

New Space Activities and Legislation

A General Overview with a Specific Reference to the Ongoing Debate in Italy

*Marina Gagliardi, Nicoletta Bini, Cristina Marabottin and Gianfranco Gabriele Nucera**

1. Introduction

The activities of private actors in the exploration and use of outer space and the emerging projects have been growing significantly in the last years, attracting a lot of attention. The increasing global commercialization of space activities and the rapidly evolving situation are in effect rising new issues and legal challenges, both at national and international level.

From a regulatory point of view, fervent debates and lively discussions proliferate at international level on these topics, while several States have already enacted or are in the process of developing national space legislation in order to cope with and regulate private and commercial space activities.

In view of the above, the present paper will introduce the concept of international responsibility of States for non-governmental space activities provided for in Art. VI of the Outer Space Treaty (paragraph 2), in order to offer an overview on the main principles of space law relevant to non-governmental activities, with a focus on new space ventures and the main legal issues arising from them (paragraph 3). Furthermore, the Italian legislative framework in the space field and a brief description of space activities carried out by universities and private actors will be presented. Finally, the current debate and the initiatives put in place in Italy to study and analyse the emerging needs will be shortly described (paragraph 4).

* Marina Gagliardi, Legal Affairs Unit, Italian Space Agency, Rome, Italy. Nicoletta Bini, Legal Affairs Unit, Italian Space Agency, Rome, Italy. Cristina Marabottini, Legal Affairs Unit, Italian Space Agency, Rome, Italy. Gianfranco Gabriele Nucera, Department of Political Sciences, Sapienza University of Rome.

2. The International Responsibility of State for Non-Governmental Space Activities: Art. VI of the OST

2.1 General Overview

Article VI of the “Outer Space Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies” (OST) is a key provision in the broader context of international space law, which established the general principle of State responsibility for outer space activities.¹

According to Art. VI of the OST,

“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”. To this end, “the activities of non-governmental entities in outer space [...] shall require authorization and continuing supervision by the appropriate State Party to the Treaty”.

Pursuant to this provision, non-governmental space activities are allowed subject to prior authorization by the appropriate State.² In fact, negotiating States agreed on the participation of both public and private subjects in space activities, provided that the relevant States assumed responsibility not only for their own space activities, but also for the activities of natural and legal persons of their nationality.³ Therefore, other actors (natural and legal persons of private law, as well as universities and research organisations⁴) have been able to conduct space activities side by side with States and international intergovernmental organisations. For the above reasons, Article VI is often

1 M. Gerhard, *Article VI of the Outer Space Treaty*, in S. Hobe, B.Schmidt-Tedd, K.U. Schrogl (eds.), *Cologne Commentary on Space Law, Vol. I, The Outer Space Treaty*, Carl Heymanns Verlag, Cologne, 2009, pp. 103-125.

2 F. von der Dunk, *The Origins of Authorization: Article VI of the Outer Space Treaty and International Law*, in F. von der Dunk (ed.), *National Space Legislation in Europe*, Martinus Nijhoff Publishers, The Hague, 2011, pp. 3-19; F. Lyall, P. Larsen, *Space Law: A Treatise*, London-New York, 2016, 57-58.

3 This represents a compromise between the Soviet Union, which suggested that space activities should be carried out solely by States, and the United States, which already had plans for privately-operated telecommunications satellites. The compromise was to allow private activities in outer space but to keep the ultimate responsibility with the States. See the Soviet and US proposals in the *Negotiations and Drafting history of Art. VI*, M. Gerard, *Art. VI of the Outer Space Treaty*, pp. 105-106, as already mentioned in reference [1].

4 According to some authors, universities and research organisations have to be considered non-governmental entities even where they are run as public statutory corporations. See M. Gerhard, *Article VI of the Outer Space Treaty*, p. 110, as already mentioned in note 1.

view as the basis for the adoption of national space legislation, or other kind of public regulatory measures, with the aim to implement the non-self-executing obligation relating to authorization and supervision of non-governmental space activities. The detailed regulations relevant to authorization and continuing supervision of States over the activities of their private operators can be implemented either through non-legislative means, such as agreements, contracts or company shares ownership or, as in the majority of cases, by means of specific national space legislation.

