technologically intensive sector. While not formally a space law, the 1991 law marked the country's entry into the regulation of outer space infrastructure and services.

This early engagement laid the groundwork for Luxembourg's more assertive entrance into the domain of space resources governance, but the evolution from a broadcasting-focused legal environment to a fully-fledged space policy took several decades. Between 1991 and 2017, Luxembourg's activities in the space sector were primarily commercial and infrastructural, anchored by the continued success of SES and a policy focus on sustainability and digital innovation. The country lacked space-specific legislation beyond the media domain, but a gradual strategic shift began to take shape in the mid-2010s under the leadership of Étienne Schneider, then serving as Deputy Prime Minister and Minister of the Economy. Recognising the economic and geopolitical potential of the commercial space sector, particularly in emerging areas like space mining and in-situ resource utilisation (ISRU), Schneider launched the SpaceResources.lu initiative in 2016, a government-backed program aimed at positioning Luxembourg as a global hub for private sector space resources ventures (Spaceresources.lu). This initiative marked a decisive political commitment to develop the legal, financial, and institutional infrastructure necessary to support space resource activities under Luxembourgish jurisdiction~~.~~ (Gouvernement.lu 2016) This was shortly followed by the 2017 Law on the Exploration and Use of Space Resources: the first such law in Europe, and second globally, after the United States. (*Loi du 20 juillet 2017*, "2017 law"; US Code Title 51) This law established an authorisation (or '*agrément*', as it is called in the law) regime, and ascertained that space resources could be owned (Article 1, 2017 law).

Following a somewhat counter-intuitive legislative sequence, this specific law on space resources was followed by its more general counterpart. The 2020 Law on Space Activities thus broadened the regulatory focus from resource extraction to encompass a wider spectrum of commercial and scientific space activities (*Loi du 15 décembre 2020*, "2020 law"). Similar to the 2017 Law, it introduced a licensing framework, safety oversight mechanisms, insurance obligations, and liability rules, thereby further aligning Luxembourg's national obligations with key provisions of international space law, including Articles VI and VII 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 Outer Space Treaty of 1967 ("Outer Space Treaty"), the Convention on International Liability for Damage Caused by Space Objects of 1972 ("Liability Convention"), and the Convention on Registration of Objects Launched into Outer Space of 1976 ("Registration Convention").

Taken together, the 2017 and 2020 laws underscore a regulatory approach centered on supporting governmental policies and the accommodation of perceived commercial needs within an international legal order with critical ambiguities and legal-political deadlocks.

This chapter aims to examine the substance and implications of Luxembourg's national space legislation, with a view toward understanding its place in the broader context of international (and European) space law and policy. Section 2 will briefly trace the legislative processes, exploring the domestic political, legal, economic, and institutional factors that shaped the drafting and adoption of the three laws mentioned above. Section 3 will provide a general commentary on the substance of the legislation. Section 4 will turn to the current challenges in implementation and interpretation. Finally, Section 5 will consider prospective reforms and the possible evolution of Luxembourg's legislative framework, particularly in light of an impending 'EU Space Act' (Proposal, 2025).

2. HISTORY OF THE LAW-MAKING PROCESS

2.1. 1991 Electronic Media Law

Luxembourg's entry into regulating activities linked to outer space began indirectly with the 1991 law. While its formal focus lay in liberalising the satellite broadcasting sector, the law provided the structural and conceptual foundation for Luxembourg's later development of explicit space legislation. Drafted under the government of Prime Minister Jacques Santer, the law was a response to broader European Community directives intended to open telecommunications markets and encourage cross-border broadcasting. (White Paper 2023) It was also a direct consequence of the establishment of SES, and the need for a legal framework for its activities (Calmes et al 2021).

The 1991 law, in its original form, granted the power to issue licenses to the government (Art. 4, Original 1991 Law). A subsequent amendment in 2013 (*Loi du 27 août 2013*) established the *Autorité luxembourgeoise indépendante de l'audiovisuel* (ALIA), which took over regulatory and supervisory functions from the government. A further amendment in 2021 (*Loi du 19 Novembre 2021*) strengthened ALIA's autonomy, reflecting a broader European trend to create fully independent regulators in the media and telecommunications sectors. (Article 30, EU Directive 1018/1808; amending Directive 2010/13/EU).

The licensing and oversight mechanisms applied to satellite operators anticipated many of the later requirements codified in Luxembourg's space laws, including registration duties and reporting on operational capacity, as well as other disclosure obligations.

Critically, the 1991 law and its gradual transformation demonstrated the benefits of combining light-touch licensing with administrative competence and the alignment of national legislation with sectoral support. These features would become characteristic of Luxembourg's approach to space regulation in the following decades.

2.2. 2017 Space Resources Law

Luxembourg's decision to pioneer legal frameworks for space resources extraction culminated in the 2017 law, namely the Law on the Exploration and Use of Space Resources. This legislation emerged in parallel with the government's strategic initiative, SpaceResources.lu, which was launched in 2016 under Deputy Prime Minister and Minister of the Economy Étienne Schneider. The policy context was shaped by growing commercial interest in asteroid mining and ISRU, coupled with Luxembourg's desire to diversify its economy beyond satellite broadcasting and financial services (Interview by Étienne Schneider 2017).

The 2017 law applies to "exploration and use of space resources *for commercial purposes*" (Article 3, 2017 law; emphasis added), and excludes "satellite communications, orbital positions or the use of frequency bands" (Article 2(4), 2017 law). Its authorisation regime was inspired by Luxembourg's financial supervisory models and laws, particularly the 1993 Law on the Financial Sector (*Loi du 5 avril 1993*, "1993 law"; Gładysz-Lehmann 2023: 40; Hofmann et al 2022: 21). The procedural requirements imposed on applicants mirror financial sector licensing in several respects: operators were required to establish a registered office in Luxembourg, disclose their beneficial ownership structure, and demonstrate both technical competence and financial solvency, among other features. This alignment allowed policymakers to leverage existing administrative expertise, aiming to reassure investors that the jurisdiction offered a stable regulatory environment with key legal guarantees.

Some key normative questions were raised during the making of the 2017 law as well. After the preparation of the draft law in 2016, the *Conseil d'État* issued its Opinion no. 51.987 on 7 April 2017 ("2017 Opinion"), which identified a series of concerns relating to legal precision. First of all, in response to the first version of the Article 1, which read that space resources could be owned "in accordance with international law", it expressed its doubts as to whether the ownership of space resources could readily be assumed to be legal under international law (2017 Opinion: 9; Hofmann et al. 2022: 5). It also questioned as to how legal certainty can be ensured, so that other states would recognise the ownership rights nationally rendered possible under the law (2017 Opinion, 6 and 9). It also recommended expanding the context of the "use" of space resources and detailing the conditions applicable to the sale of these resources by a licensed operator – and whether the third parties acquiring these resources would be covered by the law (2017 Opinion, 9-10). Notably, the *Conseil*'s opinion also proposed including obligations aimed at preventing environmental harm and called for clearer articulation of whether pre-licence environmental assessments should be imposed (2017 Opinion, 7-8).

In its January 2017 opinion, the Chambre of Commerce highlighted the absence of a definition for "space resources", noting that its inclusion would allow "private operators interested in the exploitation and utilisation of space resources" to "identify the concerned resources without difficulty" (Parliamentary Dossier No 7093/1: 2).

The legislature ultimately removed the reference to international law on the question of ownership. No environmental requirements, beyond the risk assessment requirement and liability allocation under Article 10, were ultimately included. The rationale was likely that this liability framework, under which operators would be strictly responsible for damage resulting from their activities, would serve as an effective deterrent against irresponsible conduct, including environmental harm.

The parliamentary dossier no. 7093 and the accompanying committee reports reflect this tension between regulatory ambition and legal certainty. In response to *Conseil d'État*'s opinion, the Economic Affairs Committee (*Commission de l'Economie*) reiterated that it considers it essential to unequivocally pronounce on the right of ownership of resources potentially brought back from outer space, despite the ambiguity in international law (Parliamentary Dossier No 7093/3: 4). The final text was adopted by a substantial majority (55 out of 57 members of the parliament), officially making Luxembourg as Europe's first state to enact a comprehensive legal regime recognising property rights in space resources.

Following its adoption, the law received considerable international attention (Froust 2017). It was praised for offering a clear path to licensing and legal certainty, but also criticised for the omission of sustainability obligations (Hofmann and Bergamasco 2019: 5) and for potentially deepening fragmentation in the interpretation of international space law (De Man 2017). These debates underscore the balancing act at the core of the 2017 law: attracting investment through clarity and a certain degree (or claim) of legal certainty, while abstaining from more explicit environmental safeguards and proceeding without a broader multilateral consensus on the legal status of space resources.

2.3. 2020 Space Activities Law

The passage of the 2020 law, namely the Law on Space Activities, marked the consolidation of Luxembourg's space regulatory framework (Hofmann 2022: 530). While the 2017 law addressed the specific domain of space resource utilisation, the 2020 law established a general licensing and oversight regime encompassing all other commercial and scientific space activities under the jurisdiction of Luxembourg. As Article 3 of the 2017 law qualifies the scope of application to resource activities of a commercial nature, it was argued that space resource activities which do not have this feature would be covered by the 2020 law (Hofmann 2022: 526).

The impetus for this broader statute was the proliferation of *NewSpace* operations and different (some of which are prospective) business models consolidating in Luxembourg, represented by its increasingly vibrant space business community, which includes companies developing technologies for in-orbit servicing, debris removal, and satellite constellation deployment. These novel activities are not covered by the scope of the earlier 1991 law; and as explained above, the 2017 law has a specific focus on (commercial) space resource activities. The 1991 law had been the principal legal basis for the authorisation of space activities which covered Luxembourgish satellite systems and frequencies for nearly three decades by that point. Furthermore, from the outset, the legislature positioned what would eventually become the 2020 law as the manifestation of Luxembourg's international responsibilities stemming from the Outer Space Treaty and the Liability Convention (Parliamentary Dossier No 7317/0: 2). Similar to the situation under the 2017 law, the authorisation and supervision framework established under the 2020 law borrows from the 1993 law, requiring operators to submit evidence of financial solidity, detailed ownership disclosures, and governance arrangements aligned with established supervisory practices in the financial sector.

The *Conseil d'État* issued its Opinion no. 52.879 on 15 February 2019 ("2019 Opinion"), scrutinising several aspects of what was then the draft law. Notably, it opposed the initial version of Article 3, which was virtually identical to the language of Article III of the Outer Space Treaty, since it seemingly attempted to transfer the international responsibility stemming from the latter intended exclusively for states to private operators (2019 Opinion: 4). It also opposed the initial formulation of Article 4, which had stipulated that operators were to take necessary measures to limit the risks of degradation of the space and terrestrial environments or their contamination. The *Conseil* deemed the obligation to be too vague to be operationalised effectively and lacking clear enforcement mechanisms (2019 Opinion: 4). As a result, legislators removed the proposed environmental protection obligation from the final text, and embedded it within a liability provision that is very similar to its counterpart under the 2017 law. Contrary to the *Conseil*, the Chamber of Commerce was receptive of the original Article 4, calling it an "absolute necessity" (Parliamentary Dossier No 7317/1: 7).

Following the logic of its predecessor, the 2020 law ended up relying on the principle of strict liability to create incentives for responsible behaviour. As such, operators remain fully liable for damage caused by their activities, which is envisaged as a mechanism expected to provide some deterrence against environmental harm.

The final structure of the law established a licensing framework which, *inter alia*, requires ministerial authorisation (2020 law, Art. 5), sets the specific conditions for such authorisation (2020 law, Art. 6), and mandates inclusion of authorisations in a public registry (2020 Law, Art. 10).

As a whole, the 2020 law, together with its 2017 predecessor, completes Luxembourg's distinctive regulatory model: a dual framework built upon financial regulatory traditions and deliberately designed to position Luxembourg as a jurisdiction of choice for space operators. This strategy of legal transplantation illustrates both the strengths and limitations of Luxembourg's regulatory approach. On the one hand, borrowing established procedures from financial regulation allowed Luxembourg to develop credible, enforceable concession processes with relative speed. On the other hand, this pragmatism appear to have come at the expense of comprehensive technical elaborations in the laws, the absence of a strong environmental impact structure, and a definitional and normative framework that is in need of further expansion.

2.4. Interrelation And Contemporary Application Of Luxembourg's Space Laws

As shown above, the enactment of the 2017 and 2020 laws has fundamentally restructured Luxembourg's legal landscape for space activities, relegating the 1991 law to a more specialised, though still important, supporting role. Together, these three laws form a layered regulatory framework in which each instrument retains a delineated domain of applicability.

The 1991 law continues to govern satellite broadcasting and audiovisual content transmitted via satellite networks. Its licensing and oversight obligations focus exclusively on the provision and distribution of media services and national content standards drawn up by ALIA. In contrast, the 2017 and 2020 laws address the broader conduct of space resource activities and any other space activity, respectively. Their adoption marked a decisive expansion of Luxembourg's jurisdiction from a niche focus on communications infrastructure to a fully-fledged regulatory regime for the commercial and scientific utilisation of outer space.

As noted above, the 2017 law applies specifically to the exploration and use of space resources of a *commercial* nature. It establishes an authorisation framework under which operators must demonstrate technical competence, financial stability and compliance, as well as liability and insurance requirements before such authorisation can be granted.

It also enshrines ownership rights over extracted resources under its Article 1, one of the law's most distinctive (and controversial) features. This recognition, though not amounting to sovereignty over celestial bodies (which would unequivocally violate Article II of the Outer Space Treaty), has positioned Luxembourg as a jurisdiction willing to provide legal certainty in an area where international law remains ambiguous. However, whether ~~or not~~ this national legal certainty can be transposed internationally is an issue unsettled at best.

By contrast, the 2020 law governs all other space activities that fall outside the narrower scope of the 2017 law, as stipulated under its Article 1(2), which notes that "This Law shall not apply to missions involving the exploration and use of space resources governed by [the 2017 law], except for Articles 15 [on the register of space objects] and Article 16, paragraph 2 [on taxation]". Pursuant to Article 3 of the 2017 law, which only captures space resource activities of a commercial nature, these activities of a non-commercial nature would also be covered by the 2020 law. Its scope includes, for example, satellite deployment for telecommunications (excluding content licensing), earth observation services, scientific missions, in-orbit servicing, and other, future orbital activities such as debris removal. Hofmann argues that given the law does not specify the successful completion of an orbit, there is no reason why suborbital flights should not be included within its scope (Hofmann 2022: 527).

The relationship among these three laws can be illustrated through a hypothetical example of a satellite operator incorporated in Luxembourg that intends to launch and operate a satellite providing both broadcasting and earth observation services, with a secondary mission to prospect for mineral resources. In such a scenario, the operator's activities would fall under multiple regimes:

- The broadcasting of audiovisual content would be governed by the 1991 law, requiring a media service licence and compliance with EU and national content obligations.
- The launch and operation of the satellite itself for earth observation would require authorisation under the 2020 law, including registration with Luxembourg's public space object register, proof of adequate insurance, and demonstration of technical and financial capability and soundness.
- Any activities relating to the exploration and potential extraction of space resources, assuming they are commercial in nature, would be subject to the 2017 law, necessitating a separate licence covering the resource extraction mission.

This example illustrates the modular architecture of Luxembourg's legislative framework: each law applies to a distinct facet of space operations, and operators must ensure compliance with all applicable statutes depending on the nature of their activities. While it could be argued that the content covered by the 2017 and 2020 laws could be consolidated under a singular legislation, a *lex specialis* on the space resource activities arguably puts an emphasis on Luxembourg's special policy focus on this particular sub-segment of the space economy.

The following chapter now turns to the content of these laws – it will summarise the content of the 1991 law, and engage with the 2017 and 2020 laws more in depth.

3. COMMENTARY ON THE LAWS

3.1. 1991 Electronic Media Law

As examined above, the 1991 law was Luxembourg's first attempt to formalise the regulation of satellite-based broadcasting. Although its scope was confined to electronic media services, its procedural architecture anticipated many regulatory techniques later transposed into Luxembourg's space legislation. It had been the principal legal basis for all space activities prior to the 2017 and 2020 laws, insofar as these activities concerned satellite broadcasting.

This section will only briefly outline its key provisions so as to provide a reference point for the subsequent commentary on 2017 and 2020 laws, and to distinguish its framework from the latter two.

Article 1 notes that "the object of the present Law is to warrant, in the field of electronic media, the exercise of the free access by the population of the Grand Duchy to a multitude of information and entertainment, by guaranteeing freedom of expression and information as well as the right to receive and transmit, on the territory of the Grand Duchy any audio-visual or audio media services". (Art. 1, 1991 law). Article 2 includes a lengthy list of definitions, including 'authority' (referring to ALIA), 'audio-visual media service', 'Luxembourg satellite service', 'Luxembourg broadcast service' (defined as "a) any Luxembourg television or radio service transmitted with a Luxembourg radio broadcasting frequency as well as b) any Luxembourg television or radio service that was granted a licence of a Luxembourg broadcast service, even in absence of transmission of this service with a Luxembourg radio broadcasting frequency"); and 'Luxembourg satellite system' (specifying that such systems should only use satellites or frequencies Luxembourg is allowed to operate under international law) (Art. 2, 1991 law).

Article 3 notes that nobody is allowed to transmit a Luxembourg of foreign broadcast service without a license obtained prior to intended operations, which are generally obtained as a result of a tender, with the exceptions laid forth in the law. The article denotes that the license is non-transferable, time-limited, renewable, and can be withdrawn if the operator no longer possesses the qualifications necessary for the license (Art. 3, 1991 law). This article introduced the core requirement of advance licensing, a principle that would become foundational in both the 2017 and 2020 space laws.

Article 4 concerns Luxembourg radio broadcasting frequencies, noting that Luxembourg shall establish and update a list of radio broadcasting frequencies, which can be allocated to different categories. Subsequent articles generally concern provisions on technical specifications, different types of telecommunication services, and rules on frequency allocation.

Article 20, entitled "Luxembourg satellite systems", follows the sequence of Article 3 in denoting that nobody can establish and operate a Luxembourg satellite system without a license obtain prior to operations. Such license would be "granted by the Government, upon joint proposal of the minister in charge of telecommunications and the minister in charge of media" (Art. 20(1), 1991 law). Just like a broadcasting license, this license is also personal, non-tradable, time-limited, renewable, and requires the operator to continuously possess the required conditions. Article 21 reiterates the rules for Luxembourg satellite 'services', adding that the beneficiary of such license has to "have the form of a legal entity under Luxembourg laws" (Art. 21(4), 1991 law).

As mentioned above, as of 2013, ALIA is responsible for carrying out the objectives defined under Article 1 as a financially and administratively autonomous entity. While it is considered to be "under the guardianship" of the ministry in charge of media, it "does not request or accept instructions from any other body on the fulfilment of the tasks assigned to it." (Art. 35(1), 1991 law).

Overall, the 1991 law retains its relevance insofar as satellite services and networks fall under the scope defined by its Article 1, and is guided by the definitions provided under Article 2.

3.2. 2017 Space Resources Law

The 2017 law has often been characterised as a landmark in national space legislation, marking Luxembourg's deliberate strategy to assert jurisdiction in a domain where international law remains ambiguous. Its adoption positioned Luxembourg as the first European country to legislate specifically on the commercial appropriation of resources extracted from celestial bodies. The statute is striking for its brevity, comprising only eighteen articles, and for the clarity with which it affirms private property rights. Yet it is equally notable for conceptual omissions and a high reliance on ministerial discretion.

Perhaps its most famous provision, Article 1, unequivocally states that "space resources are capable of being owned." (Art. 1, 2017 law ~~(unofficial translation)~~). This provision is designed to remove any doubt *vis-à-vis* Luxembourgish commercial operators that materials extracted are subject to property rights under Luxembourgish law.

First of all, the text does not attempt to define what a space resource is. A definition can be found in the commentary of the law in Parliamentary Dossier no 7093/0, which notes that "space resources are today generally understood to mean abiotic resources that are found in situ in outer space and can be extracted." (Parliamentary Dossier no 7093/0: 2). No further legal guidance is provided as to whether the term encompasses regolith, minerals, water ice, or processed derivatives. The law similarly does not distinguish between primary resources and incidental by-products. As was noted by the *Conseil*, the "use" of space resources is not defined either (2017 Opinion: 9). This lack of definitional clarity has potentially significant practical implications, as operators and insurers remain uncertain about the boundaries of what may be lawfully claimed, and what kinds of operations would be considered by the Luxembourgish authorities as resource activities. At the time of writing of this chapter, only one company, namely ispace-EUROPE, has been granted a concession under the 2017 law (ispace, 2025) ~~for the unsuccessful Hakuto M2 mission~~ for the regolith sample collection activities which had been planned for the lunar rover *Tenacious*.

The more outstanding issue is~~, of course,~~ whether space resource activities and resource ownership are even permitted under international law. While there are divergent opinions on this subject, commentators have argued that the legality of extraction and ownership of space resources could be legitimately argued (Hofmann et al. 2022: 5). Even if this argument is accepted, the extraction cannot, under any circumstances, extend to a territorial claim of the land from which the resource is extracted (Art. II, Outer Space Treaty). The commentary of the draft law's proposal, while acknowledging the ambiguity in the law, noted that a strong body of scholarship argued for the possibility of resource ownership (Parliamentary Dossier no 7093/0: 7).

Article 2 establishes that exploration or use of space resources requires prior authorisation. The conditions of acquiring such authorisation is laid out in subsequent articles of the law, starting from Article 4. Article 2(1) establishes a general prohibition subject to authorisation by the responsible ministers. This reflects an alignment with Article VI Outer Space Treaty, which requires states to authorise and supervise national activities. Domestically, it is considered "an administrative act following the corresponding administrative procedure" (Hofmann et al 2022: 13). Paragraph (2) reiterates the licensing requirement and precludes circumvention through intermediaries or proxies, ensuring accountability. Paragraph (3) binds authorisation conditions to Luxembourg's international obligations, crucially including liability under the Liability Convention and registration under the Registration Convention; but more generally the rule encapsulated by Article III of the Outer Space Treaty, which notes that outer space activities shall be conducted "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" (Article III, Outer Space Treaty). Paragraph (4) creates a clear demarcation between the 2017 law and the 1991 law: the former law does not govern satellite communications or frequency bands.

Articles 3 and 4 introduce the procedural conditions for obtaining authorisation. Here, Luxembourg's long-standing expertise in financial sector supervision is manifest, as both articles, like many others after them, were inspired by their counterparts in the 1993 law. Article 3 denotes a number of important elements: first of all, the authorisation is granted to an operator for a 'mission', which means the authorisation follows specific missions and is not given to the operator generally. Second, the mission in question must be "for commercial purposes", which ~~thus~~ means that non-commercial missions, even if they pursue space resource extraction operations, will not be covered by this law. Third, the application has a formal requirement: it must be made in writing.

Pursuant to Article 4, applicants must be incorporated in Luxembourg and maintain their registered office and central administration within the country. It also limits eligible applicants to entities incorporated under Luxembourg law (*société anonyme, société en commandite par actions, société à responsabilité limitée, or société européenne*) (Art. 4, 2017 law). It also notes that the company can be a European company (*société européene*), again, with its registered office in Luxembourg. This final form of incorporation was added upon the recommendation of the *Conseil* (2017 Opinion: 12). Article 4 of the 2017 law is more restrictive than its source of inspiration, the 1993 law, which also allows credit institutions to be licensed as a public law institutions (*établissement public*) or cooperative societies (*société cooperative*). In their respective opinions, the Chamber of Commerce and the *Conseil* both criticised the exclusion of public law institutions and cooperative societies as possible incorporation models (Parliamentary Dossier No 7093/1: 2; 2017 Opinion: 9). This provision arguably has both a regulatory rationale (jurisdictional control) and an industrial policy dimension, as it incentivises companies to relocate their legal seat to Luxembourg.

Article 5 unequivocally establishes that the authorisation is personal and cannot be assigned to third parties. This rule also largely borrows from the 1993 law (Art. 2, 1993 law), and the same rule can also be found in the 1991 law and the 2020 law.

