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# Introduction and Evaluation of Slovenian Space Activity, Policy, and Legislation Considering International Space Law

**ABSTRACT:** *The examination of the development of space activities on a global scale, identifies several trends. One of them is the transition from dualism to multilateralism – from the Cold War, when only the two world superpowers of the time were active in space, to a situation where several countries are joining the now already large circle of spacefaring nations. Recently, Slovenia has followed the trend, and has in the last three years successfully launched three satellites, drawn out its space policy, and adopted its first space legislation. As it was one of the first countries in the region to do so, it can serve as a learning tool for other states wishing to embark on the same journey, enabling them to take a critical perspective and optimise their efforts. This study briefly presents Slovenian space activity, policy, and legislation. This study focuses on the legislative part, which presents and examines the compliance with international law. Based on this, certain improvements can be made and other states can decide how to draw their own national legislation governing space activities.*

**KEYWORDS:** *space law, national legislation, liability, state responsibility, registration, space objects.*

## 1. Introduction

Only recently, Slovenia has joined the group of space active states, as it launched its first two satellites – Nemo HD and TRISAT – in 2020. Several developments of Slovenian engagement in space activities have occurred afterwards, including the strengthening of its relation with the European Space Agency (ESA) and the adoption of its first national legislation on the subject, in 2022 – the Space Activities Act adopted

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in March and a subsequent Decree on the Implementation of the Space Activities Act adopted half a year later.

This study aims to present an overview of all three aspects of Slovenian inclusion in the group of space active states, its space activity (Section 2), its space policy (Section 3) and its space legislation (Section 4). The study focuses on the legislative part, as here the national space legislation is both presented and explained, and to a certain extent evaluated considering international space law.

## 2. Slovenian space activity

Currently, the Slovenian space market is rapidly expanding. Its chief characteristic is diversification – a simultaneous engagement of different stakeholders – governmental bodies, public agencies and private actors. Oftentimes, the endeavours in space sector are conducted in cooperation between these stakeholders, covering various activities extending from collecting and processing satellite data to building and eventually procuring the launch of satellites into outer space. However, as the term ‘space activity’ in Slovenian legislation concerns merely activities related to space objects (see subsection 4.3.2.), this section predominantly focuses only on the three Slovenian satellites that have been launched into outer space, and not on other activities related to the use of outer space, such as satellite data processing.

The first two satellites named Nemo HD and TRISAT were launched in September 2020, on the Arianespace rocket Vega. At that time, Slovenia had not adopted national law governing space activities.

Nemo HD is the first Slovenian microsatellite. Its purpose is the observation of Earth, which is performed through a combination of interactive real-time video streaming and multispectral imaging. The satellite is operated by the Slovenian Centre of Excellence for Space Sciences and Technologies (SPACE-SI) and was developed in collaboration with the Space Flight Laboratory from University of Toronto Institute for Aerospace Studies.

TRISAT is a nanosatellite developed by the University of Maribor and partners aimed at remote sensing and Earth observation. The third Slovenian satellite, TRISAT-R, was launched two years later, in July 2022, by when Slovenia had already adopted its national space legislation.

TRISAT-R is again developed by the University of Maribor in cooperation with partners. Its goal is to provide valued ionizing radiation measurements from a Medium Earth orbit at an altitude of approximately 6000 km. Obtained data are planned to ensure information to characterise the space environment. Additional experiments on-board the TRISAT-R are aimed at demonstrating certain mitigation

techniques for protection of high-performance and high-density electronic components targeting the upcoming era of Artificial Intelligence in space exploration.

### 3. Slovenian space policy

Currently, Slovenia has not adopted an official space policy programme, however, in the beginning of 2023, it has made an important progress in that direction. In April 2023, the Ministry of the Economy, Tourism and Sport presented to the public a draft document titled Slovenian Space Strategy 2023-2030 and opened the floor for a public debate until 10 May 2023.<sup>1</sup> The draft Space Strategy outlines the future goals of Slovenian engagement in the space sector and sets out guiding principles, such as environmental sustainability, digital transformation, protection of space environment, economical sustainability and stimulation for the economic growth and investments, and international cooperation.<sup>2</sup> The feedback received during the phase of public debate of the Space Strategy may significantly change its content; thus, the precise scope of the document, and the chief principles included in it, remain uncertain.

As an official document outlining Slovenian space policy has not yet been finalised and adopted, therefore, space policy in a broader, general sense is presented here.

Slovenia does not have its own space agency, thus the decisions regarding its space policy are made by the governmental bodies, most often the Ministry of the Economy, Tourism, and Sport. Under its auspices operates a Slovenian Space Office (Slovenska vesoljska pisarna) which coordinates issues related to space technology with regard to Slovenia's membership of the European Union and the European Space Agency (ESA) and with other stakeholders in the national arena.

Slovenia concluded an Association Agreement in 2016 and became an associate member of the European Space Agency, which enables Slovenian companies and other institutions with the opportunity to participate in ESA's projects and space activities in the field of general support technology programmes, Earth observation, human and robotic exploration, and the scientific programme Prodex.<sup>3</sup>

Owing to the relatively small size of its market and economy, Slovenia for now, cannot afford to develop its space activity on a massive level. However, its space policy is strategically oriented towards niches in the space sector, such as developing nano- and picosatellites weighing from five to one hundred kilograms or advanced applications using breakthrough technologies such as artificial intelligence.