However, it is important to notice that enacting national legislation and regulations is not strictly limited to the implementation of art. VI of the OST, since there are also other international obligations which usually require implementation through national laws,⁵ such as the registration of objects launched into outer space⁶ and the liability for damages caused by these objects.⁷ National space regulations can also serve the purpose of ensuring that private space activities fulfil certain safety standards and that they do not run against other international obligation of the State or national security interests.⁸

Moreover, noteworthy importance is attributed to various non-legally binding instruments in complementing and enhancing existing international space law provisions, which could be translated into legal obligations by national laws. Among them, there are the declarations, principles and recommendations, developed by the United Nations Committee for the Peaceful Uses of Outer Space (UN COPUOS) and adopted or recognized by the General Assembly in its resolutions, which contain a number of non-binding norms relevant to the responsible, safe and diligent use of outer space.⁹ The UN COPUOS Space Debris Mitigation Guidelines, endorsed by United Nations General Assembly by its Resolution 62/217 of 22 December 2007,¹⁰ constitute a main example.

5 S. Marchisio, *International Legal Regime on Outer Space: Liability Convention and Registration Convention*, in *Meeting international responsibilities and addressing domestic needs. Proceedings United Nations/Nigeria Workshop on Space Law*, United Nations: Vienna, 2006, pp. 18-27.

6 See art. VIII of the Outer Space Treaty and the Registration Convention.

7 See Art. VII of the Outer Space Treaty and the Liability Convention.

8 See I. Marboe, *National space legislation*, in C. Brünner, A. Soucek (Eds.), *Outer Space in Society, Politics and Law*, Springer-Wien, New York, 2011, pp. 440-441.

9 I. Marboe, *The Importance of Guidelines and Codes of Conduct for Liability of States and Private Actors*, in I. Marboe (ed.), *Soft Law in Outer Space. The Function of Non-Binding Norms under International Space Law*, Böhlau, Wien, 2012, pp. 119-144.

10 For an overview of the implementation at national level of the UN COPUOS Space Debris Mitigation guidelines, see the “Compendium on Space debris mitigation standards adopted by States and international organizations”, fifty-third session of the Legal Subcommittee held in Vienna from 24 March to 4 April 2014 www.unoosa.org/unosa/en/ourwork/topics/space-debris/compendium.html.

In addition, important non-legally binding instruments have been lately developed or are under consideration in the framework of several initiatives on the topic of the safe, security and sustainability of outer space. In this regard, reference can be made to the recommendations of the Group of Governmental Experts on Transparency and Confidence Building Measures in Outer Space Activities (GGE on TCBMs)¹¹ and to the set of guidelines on the Long-Term Sustainability of Space Activities (LTSSA), under development by the Working Group established within the Scientific and Technical Sub Committee of the UN COPUOS,¹² on which we will come back later on (paragraph 3.5).

2.2 Special Regime of Responsibility

The OST establishes a special regime of responsibility, partially different from that provided by public international law. Regarding the general regime of responsibility, art. 2 of the Draft Articles on the International Responsibility of States for Internationally Wrongful Acts, adopted in 2001 by the International Law Commission,¹³ provides that a State is internationally responsible only for wrongful acts directly attributable to it.¹⁴ However, under some conditions the conduct of private persons or entities could also be considered acts of States for the purpose of the attribution of international responsibility. In particular, States may be, in some cases, internationally responsible for failing to take all necessary measures to prevent or suppress unlawful conduct by non-State actors.¹⁵ In addition to this, other particular

11 The Group of Governmental Experts on TCBMs in Outer Space Activities has been established pursuant to UN General Assembly Resolution 65/68 and has elaborated recommendations on possible collaborative efforts on transparency and confidence building measures in outer space activities. The Report of the Group of Governmental Experts is contained in document ref. General Assembly, A/68/189 of 29 July 2013.

12 The Working Group on the LTSSA was established in 2010 for purposes, which include producing voluntary guidelines to reduce risks to the long-term sustainability of space activities. The Terms of reference of the LTSSA WG are set in UN General Assembly Document A/66/20. A first set of guidelines was agreed upon at the 59th Session of the COPUOS, in June 2016 (see Report of the Committee, A/71/20, Annex). Discussions continue on a second set of guidelines. The full compendium will then be referred to the General Assembly in 2018.