Article 6 stipulates that all information that "may be useful for the assessment", as well as "a mission program", must accompany the application for authorisation (Art. 6, 2017 law, unofficial translation). This article entails a broader obligation than its 1993 law counterpart, which only requires "necessary" information to be furnished (Art. 3(4), 1993 law). In its opinion, the *Conseil* opined that the 1993 language, noting "necessary", is also adopted under the 2017 law (2017 Opinion: 13), which was rejected by the Economy Commission (Parliamentary Dossier No 7093-3: 3). In their respective opinions, both the *Conseil* and the Chamber of Commerce pointed out that it would be useful to indicate an exhaustive list of elements to be included in the mission programme, so that the operators can "duly prepare" their autorisation file (Parliamentary Dossier No 7093-1: 3; 2017 Opinion: 13). This request of specification was also rejected by the Economy Commission, noting that it was not necessary (Parliamentary Dossier No 7093-3: 3).

Inspired by Article 5(1) and 5 (1bis) of the 1993 law, Article 7 lays out organisational, governance-related, and risk management criteria: it requires the operator's central administration and registered office to be located in Luxembourg and ensures effective supervision and tax nexus (par. 1); demands systems covering planning, commercialisation, risk management, and internal controls (par. 2); and makes these requirements proportionate to the scale and complexity of the operator's activities, business model, and the specific mission for which the authorisation is sought (par. 3). These are posited as pre-requisites of authorisation, and an operator applying of the concession as prescribed by the law would have to provide this information in the application. Article 8 requires disclosure of major shareholders and provides for the assessment of their suitability. The suitability criteria (reputation, competence, financial soundness, and absence of links to money laundering or terrorism) mirror those under Article 6(1) to (9) of the 1993 law. Article 9 supplements Articles 7 and 8, regulating the fitness and propriety of management: it mandates good repute and professional competence, verified through police records and other evidence (par. 1); requires at least two individuals with effective control, ensuring collective decision-making and preventing capture by unqualified managers (par. 2); and imposes ongoing notification duties for changes in management (pars. 3 and 4).

Article 10 addresses the critical issue of risk assessment and coverage, which directly reflects the Outer Space Treaty provisions on international responsibility (Article VI) and international liability (Article VII). According to the draft law's commentary, the absence of a fixed numerical requirement is a conscious choice, with the express purpose to leave a wide discretion to the ministers (Parliamentary Dossier 7093/3: 10). Instead, the law permits the ministers in charge of authorising specific missions and operators to use their discretion case-by-case, among others, to assess the risk factors and what constitutes adequate financial base. Unlike the initial version of the law, which seemed to have an express preference for share capital as the primary financial base, the current version treats "personal financial means", "insurance policy of an insurance undertaking not belonging to the same group than the operator", and "a guarantee of a credit institution" as equivalent. Article 11 prescribes an annual account audit requirement for the authorisation to be granted.

Article 12 empowers the ministers to detail conditions in the authorisation, including territorial scope, mission limitations, supervisory modalities, and compliance measures. The initial draft, which included a requirement for a book of obligations (*cahier des charges*) which would contain the description of how a future operator would meet the requirements prescribed in the 2017 law to accompany the authorisation, was subsequently simplified in the final version so that the authorisation itself would describe how the conditions are met (Parliamentary Dossier 7093/0: 10). Article 13 sets an application fee to cover administrative expenses, ranging from 5.000 to 500.000 EUR depending on the "complexity of the application and the amount of work involved" (Art. 13, 2017 law).

According to Article 14, an authorisation would be withdrawn if the conditions are no longer met; if the authorization remains unused for 36 months or the operator ceases operations for 6 months; and if the authorisation is obtained through fraud. Following up on this provision, Article 15 prescribes, in accordance with Article VI of the Outer Space Treaty, a 'continuous supervision' provision to be exercised by the ministers and allows for dynamic oversight as missions evolve and progress (Art. 15, 2017 law).

Article 16 establishes that any operator granted an authorisation is fully responsible for any damage caused in connection with the mission, including harm arising from preparatory activities. Despite this expansive allocation of financial consequences to the faulty operator, and unlike national legislation in Belgium (2005 Belgian law) and France (2008 French law), the 2017 law does not provide "a right for recourse against the operator" where such damage has occurred (Hofmann et al. 2022: 77).

While this provision clearly delineates liability (and with the caveat that international responsibility and liability nonetheless remain with Luxembourg) and creates a strong deterrent against negligent conduct, it is fundamentally reactive rather than preventive: it addresses compensation for damage (albeit without defining it, unlike the 2020 law – see Hofmann et al 2022: 76-77) after it occurs. It imposes no binding obligations to take organisational and technical steps in order to prevent, or minimise the risk of, environmental harm in the first place. This reactive liability model does not provide adequate safeguards to pre-empt contamination of celestial bodies or the space environment. Moreover, Article 16 sits uneasily alongside Article 2(3) of the same law, which explicitly requires operators to conduct activities in accordance with Luxembourg's international obligations. These obligations include Article IX of the Outer Space Treaty, under which Luxembourg must ensure that its nationals avoid harmful contamination of outer space and celestial bodies. Without clear procedural requirements, such as mandatory environmental impact assessments, planetary protection protocols, or *ex ante* approvals linked to contamination prevention, Article 16 arguably falls short of demonstrating optimal compliance with this non-contamination principle. Thus, the provision, though robust on *post hoc* allocation of financial compensation, falls short of providing ~~for~~ a pre-emptive and proactive environmental protection framework.

Finally, Article 17 clarifies that authorization does not substitute for other required approvals; and Article 18 prescribes penal sanctions for, *inter alia*, unauthorized exploration or use ("a term of imprisonment of between eight days and five years and a fine of between 5.000 and 1.250.000 euros or either one of those penalties"); and violations of other obligations prescribed under authorisation requirements (imprisonment up to 1 year and fines up to €500,000).

3.3. 2020 Space Activities Law

Following the adoption of the 2017 law, the Luxembourg legislature recognised the need to provide a comprehensive regulatory foundation for all other space activities not directly concerned with space resource activities for commercial purposes (Parliamentary Dossier No 7317/0: 10). This recognition culminated into the enactment of the 2020 law. While many of the core features identified in the 2017 law, such as the reliance on ministerial discretion, as well as similar authorisation requirements and procedure, reappear here, the 2020 law nonetheless introduces distinct considerations reflecting its broader regulatory scope and operational focus.

Article 1 defines the territorial and personal scope of the law. Specifically, the statute applies to any space activities a) conducted from Luxembourgish territory or by installations under Luxembourg's jurisdiction and undertaken abroad by Luxembourg nationals or Luxembourg-registered legal entities; or b) in the territory of a foreign state or an area not subject to the sovereignty of a state by natural persons of Luxembourgish nationality or legal persons established under Luxembourg law (Art. 1, 2020 law). The initial version of the law referred to *ressortissants* rather than the word *nationalité* found in the final version (Parliamentary Dossier No 7317/0: 2): the former typically includes nationals but also those who reside in, but do not necessarily hold the nationality of, Luxembourg. This initial version allowed for a more flexible coverage of the law (Hofmann et al. 2022: 91).

The provision explicitly excludes missions governed by the 2017 law, namely, the exploration and use of space resources for commercial purposes, except where Articles 15 and 16(2) apply (space object registration and related insurance/tax issues).

Unlike the 2017 law, Article 2 of the 2020 law includes a set of definitions. Its definition of 'space activity' includes activities such as launching or attempting to launch space objects into outer space, as well as their control and use during their stay in outer space, including their return to Earth. This is supplemented by the consideration that the definition covers all activities that may result in Luxembourg being held internationally responsible (notably under Art. VII, Outer Space Treaty). This definition draws on the UN General Assembly Resolution 68/74 (Parliamentary Dossier No 7317/0: 12). It defines 'damage' as any harm to persons, property, public health or the environment directly caused by a space object during a space activity, except for activities relating to emission of signals. This final version goes beyond the draft law (Parliamentary Dossier No 7317/0: 12), which was essentially based on the definition found under Article 1 of the Liability Convention. In line with the *Conseil*'s suggestions (which referred to the 2008 French law's definition of damage, including the phrase "*et notamment à la santé publique ou à l'environnement*" (Art. 1(1), 2008 French law), the draft law was amended so as to include 'public health' and 'environmental damage'. A 'space object' may be an object (or component as well as ancillary parts) that is successfully launched in outer space; or an object whose attempted launch into outer space was attempted but has not necessarily succeeded. This definition also echoes the definition contained under Article 1 of the Liability Convention. An 'operator' is a person who carries out or undertakes a space activity either on their own or jointly, with others.

A 'qualifying holding' means an entity holding at least 10%, directly or indirectly, of the capital or voting rights, or any other possibility of exercising considerable influence over the operator's management. Given the segmented qualifiers designated by 'or', the definition is relatively flexible and aims to capture a wide range of different forms of managerial influence over the operator. Finally, the article defines 'Space Treaty', which refers to the Outer Space Treaty; and 'Liability Convention'.

Article 3 of the 2020 law is functionally similar to Article 2(3) of the 2017 law, requiring operators to comply both with the conditions of their authorisation and Luxembourg's international obligations. This continuity appears deliberate and reinforces Luxembourg's obligations under Articles VI and VII of the Outer Space Treaty. Article 4 establishes full liability for any damage caused during space activity, including preparatory works. This provision echoes Article 8 of the 2017 law, but unlike the preceding law, the 2020 provides an operative definition of 'damage', as noted, under Article 2(3).

Article 5 of the 2020 law echoes Article 2 of the 2017 law, insofar as the envisaged activities prescribed under the former law can only be undertaken with a ministerial authorisation. Its paragraph (2) contains similar language to Article 17 of the 2017 law, and stipulates that obtaining an authorisation pursuant to the 2020 law does not exempt the operator from obtaining other relevant authorisations *vis-à-vis* its activities. It sets a formal requirement: the authorisation shall take the form of a ministerial order which would be contingent upon the future operator to send in a written application, echoing the provision under Article 3 of the 2017 law. Parallel to Article 13 of the 2017 law, Article 5(3) sets an application fee between 5.000 and 500.000 Euros, depending on the complexity of the application and the volume of work. Article 5(5) states that the authorisation is personal and non-assignable, a rule that also applies under Article 5 of the 2017 law.

Article 6 sets out a consolidated provision which lays forth the requirements and conditions necessary for an authorisation to be granted, such as a registered office in Luxembourg, a robust system of financial, technical, and legal procedures and methods driving the space activity; robust system of internal governance; and honourability, knowledge, skills and experience required by the tasks and the activities. It prescribes a risk assessment and financial bases appropriate to the risks associated with the mission and auditing of its annual accounting documents. As such, this article generally corresponds to the totality of requirements and conditions stipulated under Articles 7, 8, 9, 10, and 11 of the 2017 law, as inspired by the 1993 law referred to above. This similarity is a procedural convenience, especially where separate licensing applications may be needed for certain space activities which involve commercial space resource activities covered by the 2017 law, as well as other activities covered by the 2020 law on space activities in general. This means that the operators can plausibly expect to be subject to similar assessment criteria, naturally with the caveat that the context and content of these applications may vary, given different scopes of the laws as well as the nature of the missions in question.

Article 7 is comparable to Article 6 of the 2017 law, noting that the application must be accompanied by useful information for the assessment of an application. Article 7 adds that "an activity programme" must also be added, and that the content of an application may be standardised by a Grand-Ducal regulation. Article 8(1), stipulating that the authorisation must describe the way in which the operator is authorised, corresponds virtually identically to Article 12 of the 2017 law in content. Article 8(2) notes that operators shall pay an annual fee between 2.000 Euros and 50.000 Euros, depending on the costs incurred; but overall cannot exceed 50.000 Euros per annum. This provision supplements the application fees prescribed under Article 5(4) of the 2020 law, but works similar to a 'subscription' followed by the initial application fee. This additional annual fee does not exist under the 2017 law. Finally, paragraph (3) of Article 8 notes that operators shall voluntarily furnish relevant changes in the information upon which the ministries relied while reviewing the application.

Article 9(1), articulating different situations in which an authorisation shall be withdrawn, emulates Article 14 of the 2017 law. For the situation where an operator 'abandons' or has ceased to carry out its activity in the last six months, while the unofficial English versions of the two laws differ (2017 law refers to 'renouncement'; 2020 law refers to 'abandonment'), the official French texts read identically: "*renonce ou a cessé d'exercer son activité au cours des six derniers mois*". Therefore, any semantic difference between the English texts carry no normative value. Paragraph (2) of Article 9 has no equivalent under the 2017 law. This paragraph allocates a responsibility to the relevant minister to take "all necessary measures to prevent the space activities for which the authorisation was withdrawn from affecting the safety of persons or property or the environment or causing an increased risk of international liability" for Luxembourg (Article 9(2), 2020 law).

Article 10 establishes a public register of authorisations granted under the 2020 law. As of July 2025, this register is available online, with four authorisations provided between 2022 and 2024 (Luxembourg Space Agency, Authorisation Registry). While the 2017 law does not provide for the establishment of a similar registry, an analogous list (currently comprised of one license) is available for the 2017 law authorisations as well (Luxembourg Space Agency, Space Resources Authorisations).

Article 11 notes that the operators authorised to carry out space activities shall be subject to 'continuous supervision' by the relevant minister. This provisions appears to stem directly from Article VI of the Outer Space Treaty, which allocates international responsibility for space activities, including authorisation and continuing supervision. Originally a much longer provision, it was subsequently shortened to ensure consistency with the 2017 law (Parliamentary Dossier 7317/0: 15-16 and 7317/5: 11; Hofmann et al. 2022: 146).

Article 12 of the 2020 law concerns the subject of transfer of an authorisation, as referred to under Article 5 as an exception to the non-transferability of authorisations. As 2017 law does not contain a similar provision, this is a novelty introduced by the 2020 law. It sets out to specify that no transfer of authorisation is possible without advance ministerial approval. The prohibition of transfer includes real or personal rights, such as guarantee rights and transfer of actual control over the space object (Art. 12, 2020 law). The requests of authorisation for transfer are to be made jointly with the operator transferring the authorisation and the transferee. The provision further reiterates that all authorisation requirements and standards would apply to the transferee; and that unless a special regime or an agreement is in place, a transfer authorisation request would be denied, if the transferee is located outside Luxembourg.

This provision is followed by Article 13, which regulates change of control of the operator. According to this article, operators must notify the relevant minister in writing and in advance the changes in qualified holdings, specifically those that are "in proportion of capital units or voting right held amount to or exceeding the thresholds of 20%, 30%, or 50%", or when the operator becomes, or ceases to be, a subsidiary of another natural or legal person (Art. 13(1) and (2), 2020 law). Subsequent paragraphs (3) and (4) generally lay out a procedure for the operator to furnish relevant information to the ministry, as well as the situations where the minister might intervene in the change of control, such as when the change bears the risk of negatively affecting the prudent and effective operations of the operator in question. Article 14 establishes a sanctions regime, which is virtually identical to the regime established under Article 18 of the 2017 law.

Article 15 of the law envisages the establishment of a public 'National Register of Space Objects', covering the "space objects for which [Luxembourg] shall assume a registration obligation under Article VIII of the [Outer Space Treaty] and Article II of the [Registration Convention]" (Art. 15, 2020 law). To that end, operators are to furnish the relevant ministry with all information, allowing the identification of the space object, as well as its launch and the position it occupies in outer space. The establishment of this registry via the 2020 law follows Luxembourg's accession to the Registration Convention on 15 December 2020 (*Art. Unique*, 2020 law on the Accession to the Registration Convention). The registry can currently be accessed via the website of the Space Agency (Luxembourg Space Agency, Registry of Space Objects). Article 16 of the 2020 law makes necessary adjustments to the Law of 1937 on insurance tax (*Versicherungssteuergesetz*), and Article 17 prescribes transitional provisions for operators covered by the 1991 law, as well as operators who had been carrying out activities prior to the entry into force of the 2020 law.

4. CURRENT CHALLENGES

Luxembourg's current legal regime applicable to space activities generally offers a solid foundation: it provides distinct, yet compatible authorisation tracks for space resource activities for commercial purposes on the one hand, as well as space activities in general on the other. It clearly designates competent authorities to handle, assess, and decide on authorisation applications; and it grants generous leeway with regard to assessment procedures so as to afford sufficient flexibility to authorities to consider specific features and circumstances of each mission and operator. While such administrative discretion *vis-à-vis* the relevant ministry may also be interpreted as a shortcoming, in the absence of rules differentiating different 'categories' of possible operators (arguably sectoral giants such as SES on the one hand, and SMEs on the other), any excessive rigidity in regulatory prescriptions may either underwhelm bigger companies, or overwhelm fledgling establishments – depending on the content and context of the said requirements. The flexibility, at least in principle, could provide the ministerial decision-makers to take into account these particularities in developing best practices, as the number of authorisation applications increases in the future.

One of the most prominent difficulties associated with the legal framework concerns the absence of clear and comprehensive definitions, particularly under the 2017 law. While the 2020 law provides a limited number of definitions with a certain degree of clarity, it is not certain whether these definitions would, for instance, apply to the 2017 law as well. As explored earlier, the 2017 law itself is completely devoid of any definitions. Most notably, it does not define the term 'space resources', nor does it set out criteria for what constitutes a 'space resource activity' despite superficial references in the *travaux parlementaires* (Parliamentary Dossier No 7093/0: 7). Given the absence of widespread or large-scale space resource operations as of July 2025 beyond experimental and anecdotal attempts at collecting (*inter alia*) moon dust, this issue may be seen as lacking immediate relevance or importance. However, as the space resource activities evolve, and the technologies and methods become more sophisticated, this foundational ambiguity regarding the scope of activities regulated under the 2017 will become more apparent in the absence of subsequent specifications. As Luxembourg's consistent and gradually growing policy initiatives show, that is certainly the expectation.

However, this definitional lacuna is already present and particularly evident when considering the application of the 2017 law to missions such as *Resilience*, which famously included the Luxembourg-designed and made *Tenacious* rover among its payload. Because that mission was authorised under the 2017 law on the basis that it involved the collection of regolith (ispace 2025), it established an implicit precedent that regolith itself constitutes a space resource and that any sampling or interaction with it can be deemed a resource activity. It has been established that regolith "can be processed to extract breathable oxygen and metals, such as silicon, iron and aluminium for construction" (ESA 2024), not all interactions with moon dust, which covers the entire surface of the Moon, will seek to refine or process it for resource utilisation purposes. If even a small-scale sampling mission with no immediate commercial objective (besides the fact that the NASA contract to which it was attached concerned the sale of the sample) falls within the ambit of the 2017 framework, this may set a precedent that any interaction with the moon dust due to its ‘space resource’ designation would be a space activity. If this is the approach, it is not apparent what remains subject to the 2020 law instead. Under such reasoning, nearly all surface operations on the Moon or other celestial bodies could be reclassified as resource activities, regardless of their actual purpose, as long as they are commercial in nature. This is not an abstract concern but rather a foreseeable challenge, given that lunar missions invariably involve at least some interaction with surface materials. The current legal framework offers no criteria to distinguish between incidental contact, scientific analysis, or commercial exploitation, leaving operators and regulators reliant on discretionary decisions by the ministry. Such discretion may be administratively expedient in the short term but creates profound uncertainty as the sector grows more diverse.

A second, equally pressing issue concerns environmental protection and sustainability. Both the 2017 and 2020 laws impose strict liability for damage caused by space activities, a mechanism intended to ensure compliance with Luxembourg’s international obligations under Article VII of the Outer Space Treaty and the Liability Convention. Yet the reliance on liability as the sole environmental safeguard is increasingly outdated, as it focuses on *ex post* remediation and not *ex ante* prevention. Other jurisdictions have moved decisively to incorporate sustainability standards into their national frameworks. Finland’s Act on Space Activities, for example, mandates that operators explicitly assess and mitigate environmental risks as part of the licensing process (Section 5, 2018 Finnish law). Cyprus’ 2022 legislation contains detailed provisions on sustainable conduct of outer space activities; imposes criteria on the authorities to assess the environmental impacts of activities; requires detailed plans of measures to prevent and reduce and prevent the creation of space debris, among others (Art. 12, 2023 Cypriot law). Italy’s recently adopted framework integrates sustainability and precautionary principles as central elements of authorisation (Art. 5(c), 2025 Italian law).

Luxembourg’s decision to omit such obligations cannot be attributed to oversight. As mentioned above, draft versions of the laws contained more clarity on the issue, but these were subsequently removed due to their vagueness. The choice to delete the clauses entirely, rather than refine them, creates the impression of a regulatory preference for commercial permissiveness over environmental protection and preservation. This omission is increasingly difficult to reconcile with the regulation proposal of the new

EU Space Act, which offers detailed environmental and sustainability safeguards (Arts. 96-100 (Chapter III), EU Space Act proposal 2025). As more actors place constellations in low Earth orbit and as lunar and planetary missions multiply, the absence of preventive environmental obligations is likely to attract critical scrutiny.

Another concern stems from the method the legislator adopted while implanting existing legal frameworks and transposing them to the new context of space activities. As detailed previously, Luxembourg's licensing framework imposes a set of requirements largely modelled on its financial sector legislation. While this approach certainly has practical benefits, it has also been criticised as causing an omittance of critical technical activity specifications and requirements essential to outer space activities from the 2017 and 2020 laws, except for superficial references made in the context of authorisation requirements (Gladysz-Lehmann 2023: 46).

The policy ambition to build a thriving ecosystem of start-ups is evident in initiatives such as the creation of the European Space Resources Innovation Centre (ESRIC) and targeted support programmes for early-stage ventures. In its brevity, the legal framework does not distinguish between large satellite operators with global market share and small companies conducting demonstration missions or developing novel technologies.

5. NEXT STEPS AND CONCLUSION

Luxembourg's space legislation has reached a stage where incremental adjustments will no longer suffice. The next phase should begin with a legislative clarification of the core terms that define the scope and application of the existing framework. Key terms such as "space resources" and "resource operations" should be defined in the 2017 law, not left to inference from parliamentary materials or administrative interpretation. Furthermore, contextual definitions, such as "incidental activities", could be included to designate activities that result in interactions with designated resources, but do not constitute resource activities *per se*. Overall, a synchronised list of definitions would benefit both laws, as this would help establish a consistent boundary between the 2017 and 2020 laws and reduce excessive reliance on case-by-case decisions by the ministry. Introducing formal definitions would also allow regulators and courts to assess compliance more predictably, particularly in missions that involve physical interaction with celestial surfaces and regolith.

The legal framework must also address environmental risk through preventive rules rather than compensatory liability alone. Luxembourg's current model, which focuses on *ex post* liability, is insufficient given the increase in orbital congestion and the prospect of recurring lunar surface missions. Both laws should be amended to require environmental assessments as part of the licensing process. Operators should be obliged to demonstrate technical and procedural steps to reduce contamination risk and avoid debris generation. These requirements could be introduced through delegated regulation or annexes to authorisation templates, and they would bring Luxembourg in line with newer national laws. The proposed EU Space Act, which includes detailed environmental obligations, will likely raise the standard across Member States. Luxembourg should anticipate this shift and use it as a trigger to build a more responsible regulatory framework.

In parallel, the authorisation proess needs better calibration. Discretion is currently applied without any structured mechanism to differentiate between operator types or mission scales. Rather than limit discretion, the law could introduce a two-track authorisation structure. Simpler procedures could apply to low-risk, small-scale operations, while more extensive assessments would apply to operators with more complex or high-risk profiles. Such an approach would help reduce administrative burden on emerging companies while ensuring that riskier missions are subject to closer scrutiny.

A related improvement would be to create a regulatory tiering model that distinguishes between SMEs and larger companies. A single, undifferentiated framework increases compliance costs for small operators and creates inefficiencies in supervision. Tailored procedural and financial thresholds would help remove entry barriers while ensuring that all operators are subject to proportionate control.

Luxembourg must also align its reforms with the direction set by the European Commission's proposed EU Space Act, though it is still early to rely entirely on the proposal text. It will be some time before the regulation comes to fruition, and much will depend on debates at the EU level. The proposal includes obligations that Luxembourg law currently does not address in detail. Luxembourg has an opportunity to pre-emptively align with these norms and shape the implementation debate. Doing so would reinforce its credibility as a jurisdiction of first resort for commercial space activities and ensure that its legal system remains interoperable with the emerging European (as well as international) framework.