1 See Predlog Slovenske vesoljske strategije 2030, 2023.

2 Draft Slovenian Space Strategy, 2023, p. 8.

3 For more on Slovenian cooperation with ESA see: Cooperation with the European Space Agency, 2022.

One of the future goals of Slovenia in the field of space policy is to become a full member of the European Space Agency. In addition to strengthening the cooperation with ESA, Slovenia's ambition is to involve new companies in space activities and attract foreign investments in space sector.<sup>4</sup> This goal is clearly defined in the Draft Space Strategy.

## 4. Slovenian space legislation

This section presents the provisions of the newly adopted Space Activities Act (and, where appropriate, also the provisions of the Decree on the Implementation of the Space Activities Act) and evaluates them considering the applicable international law. The evaluation is conducted in two parts. First, identifying which international obligation binding upon the Republic of Slovenia a particular provision concretises or addresses. Second, examining where practicable and appropriate, whether this provision is compliant with the identified obligation and other potentially relevant obligations, by searching for any differences or inconsistencies and possible justifications for them.

Slovenia is a party to the four primary international space law treaties, Outer Space Treaty (hereinafter, OST),<sup>5</sup> Rescue Agreement (hereinafter, ARRA),<sup>6</sup> Liability Convention (hereinafter, LIAB),<sup>7</sup> and Registration Convention (hereinafter, REG);<sup>8</sup> therefore, the 2022 Space Activities Act is presented and evaluated primarily considering these treaties.<sup>9</sup> Slovenia is also a party to several other<sup>10</sup> international treaties concerning activities in outer space, however, as this study focuses on a

4 Catalogue of Slovenian Space Industry and Research Institutions, 2022.

5 *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, 610 UNTS 205 (entered into force on 10 October 1967).

6 *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space*, 19 December 1967, 672 UNTS 119 (entered into force on 3 December 1968).

7 *Convention on International Liability for Damage Caused by Space Objects*, 29 March 1972, 961 UNTS 187 (entered into force on 1 September 1972).

8 *Convention on Registration of Objects Launched into Outer Space*, 12 November 1974, 1023 UNTS 15 (entered into force on 15 September 1976).

9 However, Slovenia is not a party to the *Agreement governing the Activities of States on the Moon and Other Celestial Bodies*, 5 December 1979, 1363 UNTS 3 (entered into force on 11 July 1984).

10 These are, for example: *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*, 5 August 1963, 480 UNTS 43 (entered into force on 10 October 1963); *Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite*, 21 May 1974, 1144 UNTS 3 (entered into force on 25 August 1979); *Constitution and Convention of the International Telecommunication Union*, 22 December 1992, 1825/1826 UNTS (entered into force on 1 July 1994).

general overview of Slovenian legislation and a basic evaluation of its compliance with international law, these international treaties and other applicable<sup>11</sup> sources of international law such as customary international law, relevant general legal principles applicable in outer space, and relevant jurisprudence and soft law mechanisms are referred to only when absolutely necessary.

#### **4.1. Subject of the Act**

Article 1 of the Space Activities Act reads as follows:

*This Act lays down the conditions and procedure for issuing licences to conduct space activities and governs the registration of launched space objects, the obligations of the operator, liability for any damage caused by space objects and the supervision of the implementation of this Act.*

Five different aims of the Space Activities Act can be deduced from the above text. First, the Act aims at laying down the conditions and procedure for issuing licences to conduct space activities. This is a concretisation of an international obligation set out in Article VI of the OST, which stipulates that State Parties to the Treaty shall bear international responsibility for national activities in outer space, irrespective of whether such activities are conducted by governmental or non-governmental entities, and that the activities of non-governmental entities require authorisation and continuing supervision by the appropriate State Party to the Treaty. Although there exist two distinct views on the legal nature of Article VI of the OST, one claiming that it concerns secondary rules on state responsibility as it represents a stricter rule of attributability to those enshrined in the 2001 Articles on State Responsibility,<sup>12</sup> and another claiming that it is a primary rule establishing a clear obligation of State Parties to the Treaty, the aim of laying down the conditions and procedure for issuing licences is compatible with both interpretations, and therefore, in accordance with Article VI of the OST.<sup>13</sup>

11 According to the Article III of the OST, the activities in the exploration and use of outer space, including the moon and other celestial bodies, must be conducted in accordance with international law, including the Charter of the United Nations. Thus, the corpus of international law applies to all human activities in outer space by means of Article III of the OST. However, it remains disputed to what extent. For more on this see Ribbelink, 2009, p. 67.

12 ILC, 'Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries' (November 2001) Supplement No. 10 UN Doc A/56/10.

13 For example, the author supporting the first view is Hobe, as presented in Hobe and Pellander, 2012, pp. 7-8. The author supporting the second view is Marchisio, in Marchisio, 2018, p. 201. For more on the distinction between these two views, see Ramuš Cvetkovič, 2021, pp. 19-20.