13 International Law Commission, *Draft Articles on the International Responsibility of States for Internationally Wrongful Acts*, UN Doc. A/56/10.

14 J. Crawford, *The International Law Commission's Articles on State Responsibility: Introduction, Text and Commentaries*, Cambridge, 2002, p. 81. In line with the above, the International Court of Justice in its judgment of 24 May 1980, in the case concerning *United States Diplomatic and Consular Staff in Tehran* (United States of America v. Iran) highlighted that the Iranian State had not taken all necessary measures to protect the US embassy from the assault of the students according to international law. In such situations, therefore, State responsibility is due to the omission of the organs of the State.

15 S. Marchisio, *Corso di diritto internazionale*, Giappichelli, Torino, 2014, 334.

situations in which a State can be held internationally responsible for acts of private entities are described in the ILC Draft Articles.¹⁶

Comparing to the above, Art. VI of the OST represents a special situation in international law since it makes no difference as to State's activities ("*whether such activities are carried on by governmental agencies*") or private's activities ("*or by non-governmental entities*"). However, according to some authors it does not mean that all national space activities are directly attributable to the State, but that the State has an international obligation to ensure that those activities are conducted in compliance with the obligations contained in the Outer Space Treaty.¹⁷

3. Non-Governmental Space Activities and National Space Legislation: New Needs and Trends

3.1 Traditional Fields of Private Space Activities

Initially, private actors were involved in two different areas of activities, *i.e.* (i) in-orbit satellite operations, conducted by commercial satellites operators and (ii) orbital launch service operations, conducted by commercial launch service providers.¹⁸

With regard to the activities under (i), thanks to space technology progress and the increasing opportunities to provide satellites services also for commercial purposes (e.g. television broadcasting), satellite telecommunications were the first field of space activities to be opened up to private and commercial operators. Private Earth observation systems have also been established. However, in this field, the most relevant achievements for private enterprises are mainly limited to the commercial exploitation of space-related information, services and products, while public entities often remain the owners of the space systems.

As mentioned above under (ii), the other sector offering potential for private actors was the orbital launch service operations. The increasing volume of space activities and involved actors has generated additional demand of

16 See, in particular, Article 5 of the Draft Articles (Conduct of persons or entities exercising elements of governmental authority) according to which: "*The conduct of a person or entity which is not an organ of the State under article 4 but which is empowered by the law of that State to exercise elements of the governmental authority shall be considered an act of the State under international law, provided the person or entity is acting in that capacity in the particular instance*".

17 I. Marboe, *National space law*, in F. von der Dunk with F. Tronchetti, *Handbook of space law*, Edward Elgar Publishing Limited, Cheltenham (UK), 2015, pp. 131-132.

18 Edith Walter, *The privatization and commercialization of outer space*, in C. Brünner, A. Soucek (Eds.), *Outer Space in Society, Politics and Law*, Springer-Wien, New York, 2011, pp. 494-496.

launching services, thus allowing the emergence of private enterprises engaged in the provision of those services on a commercial basis.¹⁹

3.2 National Laws and Regulations

In order to cope with and regulate private and commercial space activities, many States enacted national space legislation with different content and specificities, mainly inspired by the general principles contained in the international space law treaties. However, despite more than 100 States have ratified the OST, only around 30 countries adopted either comprehensive or sectorial national space laws²⁰ or legislation implementing specific provisions of the UN Treaties.²¹ Several States are in the process of developing national space legislation,²² as domestic regulations can also play an important role in responding to emerging needs,²³ as better specified in the following paragraph (3.4).