REFERENCES

Autorité luxembourgeoise indépendante de l'audiovisuel (ALIA), White Paper, Les retombées du colloque « Face aux défis de la digitalisation, quelle réforme de la loi sur les médias électroniques ? » des 25 et 26 avril 2023, https://alia.public.lu/wp-content/uploads/2023/10/20231012_Alia_WhitePaper_VersionPRINT_v18-4.pdf, Accessed 22 June 2025

Calmes, Bob, Schummer, Laurent, and Gładysz-Lehmann, Błażej (2021). "The Space Law Review: Luxembourg" (Arendt & Medernach, 9 December 2021), https://www.arendt.com/wp-content/uploads/2024/04/2021.12_-_the_law_reviews_-_the_space_law_review_3rd_ed_-_luxembourg.pdf, Accessed 24 June 2025

Chambres des Députés, Travaux Parlementaires, Dossier consolidé, no. 7093

Chambres des Députés, Travaux Parlementaires, Dossier consolidé, no. 7317

Convention on International Liability for Damage Caused by Space Objects (Liability Convention,1972), https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliability-convention.html, Accessed 22 June 2025

Convention on Registration of Objects Launched into Outer Space (Registration Convention, 1976), https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introregistration-convention.html, Accessed 22 June 2025

Conseil d'État, Avis 51.987 (7 April 2017)

Conseil d'État, Avis 52.879 (15 February 2019)

Cypriot Law N.93(I)/2023 on the Authorization of Space Activities, the Registration of Space Objects and Related Matters, https://www.cylaw.org/nomoi/arith/2023_1_093.pdf, Accessed 7 July 2025

De Man, Philip (2017). "Luxembourg's law on space resources rests on a contentious relationship with international framework" (The Space Review, 23 October 2017), https://www.thespacereview.com/article/3355/1, Accessed 22 June 2025

Directive 2010/13/EU of the European Parliament and of the Council of 10 March 2010 on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the provision of audiovisual media services (Audiovisual Media Services Directive) (Codified version) (Text with EEA relevance), https://eur-lex.europa.eu/eli/dir/2010/13/oj/eng, Accessed 22 June 2025

Directive (EU) 2018/1808 of the European Parliament and of the Council of 14 November 2018 amending Directive 2010/13/EU on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the provision of audiovisual media services (Audiovisual Media Services Directive) in view of changing market realities, https://eur-lex.europa.eu/eli/dir/2018/1808/oj/eng, Accessed 22 June 2025

European Space Agency, "Join the Space Resources Challenge" (1 November 2024), https://www.esa.int/Science_Exploration/Human_and_Robotic_Exploration/Join_the_Space_Resources_Challenge#:~:text=The%20Moon%E2%80%99s%20soil%2C%20or%20regolith%2C%20can%20be%20processed,water%2C%20additional%20oxygen%20and%20hydrogen%20for%20rocket%20fuel, Accessed 4 July 2025

Finnish Act on Space Activities (63/2018), https://tem.fi/documents/1410877/3227301/Act+on+Space+Activities/a3f9c6c9-18fd-4504-8ea9-bff1986fff28/Act+on+Space+Activities.pdf?t=1517303831000, Accessed 9 July 2025

Froust, Jeff (2017). "Luxembourg Adopts Space Resources Law" (SpaceNews.com, 17 July 2017), https://spacenews.com/luxembourg-adopts-space-resources-law/, Accessed 25 June 2025

Gładysz-Lehmann, Błażej (2023). "Tirer parti des règles du secteur financier pour règlementer l'industrie spatiale : un modèle unique de législation spatiale nationale au Luxembourg", in: ALJB – Bulletin Droit & Banque No 72, 2003, 39-47

Gouvernement.lu, "Luxembourg and ispace, a Tokyo-based lunar robotic exploration company, sign MoU to co-operate within the Spaceresources.lu initiative" (2 March 2017), https://gouvernement.lu/fr/actualites/toutes_actualites/communiques/2017/03-mars/02-luxembourg-ispace-tokyo.html, Accessed 22 June 2025

Gouvernement.lu, "Luxembourg was looking for ways to diversify its economy and explore new sectoral avenues", Interview by Étienne Schneider (16 November 2017), https://gouvernement.lu/fr/actualites/toutes_actualites/interviews/2017/novembre/15-schneider-happen.html, Accessed 22 June 2025

Gouvernement.lu, "SpaceResources.lu: New space law to provide framework for space resource utilization" (3 June 2016), https://gouvernement.lu/fr/actualites/toutes_actualites.gouvernement2024+fr+actualites+toutes_actualites+communiques+2016+06-juin+03-spaceresources.html, Accessed 1 July 2025

Hofmann, Mahulena and Bergamasco, Federico (2019). "Space resources activities from the perspective of sustainability: legal aspects", in: Global Sustainability, 2019, 3, 1-7

Hofmann, Mahulena (2022). "Luxembourg completing its space legislation", in: PJ Blount, Tanja Masson-Zwaan, Rafael Moro-Aguilar, and Kai-Uwe Schrogl (eds.). Proceedings of the International Institute of Space Law 2021, Utrecht: Eleven Publishing, 523-530

Hofmann, Mahulena, Blount, PJ, Leterre Gabrielle, Salmeri Antonino, and Zarkan, Laetitia (2022). Space Legislation of Luxembourg: A Commentary. Alphen aan den Rijn: Wolters Kluwer

Ispace, "ispace-EUROPE Secures First-Ever Mission Authorization Under Luxembourg's Space Resources Law" (8 January 2025), https://ispace-inc.com/news-en/?p=6660, Accessed 10 June 2025

Italian Law of 25 June 2025, n. 89, Disposizioni in materia di economia dello spazio, https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2025;89, Accessed 27 June 2025

Loi du 27 juillet 1991 sur les médias électroniques, https://legilux.public.lu/eli/etat/leg/loi/1991/07/27/n1/jo#art_30, Accessed 20 June 2025

Loi du 5 avril 1993 relative au secteur financier telle qu'elle a été a modifiée, https://www.cssf.lu/en/Document/law-of-5-april-1993/

Loi du 27 août 2013 portant création de l'établissement public «Autorité luxembourgeoise indépendante de l'audiovisuel», https://legilux.public.lu/eli/etat/leg/loi/2013/08/27/n5/jo, Accessed 20 June 2025

Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace, https://legilux.public.lu/eli/etat/leg/loi/2017/07/20/a674/jo, Accessed 20 June 2025

Loi du 15 décembre 2020 portant sur les activités spatiales, https://legilux.public.lu/eli/etat/leg/loi/2020/12/15/a1086/jo, Accessed 20 June 2025

Loi du 15 décembre 2020 portant approbation de la Convention sur l'immatriculation des objets lancés dans l'espace extra-atmosphérique, adoptée par l'Assemblée générale des Nations unies, à New York, le 12 novembre 1974, https://legilux.public.lu/eli/etat/leg/loi/2020/12/15/a1087/jo, Accessed 9 July 2025 (« 2020 law on the Accession to the Registration Convention »)

Loi du 19 novembre 2021 portant modification 3° de la loi modifiée du 27 juillet 1991 sur les médias électroniques, https://legilux.public.lu/eli/etat/leg/loi/2021/11/19/a833/jo, Accessed 20 June 2025

Loi du 17/09/2005 relative aux activités de lancement, d'opération de vol ou de guidage d'objets spatiaux, https://www.belspo.be/belspo/space/beLaw_fr.stm Accessed 1 July 2025

Loi no 2008-518 du 3 juin 2008 relative aux opérations spatiales, https://www.legifrance.gouv.fr/loda/id/LEGIARTI000018939324/2008-06-05/

Luxembourg, "Demographics", https://luxembourg.public.lu/en/society-and-culture/population/demographics.html, Accessed 15 June 2025

Luxembourg, "Spaceresources.lu", https://space-agency.public.lu/en/space-resources/the-initiative.html, Accessed 22 June 2025

Luxembourg Space Agency, Registry of Authorisations (as of May 2024), https://space-agency.public.lu/dam-assets/publications/2024/registry-authorisations-may2024.pdf, Accessed 6 July 2025

Luxembourg Space Agency, Registry of Authorisations for space resource activities (as of 2025), https://space-agency.public.lu/dam-assets/publications/2025/draft-registry-sr-authorisations-final.pdf, Accessed 6 July 2025

Luxembourg Space Agency, Registry of Space Objects (as of January 2025), https://space-agency.public.lu/dam-assets/publications/2025/luxembourgregistryofspaceobjects-v9-unpublished-jan2025.pdf, Accessed 9 July 2025

Luxembourg Space Agency, Space Directory (as of July 2025), https://space-agency.public.lu/en/expertise/space-directory.html, Accessed 5 July 2025

Proposal for a Regulation of the European Parliament and of the Council on the safety, resilience and sustainability of space activities in the Union (EU Space Act), 2025/0335, 25 June 2025, https://defence-industry-space.ec.europa.eu/document/download/0adeee10-af7a-4ac1-aa47-6a5e90cbe288_en?filename=Proposal-for-a-Regulation.pdf, Accessed 2 July 2025

UN General Assembly Resolution 68/74 Recommendations on national legislation relevant to the peaceful exploration and use of outer space (A/RES/68/74)

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty, 1967), https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html, Accessed 15 June 2025

Versicherungsteuergesetz Vom 9. Juli 1937, (Loi sur l'impôt sur les assurances)

US Code: Title 51 – National and Commercial Space Programs, https://www.law.cornell.edu/uscode/text/51, Accessed 1 July 2025

Ünüvar, Güneş and Su, Xueji (2024). "International Legal Governance of Space Resources and the Role of National Frameworks: The Case of China", in: Chinese Journal of International Law, 2024, 23(3), 499-545

ITALY

Table of Contents

About the Author

Andrea Capurso

Andrea Capurso is a research fellow and lecturer in space law at Luiss Guido Carli University – School of Law (Rome, Italy). He is also a licensed attorney in administrative law with a specialization in licensing procedures. He has previously worked in the legal departments of private entities and public institutions of the space sector, such as Telespazio and EUSPA.

In his nearly ten years of experience in space law, he has published numerous articles on various legal aspects of extra-atmospheric operations, from property rights to space debris to screening mechanisms for the space sector. In 2018, his article 'The non-appropriation principle: a Roman interpretation' was awarded by the International Institute of Space Law with the 'Diederiks-Verschoor Award'.

More recently, in June 2025, he defended his PhD Thesis at Luiss University titled 'Private Space Activities: Issues of International Law', which focused on the regulation of non-governmental operations in the cosmic domain and on the allocation of responsibility and liability between States in front of commercial space operations. He also holds an Advanced LL.M. in Air and Space Law from Leiden University.

Via parenzo 11,
00198 Rome, Italy
acapurso@luiss.it

Abstract

This chapter offers an overview of Italy's domestic legal framework for space activities, with particular attention to the adoption of the 2025 Law on Space Economy. It begins by recalling Italy's early achievements in space exploration and its longstanding involvement in the development of international space law, noting however the historical absence of a comprehensive national regime regulating non-governmental operations beyond the atmosphere. The new Law fills this normative gap, establishing a structured mechanism for the authorization and supervision of space activities, while at the same time promoting industrial competitiveness and supporting the development of a national space economy.

The analysis proceeds by reconstructing the law-making process that led to its approval, underlining the institutional and political choices that shaped its final content. It then offers a commentary on the structure and main provisions of the Law, from the definitions and requirements for authorization, to the rules on registration, liability, supervision, and economic planning. Emphasis is placed on the integrated approach adopted by the Italian legislator, which combines legal, technical, and economic elements within a single normative instrument.

The chapter concludes with a critical reflection on the challenges posed by the new regime. These include, inter alia, the risk of jurisdictional overreach in the application of personal jurisdiction, the complexity of the authorization mechanism for start-ups and SMEs, and the need for greater procedural clarity. In light of these issues, the final section argues for a future codification effort capable of consolidating the existing norms and enhancing systemic coherence in the governance of national space activities.

Keywords: Italy, Law, Space, Regulation, Authorisation, License, Private, Industry, Administrative, State.

1. INTRODUCTION

Only a handful of States in the world can take pride in having more than sixty years of experience in the use and exploration of outer space: Italy is among them.

Since the early 1960s, there has been a constant interest in the research and development of aerospace technologies. Already in 1964, Italy became the fourth State in history to autonomously place an object around Earth, namely the San Marco-1 satellite. That very first success made it possible to reach another historical achievement: the construction and operation of the first off-shore launch facility, the *Broglio Space Center*, through which Italian engineers completed in 1967 a never-tried-before launch from equatorial longitudes[1].

Building upon these initial endeavours, Italy created a long tradition in outer space: from telecommunications technologies (e.g. Italsat program) to research orbiters (e.g. Cassini-Huygens probe), from space infrastructures (e.g. Multi-Purpose Logistics Modules of the International Space Station) to remote sensing (e.g. COSMO-SkyMed constellation).

All this was not just the fruit of public efforts; since the beginning of Italian space missions, it was well understood that the involvement of the private sector was the key to success.

Through public funding, tenders and procurements, a vibrant industrial sector specialised in aerospace manufacturing and services was helped to grow and foster. Today, thanks to that vision, Italy hosts some world-reknowned industrial champions such as *Leonardo, Telespazio, Avio, Thales Alenia Space Italia*. Next to them, more than two-hundred small and medium enterprises (SME), such as *D-Orbit* and *Argotec*, compose the Italian landscape of space companies. With this dynamic and expanding reality of private space actors, it is no surprise that in the period 2016-2020, Italy ranked among the first ten States in the world for number of registered patents related to space technologies.

The traditionally active involvement of Italian entities in the progress of space operations has always been paralleled by an equally active role in the field of international space law.

1 See De Maria, Michelangelo and Orlando, Lucia and Pigliacelli, Filippo (2003). HSR-30, Italy in Space, 1946–1988. Noordvijk: ESA Publication Division, p. 16.

When the UN Committee on the Peaceful Uses of Outer Space (COPUOS) was established in 1958, Italy was one of the original members[2]. Since then, it was fully engaged in the regulatory processes within the Committee, including the negotiation of the five space treaties[3].

Through the years, it continuingly gave a pro-active contribution to the works of the COPUOS and, at the same time, it also took part in several other international initiatives, such as the Inter-Agency Space Debris Coordination Committee (IADC) and the Artemis Accords.

Overall, it can be said that Italy has always placed great importance in being at the forefront of the most important international endeavors for the regulation of outer space.

Nonetheless, despite its traditional investments in space programs, its support for the private space sector, and its attention for the international legal aspects of space operations, Italy has never developed a comprehensive domestic space legislation.

Other than the laws simply ratifying the four space treaties as well as the ITU Convention and Constitution, the only norms specifically adopted for extra-atmospheric operations have been the ones regulating certain specific aspects of liability, of registration, and of frequency and orbit allocations.

In particular, in 1983 the Italian legislator established a set of rules – contained in Law n. 23/1983 – on the right of Italian nationals and foreigners to obtain a reimbursement in case of damages caused by space objects: in a brief text – just six articles – it clarified the conditions under which Italy would compensate them in line with the Liability Convention. This law, however, focused only on the passive side of liability, lacking any norm on the financial responsibility of space operators who can cause damages with their space objects.

2 See the database of members to COPUOS held by the UN Office of Outer Space Affairs (UNOOSA) on its web-page: "*Committee on the Peaceful Uses of Outer Space: Membership Evolution*", available at the link: www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html (This and all the other links used in this paper were last accessed on 7 July 2025).

3 Italy is party to the Outer Space Treaty (ratified and implemented by Law No. 87 of 28 January 1970), to the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space 1968 (implemented by Presidential Decree No. 965 of 5 December 1975), the Convention on International Liability for Damage Caused by Space Objects 1972 (ratified by Law No. 426 of 5 May 1976) and the Convention on Registration of Objects Launched into Outer Space 1975 (the Registration Convention) (ratified by Law No. 153 of 12 July 2005). It has not signed nor ratified the Moon Agreement.

As for the aspect of registration, Law n. 153/2005 established the national registry for space objects and assigned its management to the Italian Space Agency (hereinafter: ASI). According to its Article 3, the obligation to register was placed upon Italian nationals that launch or procure the launch of a space object as well as upon foreigners that launch from a facility or territory under Italian jurisdiction. The same provision addressed also the information to be furnished, even if it merely translated the list of requirements envisaged by Article IV of the Registration Convention. In sum, the Italian legislator only gave some basic indications on the subjective and objective scopes of application of the duty to register, leaving untouched issues such as the definition of "*procure the launch*" and the coordination with the national registries of other States in case of transfers of control over a space object registered in Italy.

Finally, with the Legislative Decree n. 259/2003, it was established that the use of frequencies for satellites required a general authorization. The competence to manage requests for frequencies and orbital slots related to space systems was given to the Ministry of Industry and Made in Italy (hereinafter: Mimit)[4].

For decades, this was all that could be found at the domestic level on the regulation of space matters. Thus, while private companies continued to expand their activities beyond the atmosphere, the Italian legal framework remained scattered and characterized by a very basic bundle of rules.

The situation changed in 2025 when the 'Law establishing norms with regard to the space economy' (hereinafter: Law on Space Economy) was adopted, repealing the mentioned norms on liability and registration. With it, Italy filled a gap that was long overdue, especially in terms of implementation of Article VI of the OST for the aspects of authorization and supervision.

Adopting the Law on Space Economy was the fruit of a long process and of a lively debate. As a result, the final text still contains many aspects considered contentious.

4 To know more about the competence of the Ministry of Industry and Made in Italy with regard to space systems see the link: www.mimit.gov.it/it/digitale/gestione-spettro-radio/reti-e-orbite-satellitari.

Its concrete application in the following months will show the strengths and merits of the legislative choices made, but it will also unfold the inefficiencies that will require further interventions.

Thus, in this reformed legal context of Italian space activities, the present contribution aims to provide an overview of what has changed and of the new issues that the Law on Space Economy brought with it.

To that end, the next section (Section 2) delves into its law-making process, describing the steps, the factors and the considerations around which the text of the Law was elaborated. After that, the discourse proceeds in Section 3 with a commentary on the provisions of the Law, giving a summary of its structure and content. Having completed the description of the negotiating history and of the text of the Law, Section 4 moves to examine the current challenges for public authorities and private operators in its application. Lastly, some final remarks on what lies ahead for the Italian legislator are presented in the final section.

2. THE LAW-MAKING PROCESS OF THE LAW ON SPACE ECONOMY

The proposal of the Law on Space Economy officially arrived on the desk of the Italian Council of Ministers in June 2024[5].

It was the final step of a series of different legislative interventions which, in the course of the past seven years, reformed the governance of space functions at the national level and set the scene for the regulation of private space activities.

Firstly, in 2018, the high direction, the political responsibility and the coordination of space policies and programmes was attributed to the President of the Council of Ministers[6]. To support the latter in its new function, the legislator created the Inter-ministerial Committee for Space Policies and Research (hereinafter: Comint), which was meant to

5 The proposal was presented by the Ministry of Industry and Made in Italy, Adolfo Urso, and it received the immediate approval of the Council. In October it was passed on to the Parliament for its discussion. The official approval statement can be found at the link: www.mimit.gov.it/it/notizie-stampa/cdm-approvata-la-prima-legge-italiana-sullo-spazio

6 Article 1, Law n. 7/2018.

become the pivotal forum of discussions of the different public entities involved in, or affected by, national space operations. Comint was given the task, *inter alia*, to define the Government's policy directions in space matters and to approve the Strategic Document of National Space Policy, drafted by ASI[7].

As a result, the Italian space governance was centralized around the Government, shifting the role of space activities from a dimension of science and research into a matter of political action.

The following year, in 2019, the adoption of three documents set the way forward: between March and December, the Government led by Giuseppe Conte of the "Five Star Movement" party – together with Comint – approved: the Government's Policy Directions in Space and Aerospace Matters[8]; the National Strategy of Security for Space[9]; and the Strategic Document of National Space Policy[10]. Thus, the future of Italy in outer space was defined in terms of priorities, of industrial policies and of economic planning. Particular emphasis was put on the support to the new space economy and on the security implications of space activities.

After the Covid-19 pandemics, when the space sector returned to a normal curve of growth and expansion, the Italian legislator – under the Mario Draghi administration – provided the President of the Council of Ministers with a new body: the Office for Space and Aerospace Policies (hereinafter: Upsa)[11]. The latter, established in 2022[12], was meant to support the President in its tasks related to space affairs, preparing *inter alia* the dossiers for internal and international space matters. It was another indication of the growing importance of having a strong and well-prepared executive power in the management and coordination of public interests in the aerospace sector.

7 *Ibid*., art. 2.

8 President of the Council of Ministers, *Indirizzi del Governo in materia spaziale e aerospaziale*, adopted on 25 March 2019.

9 President of the Council of Ministers, *Strategia nazionale di sicurezza per lo spazio*, adopted on 18 July 2019.

10 President of the Council of Ministers, *Documento strategico di politica spaziale nazionale*, approved on 18 December 2019.

11 Law Decree n. 36/2022, art. 31.

12 Decree of the President of the Council of Ministers adopted on 12 July 2022.

At the end of October 2022, a new government was formed, led by Giorgia Meloni of the "*Fratelli D'Italia*" party[13]. It is noteworthy that the latter was co-founded by Guido Crosetto, who was since 2014 the President of the "Federation of Italian companies for aerospace, defence and security" and who was appointed Minister of Defence in the new administration.

Naturally, the industrial side of space activities and the relation between space companies and national security interests assumed an even stronger level of attention in the Meloni government.

It is no coincidence that among its first acts the Decree of the President of the Council of Ministers of 21 November 2022 was adopted, which delegated all the functions related to space and aerospace policies to the Minister of Industry and Made in Italy, Adolfo Urso[14].

With that, another important shift took place: space operations became in the new government's view a matter of the highest importance for the industrial growth of the country. They had to be developed, supported and guided focusing on economic and financial considerations; for that reason, the Ministry of Industry and Made in Italy (hereinafter: Mimit) was considered the most appropriate public body to receive full competence on them.

At this point, with the centralization of powers in the executive branch of the government, with the reformed governance signed by the creation of Comint and Upsa, and with the delegation of competence to Mimit, the ground was fertile to envisage a new regulatory framework, whose goal was to provide legal certainty for private space operators and to foster the development of new markets related to extra-atmospheric services and applications.

A first attempt was made in December 2022 with the submission of a law proposal by *Fratelli D'Italia*'s representative, Riccardo Zucconi[15]. The proposal, titled "*Provisions on the coordination of space and aerospace policies and on the competences of Comint*", was composed of fifteen articles, addressing all main aspects of an ordinary authorization and supervision mechanism: from definitions to procedural steps, from liability of operators

13 The Giorgia Meloni's Government took office on 22 October 2022.

14 Decree of the President of the Council of Ministers adopted on 21 November 2022.

15 The full text of Law proposal c. 732/2022 together with any relevant information is still available at the link: www.camera.it/leg19/126?leg=19&idDocumento=732.

to the cases of suspension and revocation of the licence. The allocation of competences imagined by Zucconi was based on a triangle formed by Mimit, Comint and the Ministry of Defence, where the latter was given only the power to suggest to Comint limitations related to the use of space data, leaving all final decisions to Comint itself[16].

Despite the fact that the idea of a law on private space activities was perfectly in line with the agenda of the government, for reasons that were never clearly stated, the proposal never went through the parliamentary discussion and was soon disregarded by the government itself. It can be presumed that the Zucconi's draft law raised a certain dissatisfaction of the industry with the substance of its provisions and, at the same time, it brought some frictions between public administrations over the distribution of competences.

Considering the quite rapid submission of the proposal after the government took office and after the Prime Minister delegated its powers to Mimit – respectively only two months and thirty-one days – it was clear that more time was needed to present such an important piece of legislation for the whole sector.

During 2023, while Mimit and other relevant actors[17] in the Italian aerospace landscape were discussing and consulting each other on how to approach the regulation of the private space sector, the President of the European Commission Ursula Von der Leyen announced a new initiative aimed at the enactment of a so-called "EU space law"[18].

The prospect of a new EU regulation affecting the national space authorization systems in Europe rendered necessary an acceleration on the adoption of a domestic regime of private space activities for Italy.

A few months after the announcement, exploiting the delays caused by the election of the new EU Commission, the government presented the text of the Law on Space Economy which, after one year of Parliamentary debate, was approved in June 2025.