Second, the Space Activities Act governs the registration of launched objects. This incorporates the obligation set out by Article II of the REG, that ‘when a space object is launched into earth orbit or beyond, the launching State must register that space object by means of an entry in an appropriate register which it shall maintain’. This register is also established with the Space Activities Act (See Article 14 below), although the establishment of the register is not listed in Article 1. Considering that the two satellites had been launched in 2020, the establishment of a register two years later may be considered too late. Although the REG does not contain a specific time frame in which the registration would be required, the phrase ‘when a space object is launched into earth orbit or beyond’ can be interpreted as, the registration is supposed to be conducted at the time of the launching of the space object at the latest. However, the interpretation of Article II in accordance with state practice is that the exact timing of recording of a space object in the national register is left to the discretion of each State.<sup>14</sup> States often establish registers several years after they have launched their first space objects into outer space, and the time gap between these two events can, in the most extreme cases, reach decades.<sup>15</sup> Thus, considering such state practice, Slovenia is not an exception.

Third, Article 1 of the Space Activities Act sets an aim of defining obligations of the operator of space activity. This is relevant considering the aforementioned Article VI, as according to this provision, Slovenia is responsible for all national activities in outer space. Thus, it is important that it regulates the obligations of operators of space activities, to minimise the potential breaches of international law that would trigger state responsibility.

Fourth, the aim of the Act is to regulate liability caused by space objects. Under international law, in particular, under Article VII of the OST and under the LIAB, the launching State is responsible for damage caused by space objects, even when the objects were operated by a private operator. Therefore, the Space Activities Act regulates the liability of the operator to Slovenia for the cases when Slovenia will be primarily liable to pay compensation under international law.

Finally, the aim of the Act is to establish supervision of the implementation of its own provisions, which ensures its practical effectiveness.

#### **4.2. Scope of application**

Article 2 of the Act sets out the scope of the application of this law:

<sup>14</sup> Jakhu, Jasani and McDowell, 2018, p. 408.

<sup>15</sup> Jakhu, Jasani and McDowell, 2018, p. 408.

*(1) This Act shall apply to space activities taking place in the territory of the Republic of Slovenia and to space objects entered in the Republic of Slovenia's register of objects launched into outer space (hereinafter: the register).*

*(2) This Act shall also apply to space activities taking place outside the territory of the Republic of Slovenia on a vessel or aircraft registered in the Republic of Slovenia and concerning space activities carried out by citizens of the Republic of Slovenia and legal persons established in the Republic of Slovenia.*

The Space Activities Act applies to four different categories of space activities: those occurring in the territory of Slovenia; those occurring outside its territory, but on a vessel or aircraft registered in Slovenia; those conducted by the citizens of Slovenia or legal persons established in Slovenia; and space objects registered in Slovenia's national register. Its scope of application is defined broadly, covering all activities with either territorial or personal link as well as all space objects in Slovenian register.

### **4.3. Meaning of terms**

Article 3 of the Act provides several definitions of the terms that are used throughout the entire document. The most relevant terms that can directly impact the international obligations of Slovenia are discussed below.

#### **4.3.1. Space object**

*[Space object] shall mean an object launched into outer space or an object intended to be launched into outer space, including the individual parts of this object that are either combined with or separated from the other components, or its launch vehicle and parts thereof.*

This definition of the term 'space object' is in part consistent with the definition of this term found in international space treaties, such as the identical Articles I(d) of the LIAB and of the REG, which states '[t]he term "space object" includes component parts of a space object as well as its launch vehicle and parts thereof'. However, the Slovenian definition contains another part, that a space object must be launched or at least intended to be launched into outer space. This addition does not create significant difference, as even the objects that are usually registered by states as space objects are launched or intended to be launched into outer space.

None of the definitions, neither the Slovenian national definition, nor the one from the LIAB and the REG contains any substantive criteria, for example, regarding the appearance or design of a space object or the type of material to be used or its complexity.<sup>16</sup>

#### 4.3.2. *Space activity*

*[Space activity] shall mean the launch of a space object into outer space, the operation and operational control of the space object in outer space, and the controlled termination of the space object's operation in outer space and/or its return to Earth, including the procedures for limiting the generation of space debris.*

The term 'space activity' can also be found in the international space treaties, in the REG (see, for example, Article VII), and to some extent also in the OST which speaks about 'activities in outer space' (see Articles V, VI, VIII...), however, it is not further defined there. Therefore, the term is open to interpretation in accordance with Articles 31 and 32 of the Vienna Convention on the Law of Treaties.<sup>17</sup> The Slovenian definition of space activity is strongly related to the term space object, as it covers merely the following activities: launch of a space object, the operation and operational control of the space object in outer space, the termination of its operation and/or its return to Earth, as well as the procedures for limiting the generation of space debris. However, it does not explicitly cover activities that are not directly linked to the operation and operational control of the space object, for example, spacewalk of the astronauts. This limitation related only to space objects is clear considering Article VII of the OST, which regulated liability for damages caused by space object, however, is too narrow considering Article VI of the OST, which establishes responsibility of State Parties for all national activities in outer space, without any limitation related to space objects.

Thus, the narrow definition may prove to be insufficient in the future, and in that case new laws will need to be adopted to follow the advancements of space technology and successfully address the legal challenges they will bring (e.g. the question of space resources).

<sup>16</sup> For more on the dilemma of the meaning of the term 'space object' see Sancin, Grünfeld and Ramuš Cvetkovič, 2021, pp. 58-60.

<sup>17</sup> *Vienna Convention on the Law of Treaties*, 23 May 1969, 1155 UNTS 331 (entered into force on 27 January 1980).