-
- 19 The first company which worked on privately-developed launch vehicles was the US Orbital Sciences with Pegasus and Taurus in the early 1990s. Other examples of commercial providers are: the International Space Company Kosmotras, ISC Kosmotras (a joint project, between Russia, Ukraine, and Kazakhstan, established in 1997); the International Launch Services (ILS), an American-Russian joint venture to sale Proton rocket launch services; the Sea Launch, established in 1995, as a consortium of four companies from Norway, Russia, Ukraine and the United States, managed by Boeing, operative through 2013.
- 20 A schematic overview of national regulatory frameworks for space activities is available on www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/schematic-overview.html. See also Space Legaltech web site, <http://fxms-lab.com/sirius/maps/#0>. Examples of national space laws: Swedish Act on Space Activities (1982:963); UK Outer Space Act (1986); Russian Law on Space Activity, Federal Law No. 5663-1 (1993); Law of Ukraine on Space Activity, No. 503/96-VR, 1996; Australian Space Activities Act 1998 (No. 123, 1998); Japanese Basic Space Law (Law No. 43, 2008 of 28 May 2008); French Space Operations Act, No. 2008-518, 3 June 2008; South African National Space Act 36 of 2008; Danish Outer Space Act, no. 409, 11 May 2016. Examples of space sectorial legislation: (i) USA: The Commercial Space Launch Act (1984) and Commercial Space Launch Amendment (2004); the Land Remote Sensing Policy Act of 1992; (ii) Canada: Remote Sensing Systems Act (S.C. 2005, c.45); (iii) 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 (2007).
- 21 Spain, Royal Decree No. 278/1995 of 24 February 1995, establishing the Registry foreseen in the Convention of 2 November 1974; Argentina, National Decree No. 125/95 “*Establishment of the National Registry of Space Objects Launched into Outer Space*”, 25 July 1995; South Korea: Law No. 8714 of 21 December 2007 “*Act on Compensation for Damage Caused by Space Objects*” (Space Liability Act), amended by Act 8852, of February 29, 2008.
- 22 Among States which are reflecting or are in the process of developing national space legislation: United Arab Emirates, New Zealand (draft Outer Space and High-Altitude activities Bill, 179-1, 2016), India, Thailand, Malaysia, Philippines, Kenya. See <http://spacelegaltech.com/>.
- 23 A. Kerrest, *The Need to Implement the Outer Space Treaty through National Law in the Light of the Current and Foreseeable Space Activity*, in IISL, Proceedings of the

As already quoted, States may maintain supervision and control over non-governmental activities also by other means including (i) ownership of commercial satellite operator's shares, (ii) agreements entered into with the commercial satellite operators, to regulate their activities and (iii) contracts to outsource specific commercial activities to private satellite operators.

Examination of national space legislation contents and their evolution has been under consideration at international level for many years. Prominent are the discussions taking place at the UN COPUOS Legal Subcommittee under several items of its Agenda.²⁴

On the basis of the analysis of various national legislation, it can be highlighted that domestic regulations tend to differ in their scope and content as a consequence of the national characteristics and degree of maturity of the space actors and industry, including their capability to undertake autonomously space activities. However, national space legislation usually contains common elements, such as scope of application; authorization and continuing supervision procedures for non-governmental activities; private operators licencing regimes; third party liability for damages provisions and insurance requirements; establishment of national register of space objects; sanctions measures. Some of these acts also detail particular aspects, such as the allocation of State and private burdens for third party damages; space debris and space environmental protection standards; transfer of ownership of objects already in orbit; provisions for specific commercial activities. In some cases, further secondary level regulations have been enacted as well as specific technical rules.²⁵

3.3 New Space Activities: New Needs and Trends

Emerging space initiatives challenge the overall context. Indeed, the widespread use of very small platforms, the plans to deploy large constellations, the advent of sub-orbital flights programmes and the development of private capabilities for mining and exploiting mineral space resources, are entailing several implications also from a legal point of view.

Small satellites activities and derived applications have opened the door to many non-space faring countries, governmental and non-governmental

54th Colloquium on the Law of Outer Space, Eleven international publishing, The Hague, 2011, pp. 551-559.

24 See, *inter alia*, UNGA Resolution 59/115 of December 2004 *Review of the Concept of "Launching State"*; Report of the Working Group on National Legislation relevant to Peaceful Exploration and Use of Outer Space (A/AC.105/C.2/101) and UNGA Resolution 68/74 on *Recommendations on national legislation relevant to the peaceful exploration and use of outer space*. See also: International Law Association, Report of the Sofia Conference (2012), Space Law, Part II, *National space legislation: A draft Model Law*.