16 See, in particular, *ibid*. artt. 4-8 and art. 12.

17 See for example the work realized by the Leonardo Foundation – a non-profit organization established by the aerospace company Leonardo – which held several consultations with public and private entities of the Italian space sector and, in September 2023, it submitted to Mimit a report called "Space Economy, Space Industry, Space Law", setting an important base for further evaluations on the regulation of the sector. The report is available at the link:

www.fondazioneleonardo.com/sites/default/files/downloads/2024-05/Presentazione_Space-Law_agg-ore-19.25-del-21-sett.pdf

18 See the European Commission State of the Union 2023 – Letter of Intent by Ursula Von der Leyen to Roberta Metsola, dated 13 September 2023. To see the current status of the EU Space Law see its "legislative train schedule" available at the link: www.europarl.europa.eu/legislative-train/theme-a-new-plan-for-europe-s-sustainable-prosperity-and-competitiveness/file-eu-space-law.

3. THE ITALIAN LAW ON SPACE ECONOMY: A COMMENTARY

Already from the title, it is possible to see that the Italian Law on Space Economy has a bigger goal than just establishing a regime on the authorization and supervision of private space activities. It aims at fostering the development of the national space industry, at increasing its competitiveness and at creating a thriving new space economy in Italy[19].

For that reason, the Italian legislator decided to structure it in five parts, among which the first four are dedicated to traditional aspects of national space legislations – i.e. definitions (Title I), conditions and procedures for granting, modifying, suspending and revoking the authorization (Title II), registration of space objects (Title III) and the distribution of liability between space operators and the State (Title IV) – while the fifth and last part addresses a wide range of economic aspects of the space sector (Title V: Measures on the Space Economy), such as funding mechanisms, economic planning, and participation of SMEs in tenders.

The final result is a law that mixes together legal, political and economic aspects of space activities, underlining their inherent connection. All this emerges clearly from the content of the Law's provisions, as described here below.

3.1 Title I: General Dispositions

The first thing that appears in the Law is the specification of its purpose. In particular, Article 1 specifies that all the following norms are meant to promote investments in the new space economy so as to increase national competitiveness and to facilitate scientific research, as well as the development of competences in the space sector and the exploitation of new technologies related to Earth observation for predicting and preventing risks.

It follows that future interpreters of the Law must take into consideration Article 1 in case of any dispute over the meaning of the Law's norms. For example, if two space activities require conflicting authorizations, and one is merely experimental while the other has an impact on the industrial growth of the sector, it appears that the latter should be privileged.

19 This goal is expressly stated in Article 1 of the Law, other than in the Parliamentary Dossier n. 388 of 29 October 2024, titled "*Disposizioni in materia di economia dello spazio*", 46.

The next aspect touched by the Law is the one of definitions. Among the various expressions defined in Article 2, "space activity" raises interesting perspectives on the Italian interpretation of the space treaties.

According to Article 2, lett. a), a space activity is more than just the launch and use of objects in outer space; it includes also the exploration, extraction and use of the natural resources found in outer space and on celestial bodies as well as any other activity put in place on the latter. This puts Italy among those States that have expressly recognized the possibility for private actors to perform space mining activities and, more in general, to operate on an extra-terrestrial territory.

Considering the signing by Italy of the Artemis Accords[20] and the several projects currently in development by the Italian space industry in relation to the lunar economy (e.g. the Moonlight project[21]), the inclusion of activities on celestial bodies under the new Italian regime is perfectly in line with the political and industrial developments of the country.

It is yet to see how such activities will be regulated in specific terms. The recognition of the possibility to perform them is in itself already significant, but they will require specific rules because they can be significantly different from cis-terrestrial activities[22]. For that reason, their inclusion in the notion of "space activity" can be seen as a prelude to a future legislative intervention establishing a proper regime for authorizing and supervising operations on celestial bodies, as other States such as Luxembourg, Japan, and the UAE have already done.

The notion of "space activity" continues with the inclusion of those operations that involve humans in outer space.

20 Italy signed the Artemis Accords on 13 October 2020 as one of the original members of this cooperation agreement, as reported at the link: www.asi.it/2020/10/artemis-siglato-il-primo-accordo-multilaterale-di-cooperazioneinternazionale/.

21 Moonlight is the European Space Agency's (ESA) program to establish a constellation of satellites orbiting the Moon, designed to provide advanced communication and navigation services. On October 15, 2024, the Italian company Telespazio signed a contract with ESA to manage the development of a satellite constellation dedicated to providing navigation and communication services for future lunar missions. The project involves a consortium of specialized companies, with Telespazio as the prime contractor and overall system integrator. For more information, see the link: www.telespazio.com/en/business/space-programmes/moonlight.

22 Capurso, Andrea (2025), "*L'autorizzazione amministrativa all'iniziativa economica privata sulla luna*", in: Munus, 2024, 3, 951.

Notably, the Italian legislator has specified that the duration of their "permanence" beyond the atmosphere is irrelevant. With that, it appears that Italy has taken a stance on the legal status of manned suborbital flights: they fall under the scope of application of space law, with all the legal repercussions which derive from such decision, such as the attribution of the competence to authorize them on ASI, instead of the national aviation authority.

This conclusion is reinforced by the fact that suborbital operations are expressly mentioned among the matters to be regulated by Mimit with one of the implementing decrees of the Law[23]. It can be deduced that they are envisaged as a form of space activity.

Notably, the Law has extended the notion of "space activity" beyond suborbital flights going even "lower", in terms of altitude. A "space activity" includes "*activities conducted through stratospheric platforms and sounding rockets*" are "space activities"[24].

From this, it can be said that there is a clear intention of the legislator to expand the powers of national space authorities. The inclusion of so-called "high altitude operations" in the concept of "space activities" brings benefits in terms of clarity and unification of operations under one regime, but it may also create confusion for operators in the future as the legal status of such operations is still under discussion at the international level and is yet to be seen whether it will fall under the scope of aviation law, space law or a third sui-generis regime[25].

The definition of "space activity" ends with an all-encompassing clause, referring to: "any other activity performed in the extra-atmospheric space and on celestial bodies by operators to whom this Law applies"[26]. This wording allows to attract under the scope of application of the authorizing system activities which do not completely fall under any of the descriptions mentioned above. In other terms, it avoids possible gaps related, for example, to new forms of operations which technological innovations will render possible in the extra-atmospheric space.

23 Law on Space Economy, article 13, para. 2.

24 Law on Space Economy, article 1, lett. a).

25 See the European Union Aviation Safety Agency (2023), *Proposal for a roadmap on higher airspace operation*, available at the link: www.easa.europa.eu/en/newsroom-and-events/news/roadmap-higher-airspace-operations-hao-proposed-easa. See also Marboe, Irmgard (2025), 'Sub-orbital activities' – the application of 'international law' in the twilight between air and space law, in: Acta Astronautica, 2025, 234, 807.

26 Law on Space Economy, article 2, lett. a).

It must be underlined, however, that an important question is left unanswered: what is "extra-atmospheric space"? Italy has decided not to adopt in the Law a clear position on the matter[27], but – considering that the preparatory works of the Law mention the 100km boundary[28] – it is not to be excluded that in the implementing decrees of the Law the Italian legislator will include such limit as the basis for the definition of extra-atmospheric space[29].

The other definitions contained in Article 2 refer to aspects such as "*launching State*", "space operator", "space object", "launch", and they are often based on the notions of the international space treaties[30]. Some of them raise a few challenges and are further analysed in Section 4.

3.2 Title II: Norms On The Performance Of Space Activities By Space Operators

As mentioned before, the second part of the Law deals with the most practical aspects of the new regime: the objective and subjective conditions for obtaining the authorization, the procedure for its release, and all the aspects that may affect the authorization during its "life", i.e. its modification, suspension, withdrawal, transfer, supervision and, finally, the applicable sanctions in case of misconducts. At the end of Title II, the legislator has allocated two important functions: 1) the function to adopt the implementing decrees of the Law; and 2) the function to serve the role of technical authority for the sector, including any aspect linked to the regulation, supervision and control over space activities.

27 It must be recalled that other States, such as Australia, Denmark, Kazakhstan, Indonesia, and Slovakia have all embraced the so-called 'Karman Line' which sets the limit of outer space at 100 km, the national law of the United Arab Emirates has adopted the 80 km boundary line.

28 See the Parliamentary Dossier n. 388 of 29 October 2024, above at 19, 59.

29 This would not create a contradiction with the inclusion of suborbital activities, stratospheric platforms and sounding rockets under the scope of application of the Law because they would have to be seen as explicit extensions of the latter to operations which – even if not reaching the area above 100 km – must be regulated as space activities for reasons linked to other legal or political considerations.

30 See respectively in Law on Space Economy, article 2, lett. o), m), l), h). For example, the definition of "space object" resembles the one contained in the Liability Convention, Article I, lett. (d).

Going more into detail, Articles 3 and 4 indicate to whom and how the obligation of obtaining an authorization applies.

The Law on Space Economy is based on the territorial and personal jurisdictions of Italy over space operators[31].

When an Italian operator is managing its space activity from the territory of another State, personal jurisdiction can result in a conflict of jurisdictions because also the State of territory has to authorize and supervise the space activity of the Italian operator. For that reason, the Law on Space Economy has established a corrective measure: Article 4, para. 4 and 5, specify that an operator can be exempted from the Italian authorization either if an international agreement is signed with the State that has already authorized such operator abroad or if analogous conditions were applied by that State's authorities in evaluating and authorizing the relevant space activity[32].

This is a common approach in national space laws[33] and it is in line with the UN recommendations on national space legislations[34]. Nonetheless, the recognition of personal jurisdiction and the application of the described corrective measures may raise several challenges which will be further analysed in Section 4.

Interestingly, the Italian legislator has adopted a less common approach in terms of defining which space activities fall under the obligation to be authorized. Article 4, para. 2, distinguishes between: single space activities, multiple space activities of the

31 Law on Space Economy, article 3.

32 *Ibid.*, article 4, para. 5.

33 See for example, the US Code of Federal Regulations, Title 51 – National and Commercial Space Programs, para. 50904(a)(2); or the Austrian Federal Law n. 132/2011 on the Authorization of Space Activities and the Establishment of a Space Registry, Article 1. As of June 2025, the criterion of personal jurisdiction appears in the national space laws of Australia, Austria, Azerbaijan, Brazil, Belgium, Canada, China, Denmark, Finland, France, Germany, Japan, Lichtenstein, Luxembourg, Malaysia, Netherlands, Norway, Portugal, South Korea, Russia, Slovenia, Sweden, Ukraine, United Kingdom, USA.

34 UN General Assembly resolution 68/74 of 16 December 2013, titled: "Recommendations on national legislation relevant to the peaceful exploration and use of outer space", para. 2: "The State, taking into account its obligations as a launching State and as a State responsible for national activities in outer space under the United Nations treaties on outer space, should ascertain national jurisdiction over space activities carried out from territory under its jurisdiction and/or control; likewise, it should issue authorizations for and ensure supervision over space activities carried out elsewhere by its citizens and/or legal persons established, registered or seated in territory under its jurisdiction and/or control, provided, however, that if another State is exercising jurisdiction with respect to such activities, the State should consider forbearing from duplicative requirements and avoid unnecessary burdens".

same kind, or different kinds of space activities interconnected[35]. In addition, it expressly recognizes the need for one authorization in case of a constellation of satellites[36].

As described above, the definition of "space activity" is very broad. More specifically, it refers – among other things – to "the launch, release, management in orbit and re-entry of *space objects*"[37]. The use of the plural "*space objects*" seems to imply that the authorization is not linked to a space activity performed with one object, but with many.

The possibility to authorize together activities with multiple space objects, multiple space activities of the same kind, different kinds of space activities interconnected, and activities involving a constellation of satellites brings to one conclusion.

In Italy, a space operator can benefit from just one authorization procedure that can cover a variety of operations beyond the atmosphere. For example, if a space company performs periodical space activities of the same kind, or if it puts in place complex space operations with different elements linked to each other, it needs to be authorized only once. In other terms, the scope of application of the Italian authorization mechanism is quite broad thanks to a wide definition of space activity, and in addition it has been even extended – in certain circumstances – to cover also more space activities together.

When the Law on Space Economy applies, the space operator has to demonstrate in its request that its space activity complies with several requirements listed in Article 5. They are grouped in three main topics: safety, resilience, and sustainability. Among them, it is possible to find the necessity of an impact assessment related to light and radio-electric pollutions, as well as the proof of cybersecurity capacities, such as data encryption measures and protection systems in case of interferences or accidents.

35 Law on Space Economy, Article 4, para. 2.

36 *Ibid*. This broad scope of application of the domestic authorization mechanism is a particularity of the Italian legislation. There is no internationally agreed formula on how the obligation to authorize non-governmental entities pursuant to Article VI of the OST should be implemented domestically, nor any definition of "space activity" at the international law. The practice of States in this regard is not univocal, but no other national space law adopts such a wide approach. Notably, the French legislation is the one that gets closer to the Italian one, by applying its authorization mechanism to space activities (e.g. launches or managements of objects in outer space) related to a group of coordinated space objects. See French Law n. 518/2008, Article 1, para. 3.

37 Law on Space Economy, Article 2, lett. a).

Next to them, the Italian legislator has also envisaged a number of requirements related the operator itself. In particular, Article 6 requires the latter to demonstrate that its conduct in the past has always been compliant with the law, lacking for example criminal records or gross financial violations. Moreover, it must demonstrate its financial solidity and the signing of an insurance contract for its space operations. Finally, Article 6, lett. e), requires the operator to demonstrate that it can rely on a service of collision prevention, either on its own or through a qualified service provider.

From an international space law perspective, many of the requirements mentioned above represent the implementation by Italy of soft law measures adopted at the international level. For instance, the necessity of a collision prevention mechanism can be seen as the translation at the domestic level of Guideline B.4 of the UN Long Term Sustainability Guidelines, titled "*Perform conjunction assessment during all orbital phases of controlled flight*"[38]. Another example is the reference to light and radio electric pollution which is clearly inspired by the discussions held in COPUOS since 2020 under the item now entitled "*General exchanges of views on dark and quiet skies for science and society*"[39].

Therefore, Italy is to be praised for having included in its Law many requirements deriving from norms and topics which – even if not contained in binding instruments – are considered of the utmost relevance at the international level. On the other side, however, the richness and complexity of requirements established in Articles 5 and 6 has created an authorization mechanism that risks to be a show-stopper for start-ups and SMEs, which will have to face costs and technical difficulties in ensuring compliance with everything that the Law requires (see Section 4).

The Law proceeds in the next article with the description of the procedure for obtaining an authorization. All requests must go through a double assessment. The first one regards the technical aspects of the space activity. It is performed by ASI[40], which according to

38 COPUOS (2019), Guidelines for the Long-term Sustainability of Outer Space Activities, in UN Doc. A/74/20 of 21 June 2019, 60.

39 See UN Doc. A/AC.105/C.1/2025/CRP.22/Rev.2 of 11 February 2025, titled "Conference Room Paper on the Protection of Dark and Quiet Skies for science and society". From a legal analysis of the topic, see the paper submitted by the International Institute of Space Law to COPUOS and recorded in UN Doc. A/AC.105/C.2/2024/CRP.28 of 16 April 2024, titled: "Report of the International Institute of Space Law on the results of its Working Group on Light Pollution of the Night Sky from a space law perspective".

40 Law on Space Economy, Article 7, para. 1-3.

Article 14 has the role of technical authority for every aspect related to the application of the Law.

If ASI reaches a positive evaluation of the request, the latter moves to a second assessment on the compatibility of the space activity with the public interests which may be affected by it[41]. Because of the more political nature of this second assessment, the request moves under the scrutiny of Comint, which can involve all public administrations potentially interested in the space activity at hand. Comint's evaluation looks at elements such as the potential prejudice to national security, or the contrast of the activity with a fundamental interest of the Republic, or the connections of the operator with States considered non-democratic or not like-minded[42].

At the end of its assessment, there are three possible outcomes: 1) the request is rejected[43]; 2) the request is approved with additional prescriptions to be implemented by the operator[44]; 3) the request is approved as it is[45]. Accordingly, Comint drafts and passes to Mimit a proposal in one of the three directions. Finally, Mimit adopts the final act of the procedure.

In sum, the authorization is the final step of a multi-layer procedure, where the requestor has to pass two potential blocks: a technical one, managed by ASI, and a political one, managed by Comint.

This biphasic procedure reflects the relevance of space activities in contemporary societies: the number of sectors that depend on, or are affected by, space services and applications justifies the need to hear a multitude of public entities before allowing a space activity to be performed[46]. Similarly, the attention for the higher public interests of the State is a mirror of the sensitive nature of space activities, which can produce consequences well beyond the purview of a private operator and that only a public authority is in the position to assess[47].

41 *Ibid*., para. 4

42 *Ibid*., para. 8.

43 *Ibid*., para. 6.

44 *Ibid*., para. 5 and 9.

45 *Ibid*., para. 6.

46 See on this regard: OECD (2022), *A new landscape for space applications*, in: OECD Science, Technology and Industry Policy Papers, 2022, 137, 8.

47 See for example for Italy: Presidency of the Council of Ministers (2025), *Government guidelines on space and aerospace*, available at the link: www.governo.it/en/articolo/government-guidelines-space-and-aerospace-published/27493.

After an authorization is issued by Mimit, its "life" can still encounter a variety of obstacles that can affect its validity. Articles 8 and 9 deal with such instances, addressing the aspects of modification, suspension and revocation of an authorization.

According to Article 8, when a substantial change of the circumstances upon which the request was assessed occurs, the operator has to start a new procedure of approval of the affected space activity. Notably, Mimit can also on its own modify the authorization – or even revoke it or null it – if it deems it necessary to protect the national defence or security or if it needs to avoid an imminent danger.

In connection with this power of intervention, Article 9 lists a number of cases where Mimit can issue a decision to suspend or revoke the authorization. In general terms, they are mostly connected to violations of the applicable laws or of the conditions established in the authorization. An important difference with the power envisaged in Article 8 is that Article 9 expressly recognizes the right of the operator to be informed of the administrative procedure that can lead to such decision and can submit to the public authority any relevant documentation to be considered before deciding on its case[48].

Notably, in exceptional cases of necessity or urgency, connected for example Italy's compliance with its international obligations, Mimit can directly intervene on the management of the space object, transferring its control to another operator or to a public entity for the purpose of ensuring the continuation – or cessation – of all space operations[49].

The transfer of control of a private space object to a third entity can also occur on the basis of an autonomous decision of the authorized operator.

In that case, Article 10 applies. Its scope of application includes also transfers of the property of a space object used under an Italian authorization. In all such occasions, the Law requires a prior authorization of the transfer by Mimit following the procedure established in Article 7.

Articles 11 and 12 address two last aspects of a space activity after it has been authorized: respectively, its supervision and the applicable sanctions in case of misconducts.

48 Law on Space Economy, Article 7, para. 2.

49 *Ibid.*, para. 3.

The function of controlling all authorized space activities is exercised by ASI[50].

To that end, the legislator has provided it with the power to access documents and information, to request a direct consultation with the operator, and to conduct inspections on site[51]. In order to facilitate ASI in its role, the last paragraph of Article 11 imposes on the operator the duty to communicate to ASI the starting of each new space operation with at least thirty days of advance and to submit a periodical report every six months[52].

According to Article 12, if the activities of ASI are hindered by the operator or if the latter does not comply with its duties of cooperation, ASI can issue an administrative sanction of economic nature, determining its amount within the limits of the Law[53]. The money thus collected are transferred into the Fund for the Space Economy envisaged in Article 23 of the Law[54].

If the operator, however, performs a space activity without the authorization or after it expired, such misconduct is punished with much more than an administrative sanction: the operator is punishable with three to six years of imprisonment and a financial fine between twenty thousand and fifty thousand euros[55].

The establishment of a detention penalty can be seen as an effective deterrent for those operators which may have the economic power to accept the risk of a financial fine in front of a larger profit obtained by their misconduct[56].

50 Law on Space Economy, Article 11, para. 1.

51 *Ibid*., para. 2.

52 *Ibid*., para. 4 and 5.

53 Law on Space Economy, Article 12, para. 1.

54 *Ibid*., para. 2.

55 *Ibid*., para. 3.

56 This is something that has already happened in the past. The most notable example is the Swarm Technology case in the USA, where the company Swarm Technology – despite the lack of the necessary authorization from US authorities – launched its satellites from abroad. It was then fined for 900.000,00 dollars, but thanks to that "illegal" launch it raised 25 million dollars in funding. See Federal Communications Commission, *Order and Consent Decree in the Matter of Swarm Technologies Inc*., File No. EB-SED-18-00026685, adopted on 14 December 2018. See also: Johnson, Chris (2019), *The curious case of the transgressing tardigrades (part 1)*, 2019, available at the link: www.thespacereview.com/article/3783/1.

With Article 12 ends the part of the Law dedicated to the authorization and supervision of private space activities. As it is often the case, the Law provides only a general framework with basic rules. This is because the specific regulations of the various matters addressed in the Law are delegated to so-called “implementing decrees”, pursuant to Article 13[57].

Among such matters the Italian legislator has included also the regulation of the characteristics and technical requisites of spaceports as well as the modalities in which suborbital and orbital operations using them are performed[58]. With that, spaceports – even if designed only for horizontal take-off and landing – are brought under the competence of Mimit and ASI. As a consequence, the national civil aviation authority is deprived of the role it had assumed in their regulations[59], with a strong change of paradigm in the governance of suborbital activities.

3.3 Title III: Registration Of Space Objects

As mentioned above, Italy had regulated some basic aspects of the registration of space objects with its law n.153/2005.

Even if the latter has been repealed by the Law on Space Economy, Title III was drafted building upon it and expanding its content to additional aspects.

In particular, the Italian registry of space objects remains in the hands of ASI according to Article 15.

Moreover, as already was the case under Article 3 of law n. 153/2005, the operator has to furnish the information listed in Article IV of the Registration Convention[60].

57 Law on Space Economy, Article 13, para. 1

58 *Ibid*., para. 2.

59 The Italian Entity for Civil Aviation (Enac) had already adopted two regulations on the matter: one issued on 1 October 2020 titled ‘Regulation on the construction and management of spaceports’; the other issued on 20 November 2023 titled ‘Regulation on suborbital operations and access to space’. Both regulations – having not the legal status of laws, but of administrative acts – are destined to be invalidated by the adoption of the implementing decrees.

60 Law on Space Economy, Article 16, para. 1.

In addition, however, the operator must share with ASI a list of information not envisaged in international treaties but in soft law measures and State practice[61], such as the owner and the manufacturer of the space object, the website where official information on the space object are published, and whether the latter is part of a constellation[62].

Article 16, para. 2, lett. g), attributes to ASI the power to request at its own discretion any information other than the ones provided according to Title III. This clause allows ASI to obtain additional information which may be required at the international level due to the evolution of the applicable regime on information-sharing.

Following the practice of some States such as the UK[63] and the Netherlands[64], Italy has interestingly endorsed the idea of having two national registries[65]. Article 17, in fact, establishes the creation of a so-called 'complementary registry' for space objects whose property or control are transferred to an Italian operator while the object is already in outer space[66].

In other words, the provision at hand deals with the cases where Italy is not a "*launching State*"[67] at the international level, but it becomes the "*appropriate State*"[68] under Article VI of the Outer Space Treaty (i.e. the State that has the international responsibility

61 In particular, Article 16, para. 2, of the Law on Space Economy appears to be influenced by UN Res. 62/101 of 10 January 2008, titled 'Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects'; as well as by UN Office for Outer Space Affairs (2023), *Registration of objects launched into outer space – Stakeholder study*, published as UN Doc. ST/SPACE/91 of November 2023.

62 Law on Space Economy, Article 16, para. 2.

63 See the UK's Outer Space Act of 1986, Section 7, together with the UK's Space Industry Act of 2018, Section 61.

64 The Netherlands' Space Objects Registry Decree of 2007, Article 2. See also The Netherlands' Explanatory Memorandum attached to the Space Objects Registry Decree of 2007, 5.

65 The practice of setting up a supplementary registry at the national level has been recognized also by: UNOOSA, *Registration of Objects launched in Outer Space – Stakeholder Study*, ST/SPACE/91, 2023, 17.

66 Law on Space Economy, Article 17.

67 See OST, Article VII, where the category of "launching State" is introduced as: "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". This is also the definition used in Italy's Law on Space Economy, at Article 2, lett. o).