### 4.3.3. Space debris

*[Space debris] shall mean space objects that remain in outer space after the termination of the space activity or as a result of space activity or objects that return to Earth in an uncontrolled way.*

The term 'space debris' is not mentioned or defined in any of the international space treaties. However, there exist several technical definitions. Among those, the most known is the definition from the Space Debris Mitigation Guidelines (SDMG): 'space debris' are all man-made objects, including fragments and elements thereof, in Earth orbit or re-entering the atmosphere, that are non-functional.<sup>18</sup> The problem of the functionality criterium is that it can be interpreted broadly,<sup>19</sup> and therefore, enable States to claim that pieces were functional in a way (for example: their function was to serve as an important piece for statistical purposes), and therefore avoid the classification of such piece as space debris. From this viewpoint Slovenian definition is less problematic to interpret.

### 4.4. License and the conditions for its issuing

Paragraph 1 of Article 4 of the Act states that, '*Space activities shall be conducted on the basis of a licence issued by the ministry responsible for technology following an application by the operator*'. An operator wishing to conduct a space activity in Slovenia, meaning most of the time the launch of a space object, must apply for a license to the appropriate ministry responsible for technology. Article 5 of the Act further states the conditions for issuing such a license:

*The licence shall be issued if the following conditions are met:*

- a) the operator is professionally qualified and has the technical knowledge of space and similar technologies and the financial capacities to conduct space activities;*
- b) space activities are conducted in accordance with the international standards and guidelines of internationally recognised standardisation organisations on the safety and technology of space activities;*
- c) space activities do not pose a threat to national defence, public order, the safety of people or their property, national intelligence and security*

18 see Inter-Agency Space Debris Coordination Committee (IADC), Space Debris Mitigation Guidelines 2001, Revised 2007; approved by United Nations General Assembly (UNGA) Resolution 62/217.

19 See Sancin, Grünfeld and Ramuš Cvetkovič, 2021, p. 72.

*operations, and protection against natural or other disasters and do not negatively affect public health, the environment or aviation;*

*č) space activities are not in contravention of treaties or rules of international law that are binding on the Republic of Slovenia;*

*d) space activities envisage the use of available frequencies in accordance with the applicable legislation governing radio spectrum management, except in the case of launch vehicles;*

*e) space activities envisage measures for limiting the generation of space debris in accordance with the applicable UN Space Debris Mitigation Guidelines and for limiting adverse environmental effects on Earth or in outer space or adverse changes in the atmosphere.*

*(2) In the application the operator shall demonstrate the meeting of conditions referred to in points a), b), d) and e) of the preceding paragraph and provide a risk assessment of space activity threats referred to in point c) of the preceding paragraph drawn up on the basis of the latest expert opinions generally accepted by the scientific community.*

*(3) The Government of the Republic of Slovenia shall determine, by way of a decree, the education, technical, financial, safety and environmental criteria to establish the meeting of criteria referred to in paragraph one of this Article, the supporting documents to be enclosed with the application, and the manner of issuing the licence.*

As mentioned, Slovenia has already issued a Decree on the Implementation of the Space Activities Act, as demanded by Paragraph 3, therefore, the additional criteria from the Decree to those demanded by Article 5 of the Act is included in the following analysis.

It can be observed from the text of the first paragraph, that the Act places significant importance on respecting international standards. Point b) demands compliance with technical international standards, whereas Point č) demands compliance with international law (to the extent that is applicable to the Republic of Slovenia). Point e) demands compliance with SDMG and thus implements SDMG into Slovenian legal order. These provisions are without doubt important as the license should not be granted if operator fails to comply with international technical and legal standards, however, the problem may arise in the process of their concretisation. During that phase sufficient understanding and knowledge is extremely important on both sides, that is, the operator applying for a license and those deciding upon such application.

In this regard, the Decree (See Paragraphs 2, 4 and 6 of Article 3 of the Decree) further defines how such compliance shall be evaluated. For example, the compliance

with international technical standards is fulfilled if the operator submits evidence of compliance with international standards and guidelines of internationally recognised standardisation organisations on safety and technology in the field of space activities or certificates of these organisations for all parts used and for the entire space object as well (Point 1 of Paragraph 2), the entire space object was developed and made within the framework of projects at the European Space Agency, which were approved by the Slovenian delegation at this agency (Point 2 of Paragraph 2), or the opinion of the European Space Agency is provided that space activities are conducted in accordance with international standards and guidelines (Point 3 of Paragraph 2).

In addition to compliance with international standards, Article 5 provides for additional conditions for issuing a license.

Point a) of Paragraph 1 sets out the condition related to the operator, who must be professionally qualified and possess both the technical knowledge of space and similar technologies as well as the financial capacities to conduct space activities. Paragraph 4 of Article 3 of the Decree establishes further concretisation of these requirements. For example, an operator is professionally qualified as a natural person when having at least level VII<sup>20</sup> of education in natural science or technical fields; and as a legal entity when employing at least three persons with at least level VII of education in natural science or technical fields.

Furthermore, Point c) of Paragraph 1 states conditions for issuing a license with respect to the safety aspects, that is, space activities do not pose a threat to national defence, public order, the safety of people or their property, national intelligence and security operations, as well as protection against natural or other disasters. Moreover, they must not negatively affect public health, the environment or aviation. The Decree further concretises these threats (See Paragraph 3 of Article 3), stating, for example, that these threats are posed when the purpose of the space activity is the implementation of communication and navigation or the collection and exchange of data important for the defence or to the intelligence-security activity of the country and the resolution of the collected data will be higher than 30 cm/pixel; or when there is a risk of an accident owing to the fall of a space object or its part to the surface of the Earth, or the airspace of the Republic of Slovenia which is greater than 1:10.000; or when space activity uses frequencies that would constitute harmful interference to air traffic in the airspace of the Republic of Slovenia. However, it is not clear from the Decree, whether the list of these examples is an open or a closed one. Considering that space technology is currently being significantly transformed, as artificial intelligence is connected to or incorporated into increasingly more space objects,<sup>21</sup>

20 This means university level or specialisation in higher professional programmes. See Slovenian Qualifications Framework Act (Zakon o slovenskem ogrodju kvalifikacij), Official Gazette of the Republic of Slovenia, No. 104/15 and 100/22.

21 See for example, Chien and Morris, 2014, p. 4; Garanhel, 2022; Bandivadekar and Berquand, 2021.

and considering the consequent concerns raised regarding the resilience of space objects to cyber- or terrorist attacks,<sup>22</sup> it would be wise to include the assessment of such threats as well.

Paragraph 2 additionally requires the operator to provide a risk assessment of the threats described in Point c) of Paragraph 1 (See subsection 4.4. above). This provision is relevant from the scope of international space law, that is, Article VI of the OST, and from the point of customary international law obligation to conduct a comprehensive environmental impact assessment (see subsection 4.6. below).

#### **4.5. Insurance and liability**

Article 6 of the Act in its Paragraph 1 provides:

*Before the launch of a space object into outer space, the operator shall take out insurance to cover any damage caused by the space activity to persons or property in the minimum amount of EUR 60,000,000 per loss event for the duration of space activities.*

According to Article VII of the OST and the provisions of LIAB, launching States are liable to pay compensation for damages caused by the space objects. Some States decide for self-insuring of the space missions, whereas others demand operators to purchase the insurance.<sup>23</sup> According to the Article 6 of the Act, Slovenia falls into the second group.

Regarding the amount demanded for insurance, 60 million EUR, the comparative analysis<sup>24</sup> indicates that it is comparable to insurance fees in foreign legislations, as the same amount is, for example, requested in Austria and France. However, the United Kingdom, changed its legislation and removed the upper insurance amount as to allow more limits on the liability of the operator, with which more flexibility and international competitiveness are aimed to be achieved.<sup>25</sup>

Article 6 of the Act also provides two exceptions (Paragraphs 3 and 4) to the insurance rule:

*(3) The operator shall not be obliged to take out insurance if it follows from the application for the issuing of the licence that:*

22 Martin and Freeland, 2020, pp. 3,7; Zekos, 2022, p. 368; Puttré, 2022; Hobe, 2019, p. 101; Miller, 2019, p. 39; Stuart, 2015.

23 Johnson, 2020, p. 26.

24 See Bhat, 2020, pp. 40-41.

25 See Commercial spaceflight: launch liabilities and insurance, 2021.

*a) the space object does not have its own means of propulsion, has a mass of less than 150 kg, is not part of a constellation, is to be launched into an unoccupied low Earth orbit slot and is constructed from materials that ensure that the object will burn up when it re-enters the atmosphere or*  
*b) the space object does not have its own means of propulsion, has a mass of less than 150 kg, is to be launched into orbits above the low Earth orbit, and will remain in orbits that do not encroach upon the geostationary orbit or orbits with an altitude between 19,882 and 20,482 km.*

*(4) If it follows from the application for the issuing of the licence that:*

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

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

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

*the operator shall take out insurance to cover the damage caused by the space activity for the time covering the launch of the space object and for a period of one year following the launch of the space object.*

However, Article 6 of the Act speaks about insurance for damage caused by *space activity*, not a space object. This choice of words creates inconsistency with Article VII of the OST as well as the provisions of LIAB. As explained above in the subsection 4.3.2., Slovenian definition of space activity is indeed strongly related to space object, and at first glance it may appear that the two terms almost overlap. However, this inconsistency is relevant when determining causation. To invoke international liability, it must be demonstrated that the damage was caused by space object. Proving causation between damage and the physical object is different from proving causation between damage and a particular *activity* related to such a space object – that being the launch, operation or the termination of its functioning. From a physical object the causation is moved to the activity, usually conducted by human(s). This could potentially become problematic. Causation is already difficult to establish, and

several issues emerge at a factual level,<sup>26</sup> however, the situation could occur, where a space object would cause damage for which Slovenia would be liable under Article VII of the OST and the provisions of LIAB; however, the insurance of the operator would not cover such damage, as the analysis of causation would indicate that it was not caused by space activity. This could occur when a space activity as defined in the Act would already cease to exist, however, the space object would remain in outer space as space debris and cause damage afterwards. This inconsistency could be resolved either by expanding the definition of the term 'space activity' accordingly, or by unifying terms and using the term 'space object' in Article 6 of the Act as well.