68 See OST, Article VI, according to which: "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". For recent academic analysis of Article VI see: O'Donnell, Scarlett (2023), International Responsibility for Activities in Outer Space in the Modern Space Age: Article VI of the Outer Space Treaty in the context of international space law and public international law, [Doctoral Thesis (monograph)]. Lund University. See also Von der Dunk, Frans (2020). "Scoping National Space Law: The True Meaning of 'National Activities in Outer Space' of Article VI of the Outer Space Treaty", in: Blount, P.J. and Masson-Zwaan, Tanja, and Moro-Aguilar, Rafael, and Schrogl, Kai-Uwe (ed.). Proceedings of the International Institute of Space Law 2019. The Hague: Eleven International Publishing, 227.

to authorize and supervise a private space operator) due to the acquisition of control of a space object by an entity under its jurisdiction[69]. Therefore, Article 17 represents an important interpretation of the OST as it demonstrates that the State which registers a space object under Article VIII of the OST does not have to be a "*launching State*" [70].

3.4 Title IV: Responsibility Of Space Operators And Of The State

The regime on the responsibility for damages caused by authorized space activities envisaged in the Law on Space Economy is based on the general rule according to which: the operator is liable for the damages caused by its space activities[71].

Article 18 then regulates the consequences of such damages on Earth or to aircraft in the air. Following the norms of the Liability Convention, it maintains the absolute liability of the operator[72], with a cap defined in Article 21[73]. Moreover, as in Article VI of the Liability Convention, it recognizes the possibility for the operator to be exonerated from its liability if it can prove that the damage has resulted from the intent of a third person or exclusively from the conduct of the damaged party[74]. Finally, if the latter has concurred to the realization of the damage with its negligence or if it has not applied the ordinary diligence to avoid such damage, its compensation can be – respectively – reduced in proportion to the gravity of its negligence or denied altogether[75]. The cap and the exonerations mentioned here apply only if the operator has acted within the limits of its authorization[76].

69 This issue has been addressed recently by: Lyall, Francis and Larsen, Paul (2025), Space Law: A Treatise – Third Edition. New York: Routledge, 85.

70 Italy's position undermines the interpretation of "appropriate State" advanced for example by: Kerrest, Armel (2023). "State responsibility and liability for space activities", in: Leclerc, Thomas (ed.). Space Law. London: ISTE – Wiley, 114. More in general on the issues related to registration and allocating the status of "appropriate State", see: Hofmann, Mahulena (2024), "Registration of Space Objects", in: Sandeepa, Bhat (ed.). International Space Law in the New Space Era: Principles and Challenges. Oxford: Oxford University Press, 122.

71 Law on Space Economy, Article 18, para. 1.

72 *Ibid.*, Article 18, para. 2. This provision replicates the regime established in Article II of the Liability Convention for the launching State.

73 *Ibid.*, Article 18, para. 3.

74 *Ibid.*, Article 18, para. 2.

75 *Ibid.*

76 *Ibid.*, Article 18, para. 4.

At the end of the provision, one last clause recites: when damage is suffered by subjects who participated in the space activity the liability of the space operator is regulated by the Italian Civil Code[77]. The repercussions of this apparently harmless norm are not to be underestimated: Article 1229 of the Italian Civil Code establishes that any agreement between the parties of a contract that exonerates in advance the liability of the debtor for gross negligence and wilful misconduct is null. As a result, Italian space operators may find themselves in a complicated situation when signing a contract with other space actors. In fact, contracts among partners for the performance of a space activity generally include cross-waivers of liability between parties, irrespective of negligence[78]. However, the contractual partner of an operator authorized by Italy can file a claim for compensation against that operator in front of Italian tribunals if it suffered damages caused by the Italian operator's negligence.

Moving to Article 19, the Italian legislator has established a commonly recognized principle: when Italy has paid compensation to third parties for damage caused by an authorized space activity in fulfilment of its international obligations, the Government is entitled to recourse against the operator within twenty-four months of the payment and up to the cap defined in Article 21[79].

In case of damages caused by space activities for which a foreign State is responsible, Article 20 regulates the procedure and conditions for obtaining compensation from Italy. In other terms, the present article replaces the already-mentioned Law n. 23/1983, adjusting its content and defining in better terms the applicable rules.

Finally, Title IV addresses in Article 21 the matter of mandatory insurance.

The first sentence of the provision clarifies that the maximum insurance coverage is set at 100 million Euros[80].

77 *Ibid*., Article 18, para. 5.

78 See the extensive analysis of such clauses in: Baumann, Ingo and Smith, Lesley Jane (2011), Contracting for Space – Contract Practice in the European Space Sector. London: Routledge.

79 Law on Space Economy, Article 19.

80 Law on Space Economy, Article 21, para. 1.

Although the amount was set quite high compared to other European jurisdictions[81], the Italian legislator has decided to allow three different levels of lower caps. The lowest limit has been established in fifty million Euros. In addition, operators aiming exclusively at research activities or qualified as innovative start-ups can benefit for an even lower cap set at twenty million Euros.

The exact determination of the three levels of caps and the conditions for benefitting of them are going to be determined in the implementing decrees of Article 13. However, the Law on Space Economy has already established that they will depend on the dimension, length, typology or proven track-record of the space activities to be insured as well as on the orbital plane of the space object used[82].

A particular feature of Article 21 is the recognition of a direct claim against the insurance company by the damaged third party[83]. Moreover, the insurance company must compensate such party even if the damage was caused the wilful misconduct of the space operator or of its employees[84].

While the victim-oriented approach of both norms is unquestionable, its repercussions on the willingness by insurance companies to insure Italian space operators may be problematic, as will be further discussed in Section 4.

Article 21 concludes the part of the Law on Space Economy dedicated to the various aspects of private space activities connected to the international space treaties (i.e. authorization, supervision, registration of space objects, liability for damages).

The next title – Title V – moves to the economic and financial aspect of the relationship between private actors and public administrations.

81 There are several States that adopt a similar mandatory cap for the amount of liability that needs to be insured by the private space operator, such as Japan, Hong Kong and Singapore. The problem is that there are many other States, especially in Europe, whose mandatory cap is lower, making it easier in those jurisdictions to sign an insurance contract at a lower cost for the operator. For example, the UK and French authorities have set the cap at sixty million Euros. A general analysis of the legal issues related to space insurance is offered by: Sandeepa, Bhat (2020), "Space Liability Insurance: Concerns and Way Forward". in: Athens Journal of Law, 2020, 6, 1, 40.

82 Law on Space Economy, Article 21, para. 2.

83 *Ibid*. Article 21, para. 4.

84 *Ibid*. Article 21, para. 5.

3.5 Title V: Measures For The Space Economy

The first two articles of Title V deal with two important instruments of economic planning.

Article 22 introduces in the Italian space policy framework the National Plan for the Space Economy, whose aim is to analyse the situation and the needs of the Italian space sector and to set up the necessary measures for promoting its development, including the allocation of resources and the planning of public-private partnerships[85].

As for Article 23, it establishes the creation of the Fund for the Space Economy, which is aimed at financing programs and projects that can increase the commercial value and technological advancement of national space activities[86].

In the same spirit of support for the economic growth of the Italian space sector, Title V continues with four articles centred on the involvement of the industry in space activities.

Article 24 establishes the main principles that the State should follow to ensure a fruitful and reasonable utilization of outer space and of national space infrastructures by private operators[87]. For example, it maintains that the State should favour activities in low Earth orbit, either of research or of commercial nature; it should assure an equitable and non-discriminatory access to data, services and resources of national space infrastructures; it should offer opportunities of public-private partnerships for the commercial use of the data coming from remote sensing infrastructures.

Going into more specific matters, Article 25 addresses the market of satellite communication. In particular, it requires Mimit to create a segment of national transmission capacity reserved to communications via satellite[88]. The assignment of such capacity has to be done through a public contract[89]. To that end, Mimit has to promote feasibility studies and activities aimed at defining the necessary technical and security requirements[90].

85 Law on Space Economy, Article 22.

86 *Ibid.*, Article 23.

87 *Ibid.*, Article 24.

88 *Ibid.*, Article 25, para. 1.

89 *Ibid.*

90 *Ibid.*, Article 25, para. 3.

Article 26 moves the focus on the use of the radio electric spectrum. In order to assure its efficient utilization, Mimit has to promote initiatives, studies and researches aimed at reducing interferences[91].

Finally, Article 27 introduces specific rules on public tenders in the space sector, excluding the ones of the EU space programme. In particular, when a tender is not divided in lots, 10% of the contract value has to go to innovative start-ups or to SMEs; when a contracting authority choses the most economically advantageous tender, it can take into consideration as an evaluation criteria the percentage of involvement of innovative start-ups and SMEs; when an innovative start-up or SME is a subcontractor, the contracting authority pays directly to the latter the amount linked to its work; 40% of the value of the contract has to be paid to the adjudicator as advance payment within fifteen days from the beginning of the work[92].

With that, the Italian legislator has concluded the substantial part of the Law on Space Law. The last four articles contain procedural and non-substantive clauses, such as the exclusion from the scope of application of the law of all space activities performed by the Ministry of Defence or by the so-called "organism of information for security"[93]; the coordination of the provisions contained therein with other applicable laws, among which particular importance may hold the law on the screening of foreign investments in cases of transfer of the authorization[94]; the entry into force of the law[95].

Overall, the content of the Law on Space Economy appears to be in line with the general standard applicable in other Western jurisdictions, especially of civil law tradition. However, Italy has taken some normative choices that make the Italian framework stand out.

On a technical level, the establishment of strict conditions in terms of sustainability, safety and security has raised the bar for national space legislations: Italy has decided to favour a highly responsible behaviour in the authorization and supervision of private space operators, even if this may have the counter-effect of deterring companies from choosing to set their space operations under the Italian jurisdiction.

91 *Ibid.*, Article 26, para. 1.

92 *Ibid.*, Article 27, para. 1.

93 *Ibid.*, Article 28, para. 1.

94 *Ibid.*, Article 28, para. 2, and Articles 29 and 30.

95 *Ibid.*, Article 31.

On a more general level, looking at the legislative approach adopted by Italy, the inclusion in the Law of aspects of economic planning and of promotion of the industrial sector may be seen as misplaced. However, the Italian choice is a mirror of the changing landscape of space activities: commercial operations beyond the atmosphere are becoming a matter of economic and geopolitical power. As a result, the role of the State has to adapt. Public regulatory measures can be used to foster the development of a national space industry and to regulate and supervise it while it conducts its activities beyond the atmosphere. The Law on Space Economy represents a perfect example of this comprehensive approach to the domestic regulation of commercial space.

The effects of this approach are yet to be seen. However, going beyond the mere description of the content of the Law and entering into a more critical analysis, it is possible to see already a few key challenges that will need to be faced before the Law can express its full potential.

4. CURRENT CHALLENGES

At the moment of writing, just a few days after the approval of the Law on Space Economy, it is too soon to comment on any actual controversy raised by its provisions.

However, a preliminary reading already allows to anticipate two main types of challenges that are likely to emerge: those concerning its substantial provisions, and those relating to procedural aspects.

4.1 Substantial Challenges

Not all the provisions regulating material aspects of the authorization and supervision mechanism can be applied without doubts or uncertainties. The vague definitions of constellation and of interconnected space activities[96]; the lack of norms on the liability

96 For the definition of constellation see Article 2, lett. f), of the Law on Space Economy, stating that it consists in a group of satellites set up for a common mission or managed in coordination. Considering that the operator of a constellation of satellites can benefit from requesting just one authorization, it is doubtful whether those satellites can be launched in different years, in different orbital planes, with different characteristics as long as they are used for a common mission or in coordination. On the topic of the nature of satellite constellations under international space law, see the analysis of: Salmeri, Antonino (2021). "Collective Space Object as a New concept of International Space Law", in: Air and Space Law, 2021, 46(2), 203. As for interconnected space activities, the Law on Space Economy does not provide any definition.

applicable to orbital damages[97]; the direct responsibility of the insurer in case of claims for compensation[98], are all examples of norms that can lead to equivocal results.

But among such provisions, two of them appear to be particularly problematic because one defies the applicability of the Law, while the other goes against its aim and purpose.

Starting with the first one, pursuant to Article 3 of the Law on Space Economy, Italy has imposed its authorization and supervision to all operators who either fall under its territorial jurisdiction or under its personal jurisdiction[99].

As said before, this imposition is based on the international obligations stemming from Article VI of the OST, according to which each State Party to the Treaty has to authorize and supervise non-governmental entities and has to assure that their activities are carried out in conformity with the applicable legal framework[100]. The first obligation is functional to the second one, meaning that the domestic authorization and supervision serve the purpose of allowing a State to assure the conformity of the private activity with its regime[101].

While the criterion of territorial jurisdiction perfectly allows Italy to comply with those two international obligations, the criterion of personal jurisdiction does not grant the same result[102].

97 Article 18 of the Law on Space Economy, in fact, regulates exclusively the consequences of damages caused on Earth or to aircraft in the air. Consequently, it is not sure whether the cap on liability established under Article 21 can apply also to damages caused beyond the atmosphere.

98 The direct action against the insurer envisaged by Article 21, para. 4, appears to be a unique feature of claims for space damages and goes against the general principle according to which the insurer can only be called in a judicial proceeding for compensation by the damaging party, because there is no legal relationship between the damaged party and the insurer of the damaging one.

99 Law on Space Economy, Article 3.

100 OST, Article VI, sentence 1 and 2.

101 See Palkovitz, Neta (2020). Regulating a revolution: small satellites and the law of outer space. Alphen aan den Rijn: Kluwer Law International, 67. More in general on Article VI of the OST, see: Gerhard, Michael (2009). “Article VI”, in: Hobe, Stephan and Schmidt-tedd, Bernard, and Schrogl, Kai Uwe (ed.). Cologne Commentary on Space Law – Volume 1. Cologne: Wolters Kluwer, 120.

102 This criticism towards the inclusion of personal jurisdiction as the basis for becoming the “appropriate State” goes against the interpretation of Article VI traditionally supported by scholars and commentators. It is in fact commonly recognized – with dubious grounds – that personal jurisdiction is one of the criterion for the application of Article VI at the national level. See for example Stubbe, Peter (2017), State accountability for space debris, Leiden: Brill – Nijhoff, 269. See also Pedrazzi, Marco (2008), “Outer Space, Liability for Damage”, para. 1, available at:

opil.ouplaw.com/display/10.1093/law:epil/9780199231690/law-9780199231690-e1203?rskey=M2wijt&result=78&prd=OPIL&print.

The reason is that Italy can assure the conformity of a private space activity with the applicable legal framework only if it can control and supervise the operator behind it. Most of the measures allowing such control and supervision require the actual presence of the operator in the territory of the relevant State. For example, the powers granted to the technical authority under Article 7 and to the supervising authority under Article 11 of the Law on Space Economy include the powers to access documents held by the operator and to inspect the premises and sites used by the operator for the space activity; at the same time, under Article 9, para. 3, in exceptional cases of emergency or urgency Mimit has the power to take direct control of the space object, depriving it from the hands of the private operator. All these powers can only be exercised if the operator is in a place under the Italian territorial jurisdiction.

How can Italy assure the conformity of a private operator's activity with the applicable legal framework if that activity is being managed from another State? How can Italy exercise its powers of supervision and enforcement?

The only possible answer is: through an agreement with the State where the national operator is managing its space operation.

However this solution raises several problems: 1) all Italian operators abroad are now called to assess whether they need to be authorized by Italian authorities; 2) if that's the case, but they can also be authorized by their State of territory, they need to check – according to Article 4, para. 4 – whether the foreign authorization that they can obtain is recognized by Italy under an international agreement with that State; 3) if not, they need to ask for the recognition of their foreign authorization by Italian authorities pursuant to Article 4, para. 5, paying a fee and having to wait a period of assessment lasting up to sixty days; 4) if their State of territory does not authorize them for any reason (for example because it does not have an authorization regime for space activities), they have to go through the authorization mechanism envisaged by the Law on Space Economy even if they are not performing their space activity in Italian territory.

In this last case, the final result is absurd.

Italy authorizes a national space operator who is in a foreign jurisdiction as if it was the "*appropriate State*" under Article VI of the OST[103]. However, it does not have the powers necessary to comply with the two other international obligations placed upon the "*appropriate State*", namely the obligation to supervise a private operator and the obligation to assure the compliance of its space activity with the applicable regime. Italy does not have enforcement jurisdiction in foreign territories, and because of that, it is not in the position to assure such compliance. Considering that – as the old Latin maxim goes – "*ad impossibilia, nemo tenetur*"[104], Italy cannot be recognized as the "*appropriate State*" at the international level.

In other words, the Italian authorization is useless if Italian public authorities cannot directly supervise and control the authorized activity. For that reason, the only possible "*appropriate State*" at the international level is the State of territory where the operator is managing its space activity.

But if the State of territory is the only responsible State under Article VI of the OST, then the Law on Space Economy poses some problematic questions: why should an Italian operator who intends to conduct its space activity in another State verify whether that State has an agreement on the mutual recognition of space authorizations with Italy? Or, when such agreement does not exist, why should the Italian operator ask for the recognition of its foreign authorization by Italian authorities, losing money and time? And if it does not obtain an authorization from the State where he wants to operate, why should it submit a request to be authorized by Italy, which has no jurisdiction over its space activity?

All these questions bring to the conclusion that the legislative choice to include personal jurisdiction as a criterion for the application of the authorization mechanism has only one result: it burdens Italian operators abroad, without any benefit for Italy, which remains not responsible for their activities under international law.

Moving to the second problematic provision, it concerns SMEs and start-ups who operate in Italy or would like to set the management of their space activities in Italy.

103 See above at 68.

104 The maxim can be translated as: no one can be obliged to do something that is impossible to do.

Although the Law on Space Economy was aimed at the development of an innovative space sector, fostering the involvement of smaller industrial realities, the subjective and objective requirements established in its Articles 5 and 6 seem to create a mechanism for obtaining the space authorization that suits only major companies.

In fact, it is hard to imagine that, for example, a small enterprise – defined as a company with less than ten employees and a total annual turnover of less than ten million Euros[105] – can have the means necessary to provide several impact assessments of its space activity, such as the ones on light and radio-electric pollution and the more general one on the environmental impact of the entire activity's life-cycle[106]; and, at the same time, have the means to guarantee the resilience of the space infrastructure against cyber and physical threats[107]; and also have a system of collision prevention either in-house or contracted with a licensed provider[108].

All these requirements – as said before – have the virtue of incentivizing a responsible and safe conduct of space activities. However, they have a cost. For SMEs and start-ups that cost may represent a reason to relocate their business elsewhere.

Clearly, this would go against the objective of the Law itself. To avoid a similar outcome, the implementing decrees envisaged in Article 13 may be decisive, as they can be used to introduce corrective measures, suitable to the capabilities of smaller industrial entities.

This is already expressly maintained for the insurance requirement, which in Article 21 requires a mandatory insurance for up to one-hundred million Euros of damages[109]. Knowing that such a high insurance cap could have represented an insurmountable obstacle for SMEs and startups, the Italian legislator has envisaged the individuation of lower caps in the implementing decrees, arriving at a minimum of twenty million euros in certain circumstances[110].

105 This is the definition established under the EU Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. See Document n. 32003H0361, published in Official Journal L123 of 20 May 2003.

106 Law on Space Economy, Article 5 para. 1, lett. a) and c).

107 *Ibid.*, Article 5, para. 2.

108 *Ibid.*, Article 6, para. 1, lett. e).

109 *Ibid.*, Article 21, para. 1.

110 *Ibid.*, Article 21, para. 2. See above at Section 3.4.

A similar solution may suit well also the implementation of Articles 5 and 6, tailoring the requirements for the authorization to the capacity of the operator and the characteristics of the activity to be authorized.

4.2 Procedural Challenges

Also in the case of the norms on procedural aspects of the authorization and supervision mechanism, the Law on Space Economy cannot be considered completely beyond reproach.

There are a few elements of the procedures envisaged in the Law that will need to be further clarifies. For example, it is not expressly stated what are the consequences of the silence of ASI at the end of the term assigned by the Law for the conclusion of its assessment; it is equally dubious whether the operator who sees its authorization being revoked, modified or nulled for reasons of national security, defence or imminent danger, has the right to receive some form of indemnification; it is also not perfectly clear what is the relationship between the procedures applicable to a transfer to a foreign entity of the control over an object managed under an Italian authorization, considering that other than the procedure established in the Law on Space Economy also the procedure established in the law on the screening of foreign investments may find application[111].

Other than the examples briefly mentioned above, there is one procedural aspect that deserves a deeper analysis: the justiciability of a denial of authorization.

Starting with a preliminary consideration, it can be said that a request for authorization under the Law on Space Economy can be rejected for two reasons.

Firstly, the technical assessment by ASI on the requirements described in Articles 5 and 6 can have a negative result; accordingly, ASI decides to reject the request and informs of its decision Mimit[112], who adopts the final act of denial.

111 See Law Decree No. 21 of 2012. See on this topic: Capurso, Andrea, and Ferrari, Francesco, and Jannotti Pecci, Enrichetta (2024). “Screening of Foreign Investments in the Space Sector: The Italian (Virtuous) Example”, in: Blount, P.J. and Masson-Zwaan, Tanja, and Moro-Aguilar, Rafael, and Schrogl, Kai-Uwe (ed.). Proceedings of the International Institute of Space Law 2023. The Hague: Eleven International Publishing, 29.

112 Article 7, para. 3, of the Law on Space Economy speaks of a “proposal” of denial to be submitted to Mimit. However, considering that Mimit seems to be bound by the assessment of ASI, it is more correct to speak of a decision of denial.

Secondly, the assessment of the public interests potentially affected by the activity pursuant to Article 7, para. 8, can generate concerns in one or more public administrations, forcing COMINT to submit a proposal to reject the authorization to the Council of Ministers. The latter adopts the final act of denial, informing the operator.

There is an important difference between the two final acts. While the first one is based on a technical activity of a public administration (i.e. ASI), the second one is based on evaluations of highly discretionary nature. This means that depending on which final act was adopted, the operator who thinks that its request was wrongly assessed has a very different possibility to obtain judicial redress.

More specifically, filing a recourse against ASI's assessment can be an effective instrument for operators. Administrative judicial authorities have in fact broad scrutiny powers over the correct application of technical rules, such as the requirements established by the Law[113]. Although the judge can never replace ASI's technical assessment, at the end of its scrutiny it can condemn ASI to renovate the evaluation following the indications established in the judgement, such as considering facts and data not taken into account in the first place, or simply removing elements of unreasonableness, arbitrariness and incoherence in the application of the technical rules applicable to the case at hand[114].

As for a recourse against Comint's assessment, the powers of judicial authorities are much more limited. Considering the nature of the public interests at the basis of Comint's evaluation (e.g. protection of national interests, national security, avoiding connections with not-like-minded States)[115], the final act appears to be a so-called

113 On this regard, see the academic analysis of: Borriello, Filippo (2021). "Judicial review of administrative decisions based on complex technical evaluations. A comparative study between Italy and the United States", in: Federalismi.it, 2021, 12, 13. See also: Caporale, Federico (2020). "L'uso dei mezzi istruttori nel trattamento giurisdizionale della discrezionalità tecnica. Il caso dell'ARERA", in: Rivista Trimestrale di Diritto Pubblico, 2020, 2, 429.

114 See Italian Council of State, Judgement n. 7097/2020: "Without wishing to retrace the long evolutionary path that has led to the guarantee of a more intense and effective judicial protection, according to the consolidated jurisprudence of this Council [...] the judicial review of the technical assessments of the administration may nowadays be carried out not on the basis of a mere formal and extrinsic control of the logical process followed by the administrative authority, but on the basis of a direct verification of the reliability of the technical operations from the point of view of their consistency and correctness, as regards the technical criteria and the application procedure" (unofficially translated by Council of State's judge Fabrizio Cafaggi).

115 Law on Space Economy, Article 7, para. 8.

"act of high administration"[116]. The latter can be subject to judicial scrutiny, but only to the extent of manifest irrationalities in formal or substantial aspects of the procedure[117]. As a consequence, it is unlikely to obtain a positive review in cases of recourse against such acts.

When an authorization for a space activity is denied on the basis of the circumstances listed in Article 7, para. 8, the operator is virtually forced to change the aspects of its activity that motivated the denial, lacking a favourable judicial mean of redress.

The problem is that, precisely because of the high discretionary nature of Comint's assessment, it is quite difficult for an operator to anticipate whether its activity will pass such assessment or not. This creates a cloud of uncertainty over any request for authorization. And the improbable possibility to obtain judicial redress renders this uncertainty even more impactful.