An explanation of such inconsistency could be that the choice of the word 'activity' instead of 'object' was a reference to Article VI of the OST, which refers to national activities in outer space, therefore covering also the activities not related to space objects (such as spacewalk of the astronauts). However, the remaining text of the Act provides minimal support to such explanation, as the only time the Act foresees a payment from the operator is in the case of liability.<sup>27</sup>

Liability is regulated by Article 16 of the Act:

- (1) The operator shall be strictly liable for any damage caused by their space object on the surface of the Earth or to a vessel or aircraft in flight.*
- (2) The operator shall be liable on the basis of fault for any damage caused by the space object in space.*
- (3) If the Republic of Slovenia pays damages for the damage caused by the space object, it shall have the right to seek reimbursement of the damages paid from the operator.*
- (4) The right of the Republic of Slovenia to seek reimbursement of the damages referred to in the preceding paragraph shall be limited by the total sum insured as defined in paragraph one of Article 6 of this Act. This restriction shall not apply if the operator causes damage intentionally or due to gross negligence, if the damage is the consequence of non-compliance with the conditions for the issuing of the licence referred to in Article 5 of this Act, or if the operator's conduct is in contravention of this Act.*

Paragraphs 1 and 2 of Article 16 of the Act follow the structure established by the LIAB, that is, its Articles II and III. Paragraph 1 follows Article II of the LIAB, as it establishes strict absolute liability in cases where damage occurs on Earth or to a vessel

<sup>26</sup> Kerrest and Smith, 2009, pp. 140-142.

<sup>27</sup> Technically, the payment of the operator is also foreseen in case of misdemeanours (see subsection 3.10. below), however, because it is difficult to claim in this particular case that the purpose of the insurance would be the payment for the breach of the law, this option has not been considered in this regard.

or an aircraft in flight. Paragraph 2 follows Article III of the LIAB as it establishes fault liability for damage occurring in outer space. However, it is noteworthy that the formulation in the Act differs from that in the LIAB, as Paragraph 2 of Article 16 of the Act covers all damage in outer space, whereas Article III of the LIAB only covers damage 'caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object'. Considering the recoverable damage, Slovenian Act is broader than the LIAB, to the benefit of the Republic of Slovenia. Another issue on the expenses of the operator apart from the broadness of Paragraph 2 is that Article 16 does not provide for any exoneration from absolute liability, as provided in Article VI of the LIAB.

However, Paragraph 3 of Article 16 appears to be a safeguard to mitigate these issues, as it states that reimbursement of the damage is only sought from the operator in cases where Slovenia has to pay itself. It could be interpreted that in case when Slovenia is not liable for the damage under international law, it will not hold the operator liable under Article 16.

#### **4.6. Conducting assessment, obtaining opinions, and issuing a decision**

This section describes relevant provisions of the Act which govern the process of evaluating the license application, conducted by the ministry responsible for technology, followed by a minister responsible for technology issuing a decision on the application.

Article 7 of the Act dictates: *'Based on the operator's application, the ministry shall prepare an assessment of the potential impact of space activities on aviation in the airspace of the Republic of Slovenia [...]'*

Therefore, the ministry must prepare an impact assessment related to aviation and airspace of Slovenia. This provision could be broader, to cover environmental impacts as well. The International Court of Justice has expressly confirmed the existence of the obligation of states to conduct environmental impact assessment in the *Pulp Mills* judgement from 2010, where the court elaborated also on the content of such assessment and concluded that as international law does not provide for the exact scope and content of the assessment, these two categories have to be determined in the national legislation or in the authorisation process of the project – with regard to the nature and magnitude of the proposed activity and its likely adverse impact on the environment.<sup>28</sup> Thus, the Act could confer upon the ministry also the obligation to conduct an assessment of risks posed to the environment, not only to the aviation and Slovenian airspace.

<sup>28</sup> *Pulp Mills on the River Uruguay* (Argentina v. Uruguay), 2010, I.C.J. Rep.14, para. 205.

It could be argued that there is no need for the ministry to conduct an environmental impact assessment, as such obligation is already conferred upon an operator in Paragraph 2 of Article 5 of the Act. However, it is essentially different whether a ministry or an operator conducts such an assessment. The operator will be inherently aiming towards the final goal of obtaining a license to conduct space activities, whereas the ministry should, *inter alia*, be aiming towards ensuring that Slovenia fully respects its international obligations. Therefore, the obligation of the operator cannot absolve a state organ from the obligation to assess environmental risks, however, it may serve as an informative tool in doing so.

To some extent, this issue is resolved by Article 8 of the Act, which states:

*(1) On the basis of the risk assessment referred to in paragraph two of Article 5 of this Act, the ministry shall, except in cases referred to in paragraphs three and four of Article 6 of this Act, request the opinion on the meeting of the conditions referred to in point c) of paragraph one of Article 5 from the following competent authorities:*

- a) the ministry responsible for defence regarding the condition that the space activity does not pose a threat to national defence or to protection against natural and other disasters;*
- b) the ministry responsible for internal affairs regarding the condition that the space activity does not pose a threat to public order or to the safety of people and their property;*
- c) the Slovene Intelligence and Security Agency regarding the condition that the space activity does not pose a threat to intelligence and security operations outside the area of defence;*
- č) the ministry responsible for health regarding the condition that the space activity does not negatively affect public health;*
- d) the ministry responsible for the environment regarding the condition that the space activity does not negatively affect the environment.*

According to Article 8, the ministry responsible for technology must request several opinions from competent bodies listed, including an opinion of ministry responsible for the environment that the space activity does not negatively affect the environment. Such an opinion is based on risk assessment provided by the operator, as prescribed by Paragraph 2 of Article 5 of the Act. This means that the opinion regarding environmental impacts could, to some extent, be considered as the fulfilment of an obligation to conduct an environmental impact assessment. However, there is an exception to the issuing of such opinion, such as for the objects described in the Paragraphs 3 and 4 of Article 6 of the Act – for example, objects that do not have their own means of propulsion, have mass of less than 150 kg, and are not part of a



constellation. The problem is that it cannot be excluded that even such objects can cause environmental damage.