In view of the analysis conducted so far it is possible to look, in conclusion, at the way forward for the Italian legislator after the adoption of the Law.

5. NEXT STEPS TO MAKE THE LAW EVOLVE IN THE FUTURE

When the Law on the Space Economy was finally approved, the parliamentary majority in the Senate opted to reject any proposed amendments. This decision was driven not by the belief that the Law was flawless, but rather by a strategic calculation: avoiding any modification that would have triggered a renewed cycle of deliberation in the Chamber of Deputies, thus significantly delaying its entry into force. Yet, the political leadership did not ignore the merit of the concerns raised during the legislative process. Aware that some

116 An "act of high administration" is a particular type of administrative act. As all administrative acts, it can be subject to a review of legitimacy by an administrative judicial authority according Article 7 of Legislative Decree n. 104 of 2010. However, it is characterized by a high level of discretion in the evaluations made by the public administration before its adoption. The point is that such discretion is not absolute, like a political act, but it is limited in two senses: firstly, because it is founded in the law and, secondly, because it has to be used to achieve the goals that the law prescribes. See among the many judgments on the matter: Council of State, Judgment n. 3871/2017, para. 3.2. See also the analysis of: Padovani, Vittoria (2022). "L'atto di alta amministrazione e l'atto politico", in: De Donno, Marzia, and Gardini, Gianluca, and Magri, Marco (ed.). Il diritto amministrativo nella giurisprudenza – II edizione, Roma: Maggioli Editore, 255.

117 See Italian Council of State, Judgment n. 129/2006, para. 9. See also: Ramazzotti, Dalila (2024), "La natura degli atti di alta amministrazione", available at the link: rivista.camminodiritto.it/public/pdfarticoli/10186_2-2024.pdf

of the objections reflected legitimate and substantive critiques, the Senate's Commission drafting the Law chose to acknowledge them by converting several proposed amendments into formal "Agenda items" for the Government, non-binding but politically significant commitments to address those issues in the implementation phase[118].

As a result, the current focus has shifted to the terrain of implementing decrees, where the practical contours of the Law will be shaped. It is in this phase that the Law's ambiguities, omissions, and structural tensions will need to be resolved, making the executive's interpretative choices critical for the Law's long-term effectiveness. However, reliance on secondary legislation, though expedient, cannot be a permanent substitute for a more coherent legislative architecture.

Indeed, one of the most pressing future tasks is to move toward codification.

While the Law demonstrates a commendable effort to integrate economic, political, and legal considerations within a single legislative instrument, it still suffers from a lack of systemic coordination. The fragmentation of regulatory sources and planning instruments risks undermining the very efficiency and predictability the Law aims to foster.

For instance, economic planning for the space sector is currently dispersed across different legal frameworks and administrative procedures[119] : why not consolidate these under a unified set of rules or a single normative corpus?

Similarly, the governance of space activities could benefit from integration into the existing Italian Code of Navigation[120], which already regulates maritime and aviation domains. Such a move would not only ensure conceptual and structural consistency across modes of transportation and mobility but would also symbolically recognize outer space as a domain requiring the same degree of normative maturity as air and sea.

Ultimately, the approval of the Law marks only the beginning of a broader institutional effort. Its success will depend not just on its immediate implementation but on the political will to build, over time, a more comprehensive and integrated legal framework for Italy's role in the space economy.

118 The list of "ordini del giorno" – as they are called in Italian – can be accessed at the link: www.senato.it/leggi-e-documenti/disegni-di-legge/scheda-ddl?tab=testiEmendamenti&did=58968.

119 See the various documents mentioned above in Section 2.

120 Italian Royal Decree n. 327/1942.

REFERENCES

LEGISLATION

- Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space 1968.
- Austria's Federal Law No. 132 of 2011 on the Authorization of Space Activities and the Establishment of a Space Registry.
- Convention on International Liability for Damage Caused by Space Objects 1972.
- Convention on Registration of Objects Launched into Outer Space 1975.
- COPUOS (2019), Guidelines for the Long-term Sustainability of Outer Space Activities, in UN Doc. A/74/20 of 21 June 2019.
- Italy's Decree of the President of the Council of Ministers adopted on 12 July 2022.
- Italy's Decree of the President of the Council of Ministers adopted on 21 November 2022.
- EU Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises in Document n. 32003H0361, published in Official Journal L123 of 20 May 2003.
- France's Law No. 518 of 2008.
- Italian Entity for Civil Aviation's regulation of 1 October 2020, titled 'Regulation on the construction and management of spaceports'.
- Italian Entity for Civil Aviation's regulation of 20 November 2023 titled 'Regulation on suborbital operations and access to space'.
- Italy's Law No. 153 of 12 July 2005.
- Italy's Law No. 426 of 5 May 1976.
- Italy's Law No. 7 of 11 January 2018.
- Italy's Law No. 87 of 28 January 1970.
- Italy's Law No. 89 of 13 June 2025.
- Italy's Legislative Decree n. 104 of 2010.
- Italy's Presidential Decree No. 965 of 1975.
- Italy's Royal Decree No. 327 of 1942.
- Italy's Law Decree No. 21 of 2012.
- Italy's Law Decree No. 36 of 2022.

- The Netherlands' Explanatory Memorandum attached to the Space Objects Registry Decree of 2007, 5.
- The Netherlands' Space Objects Registry Decree of 2007
- UK's Outer Space Act of 1986.
- UK's Space Industry Act of 2018.
- UNGA Res. 68/74 of 16 December 2013, titled: "Recommendations on national legislation relevant to the peaceful exploration and use of outer space".
- UNGA Res. 62/101 of 10 January 2008, titled 'Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects'.
- USA's Code of Federal Regulations, Title 51 – National and Commercial Space Programs.
- USA's Federal Communications Commission, *Order and Consent Decree in the Matter of Swarm Technologies Inc.*, File No. EB-SED-18-00026685, adopted on 14 December 2018.

ACADEMIC LITERATURE

- Baumann, Ingo and Smith, Lesley Jane (2011), Contracting for Space - Contract Practice in the European Space Sector. London: Routledge.
- Borriello, Filippo (2021). "Judicial review of administrative decisions based on complex technical evaluations. A comparative study between Italy and the United States", in: Federalismi.it, 2021, 12, 13.
- Caporale, Federico (2020). "L'uso dei mezzi istruttori nel trattamento giurisdizionale della discrezionalità tecnica. Il caso dell'ARERA", in: Rivista Trimestrale di Diritto Pubblico, 2020, 2, 429.
- Capurso, Andrea (2025), "*L'autorizzazione amministrativa all'iniziativa economica privata sulla luna*", in: Munus, 2024, 3, 951.
- Capurso, Andrea, and Ferrari, Francesco, and Jannotti Pecci, Enrichetta (2024). "Screening of Foreign Investments in the Space Sector: The Italian (Virtuous) Example", in: Blount, P.J. and Masson-Zwaan, Tanja, and Moro-Aguilar, Rafael, and Schrogl, Kai-Uwe (ed.). Proceedings of the International Institute of Space Law 2023. The Hague: Eleven International Publishing, 29.
- De Maria, Michelangelo and Orlando, Lucia and Pigliacelli, Filippo (2003). HSR-30, Italy in Space, 1946–1988. Noordvijk: ESA Publication Division, p. 16.
- Gerhard, Michael (2009). "Article VI", in: Hobe, Stephan and Schmidt-tedd, Bernard, and Schrogl, Kai Uwe (ed.). Cologne Commentary on Space Law – Volume 1. Cologne: Wolters Kluwer, 120.
- Hofmann, Mahulena (2024), "Registration of Space Objects", in: Sandeepa, Bhat (ed.). International Space Law in the New Space Era: Principles and Challenges. Oxford: Oxford University Press, 122.

- Kerrest, Armel (2023). "State responsibility and liability for space activities", in: Leclerc, Thomas (ed.). Space Law. London: ISTE – Wiley, 114.
- Lyall, Francis and Larsen, Paul (2025), Space Law: A Treatise – Third Edition. New York: Routledge, 85.
- Marboe, Irmgard (2025), 'Sub-orbital activities' – the application of 'international law' in the twilight between air and space law, in: Acta Astronautica, 2025, 234, 807.
- O'Donnell, Scarlett (2023), International Responsibility for Activities in Outer Space in the Modern Space Age: Article VI of the Outer Space Treaty in the context of international space law and public international law, [Doctoral Thesis (monograph)]. Lund University.
- Padovani, Vittoria (2022). "L'atto di alta amministrazione e l'atto politico", in: De Donno, Marzia, and Gardini, Gianluca, and Magri, Marco (ed.). Il diritto amministrativo nella giurisprudenza – II edizione, Roma: Maggioli Editore, 255.
- Palkovitz, Neta (2020). Regulating a revolution: small satellites and the law of outer space. Alphen aan den Rijn: Kluwer Law International, 67.
- Salmeri, Antonino (2021). "Collective Space Object as a New concept of International Space Law", in: Air and Space Law, 2021, 46(2), 203.
- Sandeepa, Bhat (2020), "Space Liability Insurance: Concerns and Way Forward". in: Athens Journal of Law, 2020, 6, 1, 40.
- Stubbe, Peter (2017), State accountability for space debris, Leiden: Brill – Nijhoff, 269.
- Von der Dunk, Frans (2020). "Scoping National Space Law: The True Meaning of 'National Activities in Outer Space' of Article VI of the Outer Space Treaty", in: Blount, P.J. and Masson-Zwaan, Tanja, and Moro-Aguilar, Rafael, and Schrogl, Kai-Uwe (ed.). Proceedings of the International Institute of Space Law 2019. The Hague: Eleven International Publishing, 227.

MISCELLANEOUS

- European Commission State of the Union 2023 - Letter of Intent by Ursula Von der Leyen to Roberta Metsola, dated 13 September 2023.
- International Institute of Space Law, "Report of the International Institute of Space Law on the results of its Working Group on Light Pollution of the Night Sky from a space law perspective", recorded in UN Doc. A/AC.105/C.2/2024/CRP.28 of 16 April 2024.
- Italian Council of State, Judgement n. 7097/2020.
- Italian Council of State, Judgment n. 129/2006.
- Italian Council of State, Judgment n. 3871/2017.
- OECD (2022), A new landscape for space applications, in: OECD Science, Technology and Industry Policy Papers, 2022, 137, 8.

- Italy's Parliamentary Dossier n. 388 of 29 October 2024, titled "*Disposizioni in materia di economia dello spazio*".
- President of the Council of Ministers, *Documento strategico di politica spaziale nazionale*, approved on 18 December 2019.
- President of the Council of Ministers, *Indirizzi del Governo in materia spaziale e aerospaziale*, adopted on 25 March 2019.
- President of the Council of Ministers, *Strategia nazionale di sicurezza per lo spazio*, adopted on 18 July 2019.
- UN Doc. A/AC.105/C.1/2025/CRP.22/Rev.2 of 11 February 2025, titled "Conference Room Paper on the Protection of Dark and Quiet Skies for science and society".
- UN Office for Outer Space Affairs (2023), *Registration of objects launched into outer space - Stakeholder study*, published as UN Doc. ST/SPACE/91 of November 2023.

ONLINE SOURCES

- Committee on the Peaceful Uses of Outer Space: Membership Evolution, available at the link: www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html (This and all the other links used in this paper were last accessed on 7 July 2025).
- European Union Aviation Safety Agency (2023), Proposal for a roadmap on higher airspace operation, available at the link: www.easa.europa.eu/en/newsroom-and-events/news/roadmap-higher-airspace-operations-hao-proposed-easa.
- Italy's signing of the Artemis Accords on 13 October 2020, as reported at the link: www.asi.it/2020/10/artemis-siglato-il-primo-accordo-multilaterale-di-cooperazioneinternazionale/.
- Johnson, Chris (2019), *The curious case of the transgressing tardigrades* (part 1), 2019, available at the link: www.thespacereview.com/article/3783/1.
- Law proposal c. 732/2022 available at the link: www.camera.it/leg19/126?leg=19&idDocumento=732.
- Legislative train schedule of the EU Space Law available at the link: www.europarl.europa.eu/legislative-train/theme-a-new-plan-for-europe-s-sustainable-prosperity-and-competitiveness/file-eu-space-law.
- Leonardo Foundation, "Space Economy, Space Industry, Space Law", available at the link: www.fondazioneleonardo.com/sites/default/files/downloads/2024-05/Presentazione_Space-Law_agg-ore-19.25-del-21-sett.pdf
- List of "ordini del giorno" for the Italian Government on the Law on Space Economy available at the link: www.senato.it/leggi-e-documenti/disegni-di-legge/scheda-ddl?tab=testiEmendamenti&did=58968.
- Official approval statement of the Italian Law on Space Economy, available at the link: www.mimit.gov.it/it/notizie-stampa/cdm-approvata-la-prima-legge-italiana-sullo-spazio.

- Pedrazzi, Marco (2008). *Outer Space, Liability for Damage*, available at the link: opil.ouplaw.com/display/10.1093/law:epil/9780199231690/law-9780199231690-e1203?rskey=M2wijt&result=78&prd=OPIL&print.
- Presidency of the Council of Ministers (2025), *Government guidelines on space and aerospace*, available at the link: www.governo.it/en/articolo/government-guidelines-space-and-aerospace-published/27493.
- Ramazzotti, Dalila (2024), "La natura degli atti di alta amministrazione", available at the link:
- rivista.camminodiritto.it/public/pdfarticoli/10186_2-2024.pdf
- Telespazio and the Moonlight space programme, available at the link: www.telespazio.com/en/business/space-programmes/moonlight.

GERMANY

Table of Contents

About the Author

Prof. Dr. Bernhard Schmidt-Tedd

Prof. Dr. Bernhard Schmidt-Tedd studied law in Cologne and Geneva and holds a doctorate of the University of Cologne. He worked from 1987-2020 for the German Aerospace Center (DLR). His last position was Head of the Department of UN-Affairs. He is a long-standing member of the German delegation at UNCOPUOS and Chair of the Working Group of Status and Application of the five UN treaties (2016-2022). He is Honorary Professor at the Leuphana University. With the Institute of Air and Space Law of the University of Cologne he realized the project Cologne Commentary on Space Law (CoCoSL). His specialization is space law and policy.

Ensener Weg 26,
D-50999 Köln, Germany
Handy: 0049-151-41651353
schmidt.tedd@gmail.com

Abstract

The question whether a national space legislation would be necessary for Germany was first discussed in 1986 by the Ministry for Research and Technology. The legal expertise came to a negative result, since at that time German space activities were practically in total executed either by the government itself or financed with public money. The question was brought up again in 1999, after some small satellite launches by private companies. Since then, there have been several attempts to initiate a legislative procedure. Despite being included in the work plans of various government coalitions, a general space law has not yet been passed. However, in 2024, the government published for the first time a key issues paper on the space act, which makes it possible to consider specific terms. It reflects condensed discussion results. Such a general space act would transform the obligation of Art. VI Outer Space Treaty (OST) to authorize and to supervise the space activities of 'non-governmental entities' into national law. Nevertheless, there are already some pieces of legislation, that form part of the concept of a national space act. Special mention should be made of the 'Act to give protection against the security risk to the Federal Republic of Germany by the dissemination of high-grade Earth remote sensing data' (SatDSiG). The background to the adoption of this law was the development of two radar satellites, TerraSAR-X (2007) and TanDEM-X (2010), producing high-grade Earth remote sensing data under a public private partnership (PPP). The article will demonstrate the ups and downs on the difficult path to a national space act and the findings reached on the key points of such a law. This not only addresses the substantive legal aspects, but also the organizational framework conditions for the implementation of such an act.

Keywords: German Space Policy, Key points for a German Space Law, Raumfahrtaufgabenübertragungsgesetz (RAÜG), Data Security Act (SatDSiG), Aircraft and space object register (Brunswick), German Space Agency (DLR), German Aerospace Industry Association (BDLI), Federal Office for Economic Affairs and Export Control (BAFA), Telecommunications Act (TKG), LTS-Guidelines and space legislation.

1. INTRODUCTION

Starting point for any consideration concerning a national space legislation should always be the implementation of Art. VI Outer Space Treaty (OST)[1], an obligation under public international law. The key phrases are:

"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."

Authorization and supervision in the legal sense means a 'burdensome' administrative act, which requires a justification by a legislative act. States might have different motivations to enact a national space law, but this international obligation must be at the center of the considerations.

The obligation to authorize and to supervise the space activities of 'non-governmental entities' is an atypical obligation under public international law. Normally, states are not responsible for the actions of their nationals abroad unless they are acting as organs or representatives of the state. It is a special feature of space law in that there are no private space activities that are detached from state responsibility. This special feature of space law goes back to a compromise in the history of the Outer Space Treaty. The main players at the time, the USSR and the USA, were in dispute as to whether they wanted to allow private space activities at all. In the end, a compromise was reached: private, non-governmental space activities were permitted, but only under state control (Hobe /Schmidt-Tedd /Schrogl (2009) pp. 105ff). The regular case of state responsibility is part of customary international law, as formulated by the International Law Commission (ILC) in the 'Draft Articles on Responsibility of States for Internationally Wrongful Acts' of 2001. The relevant norms are

1 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies of 1967 (Outer Space Treaty).

contained in Chapter II 'Conduct of organs of a State'. The special characteristics of state responsibility under space law are essential for understanding of the need for a national space act as such and for some of the necessary formulations in detail.

National space legislation and national space policy are two different subjects with some thematic points of contact. A number of countries first developed a national space policy and/or program and, in a second step, national space legislation. The overarching space policy and the resulting program planning can be viewed as an overall complex. Germany had its first space program in 1967.[2] The relation between a national space policy and a national space law is also outlined in an UN document (UN Doc. A/AC.105/C.2/117). The Legal Subcommittee (LSC) of the Committee on the Peaceful Uses of Outer Space (COPUOS) finalized in 2021 this document under the title 'Bringing the benefits of space to all countries: a guidance document on the legal framework for space activities'. This Guidance document comprises elements to assess the benefits, rights and obligations as party to the United Nations treaties on outer space, as well as elements of national space policy, strategy and regulatory frameworks. National space laws contain the necessary core elements resulting from Art. VI OST and country-specific elements at the discretion of each state. In addition, there are differences depending on whether a country adopts sector-specific individual regulations or a general regulation. When formulating a national space law, orientation can be given by the 2013 UN Resolution on 'recommendations on national legislation relevant to the peaceful exploration and use of outer space' (UNGA Resolution A/RES/68/74), as well as through comparative law considerations.

2 Mittelfristiges Programm der Bundesregierung zur Förderung der Weltraumforschung in der Bundesrepublik Deutschland in den Jahren 1967 bis 1971 (Medium-term program of the Federal Government for the promotion of space research in the Federal Republic of Germany in the years 1967 to 1971).

2. HISTORY OF THE LAW-MAKING PROCESS

2.1 German Space Policy And Program Planning

The first (West-) German space program was created in a political environment that had also an influence on the discussion about a national space law. The late 1950s and the 1960s were marked by a new beginning in scientific and technical space research and a process of organizational and institutional consolidation. The initiative to establish and to structure space research in the post-war years came from the scientific community (Reinke, 2004, pp. 48ff). In 1960, an advisory group of the German Research Foundation (DFG) developed the memorandum 'Space Research in the Federal Republic of Germany – Situation, Opportunities for Expansion, International Cooperation'. It was focused on scientific space research and driven by a concept of freedom of science. A participation in the development of launcher systems was ruled out. Observations on the industrial base were brief. An interministerial committee on space research was set up in 1961, which came to different conclusions (Reinke, 2004, pp. 61ff). European cooperation in close exchange with the USA was a clear priority, as well as the interest of industry and large-scale research. In 1962 the Cabinet agreed to participate in the European launcher development with a work package for the third stage. The leading responsibility of the 'high-tech' Federal Ministry of Atomic Energy for space matters was initially confirmed. In 1963, however, the responsibility was transferred to the new Federal Ministry of Scientific Research. The competence remained in the area of science, education and technology until 2002, [3] when it was shifted to the Federal Ministry of Economic Affairs. The latent conflict between science-oriented and industry/application-oriented persisted for quite some time.

3 1969-1994 Federal Ministry of Education and Science, 1972-1994 Federal Ministry of Research and Technology, 1994-1998 Federal Ministry of Education, Science, Research and Technology, 1998-2002 Federal Ministry of Education and Research.

On the institutional side, a 'Society for Space Research' Ltd. (GfW)[4] was founded in 1962 and became responsible for the operational implementation of space programs and projects, under the ministerial level. In the research landscape, the DFVLR[5] was founded in 1969 as a merger of a large number of predecessor institutions from the fields of aviation and (in development) space. After renaming, DFVLR became later the German Aerospace Center DLR. GfW was already in 1972 integrated into DFVLR. The question of an independent management organization for space matters came up again with the foundation of the German Space Agency[6] DARA in 1989. However, DARA was also reintegrated into DLR in 1997. The tension between the desire for an independent, flexible management structure and the requirements of public administration and budgetary law remained a constant in the institutional debate.

At the European level, the 1960s were characterized by the founding of European Space Research Organization (ESRO) and European Launcher Development Organization (ELDO), in which the Federal Republic of Germany participated. This also created facts for the financing of the programs. The sum of the factual developments and the distribution of space activities among various ministries ultimately led to the demand for a German Space Program. This first program was adopted in 1967 under the title 'Medium-term program of the Federal Government for the promotion of space research in the Federal Republic of Germany in the years 1967 to 1971'. It was the year of the conclusion of the Outer Space Treaty, which was ratified by the Federal Republic of Germany in 1969.

European and transatlantic integration of the German space programs intensified in the following two decades. On the transatlantic cooperation side, it was particularly the SPACELAB as a contribution to the Space Shuttle program, in which Germany participated extensively. In Europe it was the participation in the European Space Agency (ESA), the successor organization to ESRO and ELDO and the restructured Ariane Launcher program.

4 Gesellschaft für Weltraumforschung mbH (GfW).

5 Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt (German Research and Testing Institution for Aeronautics and Astronautics).

6 Deutsche Agentur für Raumfahrtangelegenheiten (DARA).

The space program of the German Democratic Republic (GDR) was determined by its cooperation with the Soviet Union. A national space program did not exist until the GDR came to an end (Zickler (2007) p. 467). The GDR was an active partner in the Interkosmos-cooperation, established in 1967. The main focus of space activities was on the construction of scientific instruments for space flights. The Academy's Institute for Cosmos Research (IKF) was institutionally responsible for coordinating the work and international cooperation. An outstanding event was the flight of Sigmund Jähn in the Soyuz spacecraft (26 August 1978 until 3 September 1978) as the first German in space. The activities of the IKF were incorporated into the DLR after reunification.

2.2 Considerations And Preparations For A National Space Law

In 1986 the need of a national space act for Germany was analyzed under a legal expertise of the Ministry for Research and Technology. This investigation was triggered by the Swedish Space Act of 1982 and the parliamentarian debate of the UK Outer Space Act, which was adopted in 1986.

The expert opinion denied the need for a German Space Act, as there were at that time practically no German space activities within the meaning of Art. VI OST without involvement of the government (Nagel (2002), p. 566). Most space activities were performed by the government itself or on its behalf and therefore not subject to Art. VI, 2nd sentence OST. The government and its agencies are directly bound by obligations under the treaty. The other space activities were undertaken by research organizations, which were formally 'non-governmental entities', not directly bound by the space treaties. But in the reality at this time they were dependent on governmental support, either by financial or logistics means. Therefore, the government had the possibility of indirect control over these activities.

This form of indirect control was also practiced by other European countries. Before enactment of the French Space Operations Act (FSOA) in 2008, France had developed a special approach to monitoring private-sector space activities (Schmidt-Tedd (2001), pp. 440ff). On the one hand, the development of a private space sector was supported, while on the other hand the state participated through the space agency CNES with public shares in the relevant space activities (Schmidt-Tedd/Arnold (2008), p. 1). This policy of 'Filiales and Participations, Subsidairies and Stockholdings' realized for a certain time an indirect control of the private space sector (CNES (ed.) 1999).

The situation changed with a growing number of non-governmental space activities and reduced launching costs, which enabled research organizations to launch small piggy-back payloads at affordable prices. There were also some cases of non-registration of space objects. The question about the necessity of a national space act for Germany was brought up again in 1999 by an initiative of the relevant Federal Ministry BMBF and experts from DLR. A small project group was set up, which this time came to the conclusion that a national space law is necessary to ensure the fulfillment of Germany's obligations under the space treaties (Nagel (2002), p. 567). However, the project group did not limit itself to this fundamental question, but also carried out comprehensive comparative law studies about the existing landscape of national space legislation. The result of these studies can be found in a dissertation, which comprises a model law in a bilingual version German/English (Gerhard (2002) pp. 202ff).

The project group developed a draft text, which was focused on the implementation of the obligations arising from Art. VI OST and the Registration Convention, as well as liability questions, such as a governmental right of recourse against a private operator and a mandatory risk insurance. It was the concept of an 'executing law' for the space treaties. Special subjects, such as frequency assignments or remote sensing data security were left aside. Already at this stage, some political background problems of the law became apparent. There were three areas of concern, namely (1) a good balance between commercial business development and a necessary regulatory framework, (2) a harmonized approach among the European countries and (3) the institutional side of implementing of such a law. DLR's expertise as the national space agency would be the natural basis for a licensing procedure, but could lead to conflicts of interest due to its own space activities (Nagel (2002), p. 568f). France also had a similar neutrality problem with the numerous CNES company participations when it moved from indirect control to a formal space law. The problem was solved by withdrawing from the previous share holdings. In Germany, the process did not go beyond an initial draft law text with explanatory memorandum, finalized in 2003. The inter-ministerial consensus building proved to be difficult. What remained from this first legislative approach was the long-term close exchange of experts with their European colleagues.

In the following years, Belgium (2005), the Netherlands (2008) and France (2008) passed their space laws. The German experts participated in hearings of the legislative procedure, e.g. in the Belgian hearings and 2003 at a colloquium organized within the premises of the National Assembly in Paris. In 2007 UNCOPUOS finalized a 'Resolution on Recommendations on Enhancing the Practice of States and International Intergovernmental Organizations in Registering Space Objects'. This initiative was necessary, following the deterioration in registration practices as a result of the privatization of International Telecommunication Satellite Organizations. In Germany, a specific legislation concerning sensitive high-grade Earth remote sensing data was being considered at that time. The satellite data security act (SatDSiG), prepared in a relative short time, was finalized in 2007. The question of the general space act came up again in 2009. The responsibility for space matters has meanwhile been transferred to the Ministry of Economic Affairs (BMWi). The German initiative of 2009 was not concluded.

During the next legislative period (2009-2013) the Federal Government adopted in 2010 a new space strategy under the title 'Making Germany's space sector fit for the future', which contained inter alia the following objective: "In order to give full weight to the space sector's increasing importance to Germany and to the competitiveness of its industry, the Federal Government is in the process of drawing up a national space law which, in conjunction with the legal framework established in the last parliamentary term on remote sensing data security in the Earth observation domain, will provide a comprehensive and dependable legal framework for private and commercial space activities." (p. 17). Foreign and security policy interests became of greater importance. As objective it was formulated: "Germany will make greater use of the potential for synergy between civil and military space research in the development of security-related technologies in the Earth observation and tele-communications sectors, for example." (p. 19). Under institutional aspects it was said: "Tasks in core areas of state activity are fundamentally different from the standard tasks of a research

establishment or research administration. We will review the current administrative structures within the German space sector to determine whether they meet these specific requirements and adapt them as necessary." (p. 19). This influenced also the further discussion on the space act. In 2009 the German Space Situational Awareness Centre (GSSAC) in Uedem was set-up, a military-civilian infrastructure of the German Air Force and the German Space Agency.

During this new process reference can also be made to extensive exchange with European partners. For example, the colleagues from CNES presented in May 2011 the Space Operations Act, its implementing decrees, technical regulations and the authorization process of space operations. On 15 December 2011, the Austrian Outer Space Act, the first German-language space law, came into force (Marboe (2012), pp. 26ff). Austria enacted its Space Act before the upcoming launches of the first two small Austrian satellites, thereby demonstrating its full compliance with the obligations under the space treaties. The drafting and negotiation process of the Austrian Act was accompanied by a broad participation of space law experts. The nano-satellites TUGSAT-1 and UniBRITE were launched from Indian territory by an Indian launch service provider in February 2013. In Germany, in the follow-up parliamentary term (2013-2017) the Ministry of Economic Affairs prepared in 2016 a draft under the title 'Space Security Act' (RaSiG)[7]. For the first time, interests from outside of the traditional space community were incorporated, especially those of the Ministry of Defense. The draft envisaged a new Federal Agency for Space Security. This approach, which would have resulted in additional administrative structures, was discussed critically.

The subject of space legislation was again on the agenda for the next legislative term 2017-2021. The coalition agreement of the government declared: "We will initiate a space law to create investment – and legal certainty for non-governmental space activities." (Koalitionsvertrag 2018, lines 2636-2638). The German Aerospace Industries Association BDLI welcomed the Federal Government's announcement in a white paper in November 2018. They were in favor of a law that is 'as simple and streamlined as possible' and serves the German space interests and the industry involved. A key points paper on the Space Act was circulated in 2019. The working title was now 'Act to strengthen non-governmental space activities'. In September 2023, under the 20. legislative term (2021-2025), a new 'German Federal Government's Space Strategy' was published, thirteen years after the last one. With regard to the Space Act, it is stated: "The Federal Government is aiming to enact a national Space Act (Weltraumgesetz) that would enhance sustainability in the space sector by establishing permit and monitoring requirements for space activities. Legal provisions should provide a reliable framework, and they should be conducive to innovation and competition among space companies. In preparing the Space Act, we will also consider the possibility of including security-relevant aspects."

7 Raumfahrtsicherheitsgesetz (RaSiG).

In a press release dated 4 September 2024, the German Federal Cabinet published a key points paper for a Space Act. It is not a draft law, but a relatively precise consolidated, inter-ministerial position on the key elements, which is set out in about 5 pages. On this basis, the Federal Ministry for Economic Affairs and Climate Action should draft a bill. The text of the key points paper allowed the industry association BDLI to issue its own statement back already in October 2024, after consulting its member companies.

2.3 Key Points Paper For A German Space Law

With the published key points paper, a status has been reached with which some of the key elements of the planned law can be discussed. The paper consists of a general section with background information and a special section with the main regulatory content of the envisaged law. The special section comprises six paragraphs with the following titles: (1) Scope of application, (2) Authorization requirement, (3) Recourse and coverage, (4) Supervision, (5) Registration and (6) Enforcement. The regulatory content of the paper, industry comments and fundamental considerations are included in the following analysis.

2.3.1 Basic Specifications

The paper now simply speaks again of a ‘space law’, without adding specific motivations to the title. The press release also clearly emphasizes the obligations under international law, namely authorization, supervision and registration. In addition, the principle of ‘due regard’ according to Art. IX OST is cited. In this respect, the paper clearly recognizes the international obligations as justification for the law. The subject of recourse against the operator is an additional key point related to the text of the Outer Space Treaties. As elements of national space policy the topics of (operational) safety, national security and defense interests are emphasized. The law is intended ‘to ensure traffic safety and thus the sustainability of German space activities’. Collision avoidance and space debris mitigation are explicitly mentioned. Despite the necessary requirements, the law should be designed in such a way that it contributes to ‘an innovative and competitive location for space companies’.

A special section is dedicated to the topic of a potential 'EU Space Law'. Content and progress of this initiative is still unclear, but according to the paper the intended law should be adapted to developments, if necessary. At this point, it must be made clear, that the basic obligations under Art. VI OST (authorization and supervision of the activities of non-governmental entities) are related to 'States Parties to the Treaty', and not subject to any delegation to international organizations. This follows out of Art. VI OST, 3rd sentence. International organizations remain always under the responsibility of its Member States. Therefore, an international organization cannot prescribe to its Member States how to apply Art. VI OST. This is not a limitation of Art. 189 (2) Treaty on the Functioning of the European Union, which excludes any harmonization of the laws and regulations of the Member States in those space matters (Schmidt-Tedd (2011) pp. 29f), but of international space law. However, it would be possible that Member States of the EU would coordinate technical standards of the licensing process in an open method of coordination.

2.3.2 Scope Of Application

In order to define the scope of application, it is crucial to reflect the special features of Art. VI OST. In this respect, the scope of application should not be limited to the national territory, but should also include a personal connecting factor, namely nationality of a natural person and registered office of a legal person. This combination of the two elements is contained in the key points paper. The scope of application is focused on space activities of non-governmental entities, in accordance with the telos of Art. VI OST. It does not make much sense if a governmental agency has to apply to receive a formal license from another governmental agency. The objective is, of course, that other governmental agencies also comply with the standards for space activities. But this is a question of interministerial coordination and not a relation vis-à-vis an external unity. The non-application to space activities of the Federal Government and the regional governments (Laender) is explicitly stated.

Excluded from the scope of application are as well space activities 'under the direction of international governmental organizations (ESA, EUMETSAT, EU and NATO) and in the framework of the space station cooperation ISS'. In these cases, authorization and supervision are indirectly ensured through participation in the supervisory bodies of the respective IGO. Without this regulation, overlapping with other approval procedures (positive conflict of competence) would occur regularly. Furthermore, the space act will provide for the possibility of waiving the license requirement, if an activity is licensed in another legal system. This will take account of other positive conflicts of competence.

2.3.3 Authorization Requirement

The general description of the authorization requirement is as follows:

> "The Space Act will provide for a reservation of authorization for (full or partial) space activities. It will define approval requirements and the approval procedure. The modification (in substance) and the (personal) transfer of a space activity should also require approval."

The approval requirements essentially refer to standard requirements of administrative law, as with other approval procedures. These include the reliability of the operator, safety requirements according to the state of the art in science and technology, including space debris mitigation and the exclusion of risks to national security. The provision for the scheduled termination of space activities and the financial coverage provision are defined somewhat more precisely. With regard to the specific definition of the technical requirements, including cyber security, reference is made to a legal ordinance to be issued by the Ministry. This also corresponds to a general standard that the legal burden must either be contained directly in the law or, within the framework of a constitutionally permissible delegation, in an ordinance based on the law. The formulation of such a regulation is certainly a process that takes some time, as can also be seen in comparison with European countries that have passed the law quickly. The relationship between law and regulation has a considerable impact on the possibility of adapting the legal requirements to the state of the art in technology and science and to new operational concepts.

There are three other aspects worth noting in this general section. A differentiation between complete and partial space activities is envisaged, without elaborating on this in detail. The transfer of a space activity to a third party will also require an authorization. At this point, the question arises as to whether the 'cross-border' transfer or acceptance of a space activity will be regulated as it is foreseen in the French regulation (Art. 2 and 3 FSOA). For state responsibility according to Art. VI OST, the link according to the criterion 'national activity in outer space' is essential. In case of a 'cross-border' transfer or acceptance of a space activity (by a non-governmental entity) the 'appropriate State Party' will become responsible, without necessarily having been launching state of the corresponding space object. Therefore such a transfer should require authorization.

Finally, the authorization under this Act should only relate to the area of 'space law' and not include any other statutory authorizations process. At this point, the industry notes that a link with other laws would be desirable. This concerns, for example, foreign trade, export control and satellite data security (SatDSiG). Existing laws should be examined for their relevance to space legislation.

A notable feature of the envisaged approval procedure is that a satellite constellation (a multitude of satellites for one operational function) will be regarded as a single space activity. The industry expressly welcomes this point. Simplification and standardization of the licensing procedure are certainly necessary in case of a satellite constellation. However, there is a clear difference between the function of the satellites (in series) on the one hand and the conditions of the launch (case by case) on the other. An uncritical type of satellite might have in some cases a critical launch service contract. A constellation of hundreds of satellites, identical in construction, are successively placed in orbit from eventually different launchers, launch sites and technical conditions. Perhaps it might be better to work with the approach of a type license/license a series.

Finally, the operation of a launch pad will also require an authorization and a corresponding environmental impact assessment. The wording 'operation of a launch site for space activities' does not, however, reflect the different legal points of contact between Articles VI to VIII of the OST. The launch site is directed to a 'launch activity', which will result in the factual determination of the 'launching states', launch event by launch event. The legal consequences for a 'launching state', i.e. liability under Art. VII OST and LIAB, are different from the consequences by conducting 'space activities', i.e. responsibility under Art. VI OST.

2.3.4 Recourse And Coverage

The space act will provide for a "no-fault right of recourse" against the non-governmental operator, if and to the extent that Germany is liable to other states under the space treaties. The recourse is secured by liability insurance or a bank guarantee. Claims for damages under civil law by the injured party against the non-governmental operator remain unaffected. If the operator has not acted either intentionally or with gross negligence and has carried out the space activity in accordance with the licensing requirements, then the recourse is limited. The limit is 10% of the average annual turnover, up to a maximum of € 50 million. The calculation of annual turnover is complex. In case of a satellite constellation the increased risk is taken into account in the sum to be insured or guaranteed. For a group company, the group turnover will be taken into account. One could have considered limiting the right of recourse to cases of fault-based liability (e.g. Art. III Liability Convention (LIAB)[8]) and to exclude the absolute liability under Art. II LIAB. The unlimited absolute liability 'on the surface of the Earth or to aircraft flight' is a special burden decided between State parties of an international agreement. Nevertheless Art. II LIAB also includes (a *fortiori*) the cases of fault-based liability. As a result, one would end up with a delimitation discussion of any degree of difficulty. In this respect, it seems pragmatic and appropriate to make corrections to the comprehensive "no-fault right of recourse" by means of a sum limit, compulsory insurance and other differentiations.

The industry generally welcomes the appropriate upper limits for recourse. However, the link to the group structure is criticized, which will lead to problems for smaller cooperating companies. On the contrary, cooperation between non-traditional space actors (start-ups), SMEs and large system integrators (LSI) should be supported. It is therefore proposed to delete the group link and to base the required coverage amounts on the respective mission risk.

Special regulations are being considered for universities and research organizations that operate as non-profit organizations by promoting science and research. They will be excluded from the recourse, if they did not act intentionally or through gross negligence.

8 Convention on the International Liability for Damage Caused by Space Objects (LIAB).

The same will apply if the operator is the Federal Government or a public administration (in a functional sense). The first point seems to be self-evident, the latter would apply to the Space Agency with delegated public functions.

2.3.5 Supervision

The 'supervision' section has a general paragraph about the possibilities of the relevant authority to issue orders to 'avert danger'. This corresponds to the practice of administrative procedural law and administrative enforcement law. Furthermore, a longer paragraph explains the possibilities by which the army (Bundeswehr) and possibly other security authorities are to be given the option of requesting priority services in the context of space activities. Compensation is planned. In legal terms, this is somewhat different from supervision and enforcing the license terms. Under systematic aspects, it belongs in a separate article. In its comments, industry has focused entirely on this point and is asking the fundamental question of whether this regulation is necessary and is not already included in general legal provisions. As an important anchor customer for the space industry, the state should not relativize its necessary needs through such regulations. Attention is also drawn to possible negative effects in international projects with foreign partners.

2.3.6 Registration

The paper only briefly refers here to compliance with the obligations under the Registration Convention. Details on the registration are not mentioned. Space objects are currently registered on the basis of an administrative agreement with the German Federal Aviation Office in Brunswick (Braunschweig), subordinated to the Federal Ministry for Transport (BMV). The entry is made in an annex to the aircraft register (Luftfahrzeugrolle). The content is not generally accessible to the public. It can be assumed that responsibility for the Space Object Registry will be transferred to the lead ministry once the Space Act has been passed. Under space law it is important to recall that the national registration is the legally constituent act for the allocation of 'jurisdiction and control' according to Art. VIII OST. The entry of the space object in the national registry is notified via diplomatic channel to the UN-Register, which fulfills the publicity function. A timely and efficient national registration is therefore important for the effect of the UN-Register. The non-consolidated national registration process has repeatedly led to delays in the past.

Registration of space objects is one of the very early obligations under space law, already contained in UNGA Resolution 1721 B (XVI) of 20 December 1961. Today, in the 'Guidelines for the Long-term Sustainability of outer space activities' (LTS-Guidelines 2019) specific aspects of registration are highlighted. LTS-Guideline A.5 emphasizes the importance of a proper registration of space objects as a key factor for safety and long-term sustainability of space activities. "Inadequate registration practices may have negative implications for ensuring the safety of space operations." States are called upon to adopt appropriate national regulations "to harmonize and sustain over the long term such registration practices on the widest possible international basis." Registration is not only an act of the registrar. In times of multi-cluster launches and large constellations the adequate preparation of a proper registration results in a complex management and coordination effort (Schmidt-Tedd (2024) pp. 335ff). Any other launching states must be determined, the registration obligations have to be coordinated and transferred in launch service agreements and/or cooperation agreements, reasonably before launch. This practical side of the registration process suggests that the responsibility should be with the acting Space Agency as the management organization with delegated public functions under the responsible ministry. This is for instance also the case in France (Titre III, Art. 12 FSOA). The BDLI paper has clearly addressed the above-mentioned context with sustainability.

2.3.7 Enforcement

The chapter on law enforcement addresses both, the institutional side and decision deadlines. Ministries other than the responsible ministry will have the opportunity to declare their interest in participating in the decision-making process within one week. In this case, they will have three weeks to justify their vote. With regard to the implementation-structure it is stated: "A public authority under the ministry BMWK will become responsible. In order to fulfill its tasks, the latter may involve the help of administrative assistants (e.g. the German Space Agency DLR)".

The institutional side of the decision-making process is a highly complex question and has already held up the enactment of a law in the past. Administrative acts in the context of 'authorization and supervision' are to be qualified under constitutional law as essential tasks of a public administration. In principle it is possible to delegate the execution of a public task, on a legally defined basis, to a private entity, such as an agency under private law. Nevertheless, the public side must have a core competence to supervise the private entity, to which the public task is delegated. This leads to the question if this core competence can be allocated in a division of the Ministry, or if an independent public authority is necessary. The logical follow-up question is whether parallel structures to the existing space agency are being established, with the resulting costs. This point was also immediately questioned in the statement of the industry association BDLI.

A few explanations are necessary to understand the status of the space organization DLR. Large-scale research organizations in Germany are generally organized in forms of private law, either as registered association (e.V.) or as limited liability company (GmbH). DLR acts as registered association (e.V.). The delegation of public functions to a private entity is a wide, comprehensive subject. The transfer of administrative functions to the private sector was politically supported at a time of privatization and deregulation. In course of the foundation of the legally independent space agency DARA in 1989, a limited liability company GmbH, founded by the federal government, the first law governing the transfer of administrative functions in the sector of outer space activities (RAÜG) was enacted.[9] After the integration of DARA in the structures of the German Aerospace Center, a research center under indirect governmental supervision, the act was adapted. Under sec. 1 the transfer of administrative functions is regulated as follows: "(1) The supreme federal authorities in charge of outer space activities confer to the German Aerospace Center (DLR) the authority to perform administrative functions in the sector of outer space activities in its own name and acting as an administrative authority under public law." Insofar DLR acts as a 'functional public administration'. The double character of DLR, on the one hand a relative independent research institution and on the other a national Space Agency under a contract relation with the Federal Government repeatedly

9 Raumfahrtaufgabenübertragungsgesetz (RAÜG) of 8 June 1990.

led to discussions and adjustments. At this point, a comparison with the structures of the French Space Agency CNES is also interesting (Schmidt-Tedd (2001) pp. 437ff). CNES was founded 1961 with a double-character as 'public-law institution with industrial-commercial character'(Loi no. 61-1382, Art. 1).[10] The integration of DARA in DLR and with this the establishment of the prescribed double-nature was justified with the following arguments: "By combining the experience and resources of former DLR (research institutes, operation of large-scale equipment, ground facilities) and DARA (space planning and management), ... will enable synergy gains and efficiency improvements to strengthen the German space industry. Leaner structures are to be created at the same time." (Entwurf eines Gesetzes zur Änderung des Raumfahrtaufgabenübertragungsgesetzes, p. 2).

Concerning the space legislation the double character of DLR has the following practical consequences. The German Space Agency at DLR is a separate unit in the structure of DLR. Personnel and finances are kept separate from DLR as research institution. The German Space Agency at DLR manages the federal space budget on behalf of the federal government. Insofar, DLR as research institution is a non-governmental entity in the meaning of Art. VI OST, while the German Space Agency at DLR is part of the governmental system. Self-financed space activities of the DLR research institution are non-governmental space activities.

2.3.8 Open Issues

At the contractual level of space activities, a number of international peculiarities have emerged that deviate from the usual standard under civil law. Especially the launch service agreement has particularities that differ from the usual transportation contract. Except for the real commercial sector of telecommunication services, a 'best effort clause' is quite common, according to which not success, but the best possible endeavor is owed (Schmidt-Tedd (1989) pp. 330-340). In science and international cooperation, a 'cross waiver of liability' is generally accepted. This is intended to avoid conflicts between the partners and make risks more predictable. Assuming a common interest in the success of

10 Etablissement public de caractère industriel et commercial (EPIC).

the project and the incorporation of mechanisms for continuous, joint project monitoring, the respective separate risk bearing (cross waiver of liability) appears comprehensible, given the particularities of space projects. However, this regulation may conflict with general provisions of civil law (consumer protection / limitations for general clauses and conditions). It would therefore make sense to legitimize this contractual practice of space agreements, as it has been done in the French Space Operations Act (Schmidt-Tedd/Arnold (2008) pp. 3f).

3. COMMENTARY ON THE EXISTING ELEMENTS OF NATIONAL SPACE LEGISLATION

3.1 Act To Give Protection Against The Security Risk To The Federal Republic Of Germany By The Dissemination Of High-Grade Earth Remote Sensing Data (SatDSiG)

3.1.1 Background And Policy Context

This specific aspect of remote sensing data security might be in other national space acts one point among several. Germany had special reasons to regulate this piece of legislation in a separate law (Schmidt-Tedd/Kroymann (2008) pp. 97ff). The background of this Act SatDSiG is the Public Private Partnership (PPP)-initiative for the realization of two high-grade radar-satellites, TerraSAR-X and Tandem-X. Radar satellites have been the priority for some time in Germany's space policy in the field of earth observation. In a time of tight budgets, the realization of the two satellite-projects was only possible in a burden-sharing between the public side and industry. It was further the intension to trigger a real Earth observation (EO)-data market, comparable to the telecommunication sector. At that time, the data distribution companies EOSAT (USA), Radarsat (Canada), Spot Image (France) and Eurimage (Italy) already existed, but with a limited commercial impact, due to the moderate resolution of the data. The commercial breakthrough came with the launch of the Ikonos satellite from Space Imaging (USA) in 1999, with a geometric resolution of 1 meter. Ikonos was operated on a full commercial basis. The resolution of the later TerraSAR-X was in the same range. Given the widespread free of charge distribution of regular EO data, the real market potential lies in high-resolution data. However, this also gives rise to security-related issues.

The cooperation agreement between DLR and Astrium GmbH about the realization of TerraSAR-X was concluded 25 March 2002. The PPP-concept is based on a shared investment of the public side (Federal space budget, DLR Space Agency and DLR R&D) and the private space industry (EADS-Astrium and the data distribution company Infoterra). Despite of the joint investment, the goals pursued by the partners are different: on the one hand scientific, on the other commercial. The rights on data distribution were divided in 'scientific' for the public investor and 'commercial' for the private partner. This applies worldwide. Each partner had a complete access to the data, but the distribution was limited by the respective data rights. The financial commitment of the industrial partner had to be refinanced through the subsequent sale of data. Data requests from the public sector, outside the scientific community and the corresponding co-financing ministry, are assigned to the commercial sector. It is in the logic of the commercialization approach that public customers should also plan regular budgets for those special, high-quality data, if required. The cooperation agreement about the complementary Tandem-X satellite was signed 30 August 2006. The parallel flight of the two satellites made it possible to produce a high-grade Digital Elevation Model (DEM) of the Earth. TerraSAR-X was launched 15 June 2007 and Tandem-X 21 June 2010.