Article 10 of the Act further establishes a commission, appointed by the minister responsible for technology, to examine the license application. The commission must be independent from the interests of the operator. At the end of the examination process, commission issues an opinion regarding the compliance with the requirements and sends it to the minister.

According to Article 11 of the Act, the final decision on the license application is issued by the minister responsible for technology.

After already being issued, the license may be revoked in cases prescribed by Article 12 of the Act.

#### **4.7. Transferring the operation of a space object**

Article 13 of the Act regulates the transferring of the operation of a space object to another operator:

*(1) The operation of the space object for which the licence referred to in Article 4 of this Act was issued shall be transferred to another operator that is a citizen of the Republic of Slovenia or a legal person established in the Republic of Slovenia only with the ministry's permission if the new operator meets the conditions referred to in points a) and c) of paragraph one of Article 5 of this Act and if the operator to which the operation of the space object is to be transferred has insurance pursuant to Article 6 of this Act.*

*(2) If the operation of the space object is transferred to an operator that is a citizen of another state or a legal person established in another state, the ministry shall grant permission provided that the Republic of Slovenia has signed with that State an international agreement regarding the regulation of liability for damage.*

*(3) The operation of the space object shall be transferred from the operator that is a citizen of another state or a legal person established in another state to another operator that is a citizen of the Republic of Slovenia or a legal person established in the Republic of Slovenia only with the ministry's permission if the conditions referred to in Article 5 of this Act are met and if the operator to which the operation of the space object is to be transferred has insurance pursuant to Article 6 of this Act.*

As it can be observed from the text, the Article distinguishes between transferring of the operation to an operator who is a citizen of the Republic of Slovenia or a legal

person established in the Republic of Slovenia and all other operators, citizens of another state or legal persons established in another state. In both situations, the permission of the ministry is required. In the second situation, additional requirement is prescribed that the Republic of Slovenia has signed with that State an international agreement regarding the regulation of liability for damage. This is important with respect to the Article VII of the OST and the provisions of the LIAB. Such an agreement aims to regulate the issue in international space law that when transferring jurisdiction and control over a space object, there is no automatic transfer of liability.<sup>29</sup>

Although this Article mentions transferring the *operation*, not the ownership over a space object, and therefore does not directly address the phenomena called on-orbit transfers, it is relevant in that context as well, as transferring of the operation of a space object is mostly conducted on the basis of transferring of the ownership.

#### **4.8. Register**

Article 14 of the Act establishes Slovenian national register of space objects:

*(1) The ministry shall establish and maintain a register for the purpose of collecting data on space objects launched into outer space, communicating this data to the United Nations Register of Objects Launched into Outer Space and conducting supervision of space activities.*

*(2) The register shall be public and shall be kept as an electronic database of data on launched space objects.*

*(3) The Republic of Slovenia shall be considered the state of registration if the space object is entered in its register. [...]*

With this Article, Slovenia established a national register and fulfilled its obligation under Article II of the REG. As stated in Paragraph 3 of Article 14, Slovenia is thus considered a state of registration of all space objects entered into its register. This is relevant in relation to Article VIII of the OST, which claims that 'A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body'. Jurisdiction in the sense of that rule means the ability to legislate and enforce the laws and rules in relation to space objects or persons onboard, whereas control means the exclusive right and the possibility

<sup>29</sup> See von der Dunk, 2017, pp. 33-36; Dasgupta, 2016, pp. 5-6. See also Grünfeld, 2021.

to supervise the activities of space object and personnel thereof.<sup>30</sup> However, these are limited by the obligation to conduct activities in outer space in accordance with international law, as provided by Article III of the OST.

#### **4.9. Obligations of the operator**

A chapter of the Act is titled 'Obligations of the operator' regarding the obligations after the issuing of the license. These obligations are regulated in Article 17 of the Act:

*(1) The operator shall notify the ministry in writing within eight days of any event or fact that could affect the validity of the issued licence or of any change with regard to the meeting of conditions under which the licence was issued.*

*(2) The operator shall promptly notify the ministry in writing or orally of any accident or emergency that poses a risk to the safety of people, the environment, or the maintenance of public order and national security and carry out appropriate measures to prevent or minimise the consequences of such accident or emergency and notify the ministry of such measures in writing.*

*(3) The operator shall notify the ministry in writing within eight days of any circumstances that prevent the operation or operative control of the space object and of any change or termination of its space activity.*

Article 17 mostly regulates the obligation to notify, and that such an obligation concerns three distinct types of information that must be notified. Two of the categories, described in Paragraphs 1 and 3, must be notified within eight days of the occurrence of the event that would either affect the validity of the license issued or the conditions for issuing a license or could affect the operation or control over the space object or change the termination of its activity. These two categories appear to concern less dangerous situation. However, Paragraph 2 demands prompt notification about any accident or emergency that would pose a risk to the safety of people, the environment, or the maintenance of public order and national security. In the same paragraph, Article 17 sets out another obligation of the operator, which is to conduct appropriate measures to prevent or minimise the consequences of such accident or emergency (and notify about the measures adopted).