The USA has had a formalized data security policy since 1992. The policy is based on a 'Memorandum of Understanding concerning the licensing of private Remote Sensing Satellite Systems' between Department of Commerce (DOC), Department of State (DOS), Department of Defense (DOD), Department of Interior (DOI) and the Intelligence Community of December 1999. Legal basis is the Land Remote Sensing Policy Act 1992 (USC 15 Chapter 82, Sec. 5601 et seq.) in conjunction with the Regulations on Licensing of Private Land Remote Sensing Space Systems (15 CFR Part 960 as of 31 July 2000). In the course of the Radarsat development, Canada has made a corresponding commitment in 2000 under a Government-to-Government agreement with the USA. The dispositions of the agreement were transformed into domestic law in 2005 by the 'Act governing the operation of remote sensing space systems' (Bill C-25 of 25 November 2005). This was already necessary due to a territorial link in the implementation of the project. France has in its space act FSOA a general clause (Title VII, Art. 24) with reference to administrative regulations. The competent authority should ensure that the activities of primary data operators of data generated in space "do not harm the interests of the nation, in particular the defense, foreign policy and international commitments of France". In view of the radar-projects, it was essential for Germany to find a satisfactory solution for data security, for reasons of self-interest and also to avoid problems with export licenses for critical US-components. This solution should be independent and transparent and support market development with predictable regulations. Individual administrative decisions and ad hoc interventions in the market in times of crisis do not appear to be the best approach. Preliminary investigations have also shown that the German Foreign Trade Act (AWG) and the export regulations are not applicable in the case of data security of remote sensing systems. In 2004/2005, the German government established for an interim phase a policy to safeguard national security and foreign policy interests. The draft-bill has been coordinated between the ministries since 2004 and presented to the industry association BDLI in 2006. The draft was finalized by the cabinet decision of 24 January 2007 and introduced in parliament in March 2007. The act came into force 1 December 2007. The related ordinance (SatDSiV) was issued 26 March 2008.

3.1.2 The Act And Its Regulations

The act is divided into seven parts, namely 1. Scope of application, 2. Operation of a high-grade earth remote sensing system, 3. Dissemination of data, 4. Priority compliance with requests from the Federal Republic of Germany, 5. Implementing regulations, 6. Fine provisions / penal provisions and 7. Transitional and final provisions. The first three parts contain the core of the regulation (Gerhard/Schmidt-Tedd (2008) pp. 411ff).

The act applies "1. to the operation of high-grade earth remote sensing systems a) by German nationals or by legal persons or associations of persons under German law, b) by foreign legal persons or foreign associations of persons with their head office within the territory of the Federal Republic of Germany, or c) if inalterable sequences of instructions to command the orbital system are transmitted from within the territory of the Federal Republic of Germany" and "2. to the handling of data generated by a high-grade earth remote sensing system as described in Number 1 until the moment of their dissemination a) by German nationals or by legal persons or associations of persons under German law, b) by foreign legal persons or foreign associations of persons with their head office within the territory of the Federal Republic of Germany, or c) where the data are disseminated from within the territory of the Federal Republic of Germany." The act further stipulates that a statutory ordinance determines the conditions under which data have particularly high information content. This shall be done by the criteria: 1. geometric resolution, 2. spectral coverage, 3. the number of spectral channels and the spectral resolution, 4. radiometric resolution and 5. the temporal resolution. The information content of microwave sensors or radar sensors shall also be determined according to 1. the polarization characteristics and 2. the phase history. The provisions of the ordinance will consider the possible effects of disseminating data with particularly high information content on the vital security interests of the Federal Republic of Germany, the peaceful co-existence of nations and the foreign relations of the Federal Republic of Germany. These provisions define the framework for the ordinance, which is in line with the legal principle of certainty.

The act is based on the principle that the data of the high-grade earth remote sensing system are transmitted in an encrypted, secure data transfer to the closed area of a database. From there, the decision is made as to whom the data will be disseminated. The act only considers the first dissemination of the data from the protected area to the public, not any subsequent redistribution. A requirement for approval for all further dissemination steps would prevent a realistic commercialization concept. Therefore, the security check is focused on the first dissemination. In line with this approach the act establishes a reservation of permission for the operation of a high-grade earth remote sensing systems (part 2) and the need of a dissemination license for data provider wishing to disseminate data (part 3) under the scope of application of this act (high-grade systems). The responsible authority under this statute is basically the Federal Office for Economic Affairs and Export Control (BAFA)[11] in Eschborn.

Commercialization requires quick and reliable purchasing decisions. Authorization procedures that cannot be timed would stand in the way of an effective market development. In order to balance the security requirements and the market needs the act has developed a very specific automated sensitivity check. The distribution company can use licensed software to carry out the sensitivity check in-house, immediately after receiving the

11 Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA).

data request. The sensitivity check is based on the criteria of the ordinance, enacted under the SatDSiG. With the necessary input, the program comes to a clear answer. The company does not make its own decision. An administrative review only takes place if the data request is sensitive. In all other cases the data can be disseminated / distributed immediately. In practice, it has been shown that the vast majority of data requests are non-sensitive.

The operator license depends on four different requirements. 1. The operator of the high-grade earth remote sensing system must possess the requisite degree of reliability. 2. The sequences of instructions for the command of the orbital or transport system, the control of the sensors, the control of transmission of data by the orbital or transport system to a ground segment of the operator and the control of the dissemination of data directly by the orbital or transport system are produced within Germany and protected against alteration by third parties. 3. The transmission of the data by the orbital or transport system to a ground segment of the operator has to be protected from becoming known to unauthorized third parties. 4. The operator has taken technical and organizational measures preventing unauthorized persons from gaining access to the command installations of the high-grade earth remote sensing system and to the installations for receiving, processing and storing the data and entry to the control rooms used for the same. The requirements are secured by obligations of documentation, notification and information. The responsible authority can prohibit the acquisition of an enterprise that operates a high-grade earth remote sensing system or the acquisition of a direct or indirect participating interest in such an enterprise by 1. foreign nationals or by legal persons or associations of persons under foreign law, or 2. legal persons or associations of persons under German law in which foreign nationals or legal persons or associations of persons under foreign law hold at least 25 per cent of the voting rights.

The dissemination license for data provider has similar requirements as for the system operator. The data provider must possess the requisite degree of reliability. He has to take technical and organizational measures preventing unauthorized persons from gaining access to the installations for receiving, processing or storing the data of a high-grade earth remote sensing system or entry to the control rooms used for the same. The transmission of the data between various locations of the ground segment of the data provider and the transmission of the data to a different data provider must be protected from becoming known to unauthorized third parties. The dissemination of the data generated by a high-grade earth remote sensing system has to be guaranteed to be secure according to the state of the art.

The core element of the act is the sensitivity check according to § 17 SatDSiG in conjunction with the ordinance SatDSiV. A data request is sensitive

> "if 1. the information content of the data obtained as a result of the sensor-operating mode used and form of processing used, 2. the target area represented by the data, 3. the time of generation of the data and the period of time between generation of the data and compliance with the request and 4. the ground segments to which the data are to be transmitted, when viewed as a whole, reveal the possibility of harm being caused to the vital security interests of the Federal Republic of Germany, to the peaceful co-existence of nations or to the foreign relations of the Federal Republic of Germany. The view as a whole according to Sentence 1 takes account of the personal characteristics of the requesting party and should take account of the persons who prospectively come into contact with the data as provided for in the request, including their usual places of residence. The data provider shall check the identity of the requesting party in suitable manner and require the names of the persons who prospectively come into contact with the data as provided for in the request, including their usual places of residence."

The considerations described here in principle are implemented in the ordinance in clear, sequentially organized yes/no questions, that leave no room for interpretation. It is worth mentioning that the general criteria are the only ones that consider "the persons who prospectively come into contact with the data", although the subsequent supply chain is not checked again. Un-sensitive data requests can be delivered directly.

If a data provider wishes to comply with a sensitive data request, he requires a permit. The decision is made by BAFA in an administrative procedure, according to the criteria "the dissemination of data in the individual case does not harm the vital security interests of the Federal Republic of Germany, does not disturb the peaceful co-existence of nations and does not substantially impair the foreign relations of the Federal Republic of Germany." There are three possible decisions: permit to deliver, permit under conditions or ban to deliver. The responsible authority should decide on the application for the permit within one month of its receipt at the latest. The ordinance SatDSiV has inter alia a list of critical sensed target areas and a negative list for ground stations. Sensitive is a delivery time of less than five days, a criterion that is easy to avoid. The text of the SatDSiV and the sensitivity test scheme are publicly accessible and can therefore be calculated transparently.

The SatDSiG regulates specific requirements for the operation of a high-grade earth remote sensing system. This is not a license in the meaning of Art. VI OST, concerning the space activity of a non-governmental entity. The launch of the satellite as such is a separate subject. Frequency registration according to ITU is also a separate topic. The law also does not affect the legal areas of data protection, data freedom and copyright (Gerhard/Kroymann/Schmidt-Tedd (2008) pp. 28f).

3.2 Frequencies

For the sake of completeness, it should be noted that the assignment of frequencies for satellite communications is the oldest regulated topic in the field of national space law. Rules for this already existed before the privatization (1994) of the federal post office. The former federal post was owner of three communication satellites, called DFS-Kopernikus 1-3, launched in the years 1989, 1990 and 1992. Today the subject is regulated by the 'Administrative regulations for the assignment of frequencies for satellite communications' (VV SatFu),[12] based on Section 91 (1) of the Telecommunications Act (TKG) of 23 June 2021 (Federal Law Gazette I, 2021, p. 1858),[13] as amended.

3.3 Air Space And Space Flight

There is a link to space activities in the German Aviation Act.[14] § 1 (2) of the Aviation Act as published on 10 May 2007 (Federal Law Gazette I, 2007, p. 698), as amended regulates that "Spacecraft, rockets and similar missiles are considered aircraft as long as they are in airspace". § 1 (1) contains the basic freedom to use airspace, restricted by the provisions of the Aviation Act and various other legal provisions. § 1 (2) contains the list of aircraft to which the law applies. 'Spacecraft, rockets and similar missiles' are treated in the same way as long as they are in airspace.

12 Verwaltungsvorschriften für die Zuteilungen von Frequenzen für Satellitenfunk (VVSatFu).

13 Telekommunikationsgesetz (TKG).

14 Luftverkehrsgesetz in der Fassung der Bekanntmachung vom 10. Mai 2007.

4. CURRENT CHALLENGES IN DEVELOPING A NATIONAL SPACE ACT

The basic obligation to implement national space legislation is based on Art. VI OST. However, this obligation no longer stands alone. In order to properly implement Art. VI OST, the national legislator will take note of the UN Resolutions and Guidelines that have since been developed and that are related to the national responsibility for non-governmental space actors of the relevant state. The most recent and specific guidelines in this regard are the LTS-Guidelines of 2019. In the preambular part they describe the background to the need for action today (see especially paras. 1.-3. and 7). The Guidelines were developed with a ‘holistic approach to promoting the long-term sustainability of outer space activities’. The background is described as follows: “The proliferation of space debris, the increasing complexity of space operations, the emergence of large constellations and the increased risks of collision and interference with the operation of space objects may affect the long-term sustainability of space activities.” Germany, as an active space-faring nation, is directly affected by these developments.

The main part with the guidelines is divided in four chapters, namely A) Policy and regulatory framework for space activities, B) Safety of space operations, C) International cooperation, capacity-building and awareness and D) Scientific and technical research and development. Under Guideline A.1 it is stated that “States should adopt, revise and amend, as necessary, national regulatory frameworks for outer space activities, taking into account their obligations under the United Nations treaties on outer space as States responsible for national activities in outer space and as launching State.” Furthermore, it is said that “States should consider the need to ensure and enhance the long-term sustainability of outer space activities.” This means that states are invited to continuously update their regulatory framework. New laws should, of course, be based on the current state of legal development. But the guidelines go even further. “States should consider not only existing space projects and activities but also, to the extent practicable, the potential development of their national space sector, and envisage appropriate, timely regulation in order to avoid legal lacunae.” With this, a pro-active legislation is demanded. Under point 4 the nexus to Art. VI OST is referenced and explained that, in addition to the traditional concerns of the licensing process (safety, liability, reliability and cost), long-term sustainability of outer space activities should also be considered.

Guideline A.3 is dedicated to the supervision of national space activities. Inter alia it is stated that "States should encourage each entity conducting space activities to: (a) Establish and maintain all the necessary technical competencies required to conduct the outer space activities in a safe and responsible manner and to enable the entity to comply with the relevant governmental and intergovernmental regulatory frameworks, requirements, policies and processes…". It is also interesting that the management structures of the responsible entity are discussed in more detail below. The commitment for promoting the long-term sustainability of the outer space activity should be allocated "at the highest levels". Guideline A.5 is as well very specific and operational, concerning the subject: 'Enhance the practice of registering space objects'. This guideline is aimed primarily at the state. Chapter B, with the guidelines for safety of space operation, in turn includes private, non-governmental actors in the considerations. In Guideline B.4 (Perform conjunction assessment during all orbital phases of controlled flight) the rule is explained as follows: "With due consideration to article VI of the 1967 Outer Space Treaty, States should encourage entities, including spacecraft operators and conjunction assessment service providers under their jurisdiction and/or control to perform conjunction assessments through national mechanisms, when applicable." If you take a proactive approach to the topic of space operation, you will also consider a Space Traffic Management (STM) Regime, not yet existing but evolving under the discussions in many fora.

Overall, this brief overview of the Guidelines shows the dynamic development that serves as relevant input for the national legislator. An essential point for the national legislator is the relationship between the long-term text of the space act and the more easily adaptable implementing regulations. Many of the concrete, operative regulations of 'authorization and supervision' will be part of the implementing regulations. It is therefore important to maintain the connection between the know-how of the technical and legal development of space operation and the actors involved in implementing the law.

5. FUTURE PERSPECTIVES

For the German legislator, it will now depend on whether, after years of preliminary discussions, it will be possible to implement the agreed key elements in a law and pass it. There is no lack of comparative models. The real challenge, however, lies in formulating the implementing provisions, ordinances and organizational-institutional implementation measures. In May 2025, Germany got a new government. A new Ministry of Research, Technology and Space was formed. The topic of space has thus gained greater visibility and importance. The coalition agreement between the governing parties for the 21st legislative period (2025 to 2029) includes a section on space program policy and strengthening the space industry (Koalitionsvertrag 2025, lines 222-234). There is no explicit statement on a space act. However, it can be assumed that the new government will continue to follow the key points paper of the previous government.

REFERENCES

UN-Treaties and UN-Documents

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (OST), done 27 January 1967, entry into force 10 October 1967, 610 UNTS 205 (Outer Space Treaty).

Convention on the International Liability for Damage Caused by Space Objects (LIAB), done 29 March 1972, entry into force 1 September 1972, 961 UNTS 187.

Convention on Registration of Objects Launched into Outer Space (REG), done 14 January 1975, entry into force 15 September 1976, 1023 UNTS 15.

International co-operation in the peaceful uses of outer space, UNGA Resolution 1721 B (XVI) of 20 December 1961.

International Law Commission, Draft Articles on Responsibility of States for Internationally Wrongful Acts, UN Doc. A/RES/56/83 (2001), distributed 28 January 2002.

Recommendations on Enhancing the Practice of States and International Intergovernmental Organizations in Registering Space Objects, UNGA Resolution 62/101, adopted 17 December 2007.

Recommendations on national legislation relevant to the peaceful exploration and use of outer space, UNGA Resolution A/RES/68/74, adopted 11 December 2013.

Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space of 2019, as contained in UN Doc. A/74/20, Annex II, Report of the Committee on the Peaceful Uses of Outer Space, 62nd session (12-21 June 2019), adopted by the Committee as UN Doc. A/AC.105/C.1/L.366.

Bringing the benefits of space to all countries: a guidance document on the legal framework for space activities, UN Doc. A/AC.105/C.2/117, distributed 26 January 2022.

Other Documents

Act governing the operation of remote sensing space systems, Bill C-25, 38th Parliament, 1st session, royal assent 25 November 2005, Statutes of Canada 2005, c. 45.

Act to give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote Sensing Data (Satellite Data Security Act — SatDSiG) of 23 November 2007, Unofficial Translation.

Aviation Act as published on 10 May 2007 (Federal Law Gazette I, 2007, p. 698).

Belgian Space Law, Act of 17 September 2005, revised by the Act of 1 December 2013.

Eckpunkte Weltraumgesetz, Auswertung des BDLI und seiner Mitgliedsunternehmen, BDLI (ed.) 10/2024, (https://www.bdli.de/sites/default/files/2024- 1/2024_BDLI%20Auswertung_Eckpunkte%20Weltraumgesetz.pdf), last access 1 April 2025.

Entwurf eines Gesetzes zur Änderung des Raumfahrtaufgabenübertragungsgesetzes, Bundesrat, BR-Drucksache 608/97, 15.08.97, p.2.

Etablissement public de caractère industriel et commercial (EPIC), Loi no. 61-1382 of 19 December 1961 instituant un Centre national d' études spatiales, Journal Officiel (JO) du 20 Dec. 1961, Art. 1.

French Space Operations Act (FSOA), adopted by French Senate on 22 May 2008, signed/dated 3 June 2008, Loi no. 2008-518.

Gesetz zum Schutz vor Gefährdung der Sicherheit der Bundesrepublik Deutschland durch das Verbreiten von hochwertigen Erdfernerkundungsdaten (Satellitendatensicherheitsgesetz — SatDSiG) vom 23. November 2007, (BGBl. I, 2007, Nr. 58), ausgegeben zu Bonn am 28. November 2007.

Key Points of the Federal Government for a German Space Act (WRG), Press Release 4 September 2024

(https://www.bmwk.de/Redaktion/EN/Downloads/E/eckpunkte-breg-weltraumgesetz_en.pdf?__blob=publicationFile&v=3), last access 1 April 2025.

Koalitionsvertrag zwischen CDU, CSU und SPD, 19. Legislaturperiode, 12 March 2018, lines 2636-2638 (space law).

Koalitionsvertrag zwischen CDU, CSU und SPD, 21. Legislaturperiode, 5 May 2025, lines 222-234 (space).

Luftverkehrsgesetz in der Fassung der Bekanntmachung vom 10. Mai 2007 (BGBl. I, 2007, S. 698).

Making Germany's space sector fit for the future, The space strategy of the German Federal Government, published by the Ministry of Economics and Technology (BMWi), Berlin November 2010, (English version).

Mittelfristiges Programm der Bundesregierung zur Förderung der Weltraumforschung in der Bundesrepublik Deutschland in den Jahren 1967 bis 1971 (Medium-term program of the Federal Government for the promotion of space research in the Federal Republic of Germany in the years 1967 to 1971), adopted 26 July 1967.

Pressemitteilung Luft- und Raumfahrt, 4.9.2024, Mehr Sicherheit und ein guter Wettbewerbsrahmen für die Raumfahrt, Bundeskabinett beschließt Eckpunkte für ein Weltraumgesetz, >Pressemitteilungen, 2024/09, (https://www.bmwk.de/Redaktion/DE/Pressemitteilungen/2024/09/20240904-bundeskabinett-beschliesst-eckpunkte-fuer-ein-weltraumgesetz.html), last access 1 April 2025.

Raumfahrtaufgabenübertragungsgesetz (RAÜG) of 8 June 1990 (BGBl. I, 1990, p. 1014).

Raumfahrtaufgabenübertragungsgesetz (RAÜG) as promulgated 22 August 1998 (BGBl. I, 1998, p. 2510), bilangual version German/English under UNOOSA documents: (https://www.unoosa.org/documents/pdf/spacelaw/national/Germany_RAUeG_EN.pdffunctional), last access 1 April 2025.

Telecommunications Act (TKG) of 23 June 2021 (Federal Law Gazette I, 2021, p. 1858).

Telekommunikationsgesetz (TKG) vom 23.6.2021, (BGBl. I, 2021, S. 1858).

The German Federal Government's Space Strategy, published by Federal Ministry for Economic Affairs and Climate Action, Berlin, September 2023,

(https://www.bmwk.de/Redaktion/EN/Publikationen/Technologie/the-german-federal-governments-space-strategy.pdf?__blob=publicationFile&v=1), last access 1 April 2025.

The Netherlands Rules Concerning Space Activities and the Establishment of a Registry of Space Objects (the Space Activities Act), Bill of 13 June 2006, in force since 1 January 2008.

Verordnung zum Satellitendatensicherheitsgesetz (Satellitendatensicherheitsverordnung – SatDSiV) vom 26. März 2008, (BGBl. I, 2008, Nr. 12), ausgegeben zu Bonn am 4. April 2008.

Verwaltungsvorschriften für die Zuteilungen von Frequenzen für Satellitenfunk (Administrative regulations for the assignment of frequencies for satellite communications), (VVSatFu), Bundesnetzagentur, Referat 223, Stand: 22.4.2024.

Monographs and articles

CNES (ed.), Filiales and Participations, Subsidairies and Stockholdings, Paris: CNES Document.

Gerhard, Michael (2002), Nationale Weltraumgesetzgebung, Völkerrechtliche Voraussetzungen und Handlungserfordernisse, Cologne: Carl Heymanns Verlag, (with a Summary in English).

Gerhard, Michael/Kroymann, Max/Schmidt-Tedd, Bernhard (2008), Ein Gesetz für die Raumfahrt: Das neue Satellitendatensicherheitsgesetz, ZLW 57. Jg., 1/2008 pp. 40-54.

Gerhard, Michael/Schmidt-Tedd, Bernhard (2008), Germany enacts Legislation on the Distribution of Remote Sensing Satellite Data, in: International Institute of Space Law IISL (ed.), Proceedings of the fiftieth colloquium on the law of outer space, American Institute of Aeronautics and Astronautics, Washington D.C., pp. 411-419.

Hobe, Stephan/Schmidt-Tedd, Bernhard/Schrogl, Kai-Uwe (eds.), (2009), Cologne Commentary on Space Law (CoCoSL), Volume I, Cologne: Carl Heymanns Verlag.

Kaiser, Karl/v. Welck, Stephan Frhr. (eds.), (1987), Weltraum und internationale Politik, München: Oldenbourgh Verlag.

Marboe, Irmgard (2012), The New Austrian Outer Space Act, in: ZLW, 61.Jg., 1/2012, pp. 26-61 (including the unofficial translation of the act and an explanatory report).

Nagel, Karl-Friedrich (2002), Current Plans for National Space Laws – Germany, in: Karl-Heinz Böckstiegel (ed.), 'Project 2001'- Legal Framework for the Commercial Use of Outer Space, Cologne: Carl Heymanns Verlag, pp. 565-569.

Reinke, Niklas (2004), Geschichte der deutschen Raumfahrtpolitik, Konzepte, Einflußfaktoren und Interdependenzen 1923-2002, München: Oldenbourgh Verlag.

Schmidt-Tedd, Bernhard (1989), Best efforts principle and terms of contract in space business, in: International Institute of Space Law IISL (ed.), Proceedings of the thirty-first colloquium on the law of outer space, American Institute of Aeronautics and Astronautics, Washington D.C., pp. 330-340.

Schmidt-Tedd, Bernhard (2001), Staatliches Engagement bei partiell marktfähigen Raumfahrtanwendungen, in: Benkö, Marietta/Kröll, Walter (ed.), Liber Amicorum Karl-Heinz Böckstiegel, Cologne: Carl Heymanns Verlag, pp. 424-461.

Schmidt-Tedd, Bernhard (2011), The Relationship between the EU and ESA within the Framework of European Space Policy and its Consequences for Space Industry Contracts, in: Lesley Jane Smith/Ingo Baumann (ed.), Contracting for Space, Surrey UK/Burlington USA, Ashgate, pp. 25-34.

Schmidt-Tedd, Bernhard (2024), Registration requirements for satellites and the reality of large constellations, in: Lesley Jane Smith/Ingo Baumann/ Susan-Gale Wintermuth (ed.), Routledge Handbook of Commercial Space Law, Abington/New York, Routledge pp. 331-342.

Schmidt-Tedd, Bernhard/Arnold, Isabelle, (2008), The Frensh Act relating to space activities, From international law idealism to national industrial pragmatism, in: ESPI Perspectives, August 2008, Issue No. 11, pp. 1-23.

Schmidt-Tedd, Bernhard/Kroymann, Max (2008), Current Status and Recent Developments in German Remote Sensing Law, Journal of Space Law (Vol. 34), pp. 97-140.

Trischler, Helmuth/Schrogl, Kai-Uwe (eds.), (2007), Ein Jahrhundert im Flug, Luft- und Raumfahrtforschung in Deutschland 1907-2007, Frankfurt/M.: Campus Verlag.

Zickler, Archim (2007), Weltraumforschung in der DDR, in: Trischler, Helmuth/Schrogl, Kai-Uwe (eds.), (2007), Ein Jahrhundert im Flug, Luft- und Raumfahrtforschung in Deutschland 1907-2007, Frankfurt/M.: Campus Verlag, pp. 460-478.