30 Schmidt-Tedd and Mick, 2009, p. 157.

#### **4.10. Offences and fines**

Finally, Article 18 of the Act regulates the offences and prescribes the fines accordingly:

*(1) A legal person shall be fined from EUR 2,500 to EUR 250,000 and a legal person deemed to be a medium-sized or large company under the act governing companies shall be fined from EUR 5,000 to EUR 500,000 for the following offences:*

*a) if they conduct space activities without a licence (paragraph one of Article 4);*

*b) if their application intentionally contained false or incomplete information that was the basis for the issuing of the licence referred to in Article 5 of this Act;*

*c) if they fail to submit proof of insurance for any damage caused by the space activity pursuant to Article 6 of this Act before the launch of the space object into outer space (paragraph two of Article 6);*

*č) if they fail to implement measures set out in the decision to revoke the licence (paragraph two of Article 12);*

*d) if they transfer the operation of the space object in contravention of Article 13 of this Act;*

*e) if they fail to send the data for entry in the register within the time limit referred to in paragraph five of Article 14 of this Act;*

*f) if they fail to notify the ministry within eight days of any changes or amendments to the data referred to in paragraph six of Article 14 of this Act (paragraph seven of Article 14);*

*g) if they fail to notify the ministry within eight days in writing of any event or fact that could affect the validity of the issued licence or of any change with regard to the meeting of conditions under which the licence was issued (paragraph one of Article 15);*

*h) if they fail to promptly notify the ministry in writing or orally of any accident or emergency that poses a risk to the safety of people, the environment, or the maintenance of public order and national security and fail to carry out appropriate measures to prevent or minimise the consequences of such accident or emergency (paragraph two of Article 15);*

*i) if they fail to notify the ministry within eight days in writing of any circumstances that prevent the operation or operative control of the space object or of any change or termination of its space activity (paragraph three of Article 15);*

*j) if they fail to provide the ministry with access to their business premises and facilities or fail to allow them to inspect their business documentation or fail to provide the required information (paragraph two of Article 17).*

*(2) A fine of EUR 1,500 to EUR 150,000 shall be imposed on a sole trader or self-employed person who commits an offence referred to in the preceding paragraph.*

*(3) A fine of EUR 200 to 10,000 shall be imposed on the responsible person of a legal person or the responsible person of a sole trader or self-employed person who commits an offence referred to in paragraph one of this Article.*

*(4) A fine of EUR 100 to EUR 5,000 shall be imposed on an individual who commits an offence referred to paragraph one of this Article.*

The offences concern violations of the provisions of the Act. The fines are limited by minimum and maximum amount, varying in regard to the subject receiving the fine. The maximum amount is prescribed in accordance with Slovenian legislation regulating misdemeanours, however, it can be considered as disproportionately low when compared with the insurance required and the potential costs Slovenia will bear in case of liability for damage caused by space objects.<sup>31</sup>

## 5. Conclusion and way forward

The recent years mark the beginning of the development of Slovenian space activity, however, the ambitious space policy does not imply its entirety or end. The newly adopted Space Activities Act further provides for its continuation.

The Act contains the primary provisions aimed at fulfilling Slovenian international obligations under international space law, including the establishment of a national register of space objects in accordance with Article II of the REG and the regulation of authorisation licensing proceedings in accordance with Article VI of the OST. In general, it offers a solid basis for continuation of Slovenian space activities.

However, Space Activities Act could be improved in a manner that would ensure more consistency, as it can be observed from several subsections of Section 3 of this paper. Moreover, as technology advances, new legal challenges approach. This has already been demonstrated by the challenges brought forward by the use of artificial

31 Sancin, Grünfeld and Ramuš Cvetkovič, 2021, p. 75.

intelligence in space activities.<sup>32</sup> As Slovenia plans to engage in developing artificial intelligence for such purposes, legal regulation will have to be changed accordingly. Either the provisions related to the effects of artificial intelligence on the liability, data in the register of space objects, and other core matters will have to be amended, or a new law governing the use of artificial intelligence will have to be adopted. In that case the legislator will have to consider the existing Space Activities Act and examine all potential effects of artificial intelligence on its provisions to ensure that the legislation is effective and not contradictory.

Furthermore, as it became clear that sustainability of the use and exploration of outer space is crucial to fulfil the primary principles of space law, set out in the OST, and to ensure that future generations have access to outer space, national legislation must ensure sustainability. Slovenian space policy and legislation recognise the importance of sustainability, as sustainable environment is, for example, mentioned as one of the aims in the draft space strategy, and the Space Activities Act makes reference to SDMG and certain mechanisms for environmental protection, such as impact assessment. However, a greater highlight could be made in that regard. It is expected that the future development of Slovenian space policy and legislation will adopt more steps in that direction and provide some good practices and examples, compliant with the international guidelines, such as United Nations Office for Outer Space Affairs (UNOOSA) Guidelines for the Long-term Sustainability of Outer Space Activities,<sup>33</sup> that will be able to translate to other states or on the international level.

<sup>32</sup> See, for example, Abashidze, Ilyashevich, and Latypova, 2022; Bratu, 2021; Bratu, Lodder and van der Linden, 2021.

<sup>33</sup> Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space 2019, approved by United Nations General Assembly (UNGA) Resolution 74/20.

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