25 See French national space law, Loi No. 2008-518, 3 June 2008, *relative aux operations Spatiales*, and implementing Decrees n. 2009/640; No. 2009/643 and No. 2009/644.

operators to join the use of outer space. Even if there is no internationally recognized definition of small satellites, they are often referred to as satellites with a mass less than 200 kg.²⁶ With respect to the larger ones, those platforms are simpler, faster and more affordable in their design and manufacture, but many of them cannot be manoeuvred after their positioning into orbit. Operations of very small satellites have become one of the main drivers for the need to enact new national space laws²⁷ or amend and complement the existing legislation, in order to take into account, the peculiarity of those missions.²⁸ Indeed, those satellites are space objects under international space law and their operation is associated to international obligations, such as registration, and the State international responsibility and liability. For this reason, high attention has been raised at international level on the necessity to implement safe operations of small satellites.²⁹

A major development in this domain has been the emerging concepts of large constellations, composed of hundreds up to thousands of small satellites developed by commercial operators, planned and/or started to be deployed in Low Earth Orbit, with the aim of providing, *inter alia*, worldwide telecommunication services, internet access, digital divide solutions and Earth observation imaging services.³⁰ The existence and sustainability of large

26 According to NASA website small spacecraft (SmallSats) focus on spacecraft with a mass less than 180 kilograms and about the size of a large kitchen fridge. Even with small spacecraft, there is a large variety of size and mass that can be differentiated: Mini-satellite, 100-180 kilograms; Micro-satellite, 10-100 kilograms; Nano-satellite, 1-10 kilograms; Pico-satellite, 0.01-1 kilograms; Femto-satellite, 0.001-0.01 Kilograms. See <https://www.nasa.gov/content/what-are-smallsats-and-cubesats>. See also “*Guidance on Space Object Registration and Frequency Management for Small and Very Small Satellites*” issued by UN UNOOSA and ITUA/AC.105/C.2/2015/CRP.17, 13 April 2015.

27 Austrian Federal Law on the Authorization of Space Activities and the Establishment of a National Space Registry (Austrian Outer Space Act), 28 December 2011; Belgian Law on the activities of launching, flight operations or guidance of space objects, 17 September 2005.

28 In this regard: The Netherlands – Decree of 19 January 2015 enacted in order to expand the scope of the Space Activities Act (2007) to include the control of unguided satellites; Belgium – Law of 17 September 2005 on the Activities of Launching, Flight Operation or Guidance of Space Objects, as revised by the Law of 1 December 2013 (B.O.J. of 15 January 2014). See also debate currently ongoing in the United Kingdom, on plans for a ‘traffic light’ approach to simplify regulation for small satellites, in “*Satellites and space: Government Response to the Committee’s Third Report of Session 2016–17*”.

29 See, *inter alia*, “*Guidance on space objects registration and frequency management for Small and Very Small Satellites*”, issued by UNOOSA and International Telecommunications Unions (ITU). Discussions on this topic are also taking place under the UN COPUOS Legal Sub Committee Agenda item: “*General exchange of views on the application of international law to small satellite activities*”.

30 Companies such as OneWeb, Space X and Boing have filed plans to launch constellations of between 720 and 4,425 small, low-cost satellites. In particular, (i)

constellation is, however, associated to several national and international regulatory issues, including: frequencies allocation; impacts on the space environment; registration policies for large numbers of space objects. In particular, the concern of consequences on the space debris population, remains one of the most relevant. In this respect, the Inter Agency Space Debris Coordination Committee (IADC)³¹ has undertaken specific actions which include a new activity to propose possible additional measures in response to small satellites and large constellations and the assessment of the ability of the existing debris mitigation guidelines to effectively manage the large constellations impact on the orbital environment.³²

In general, the amount of space debris is constantly increasing due to the growing volume of space activities, but only non-binding international guidelines and standards are currently in place. Therefore, national legislations which set binding rules on national space operators, contribute to improve the protection of the space environment, as in the case of those national laws which envisage the compliance with safety standards and preventive space debris mitigation measures, as pre-requisites for the issuance of the authorization to operate.³³ However, in the long term, the implementation of further technical and possible legal measures may be needed to preserve the safe operations of space objects.

Another sector offering interesting prospects to space industry is that of sub-orbital activities, which may be used for purposes ranging from science and research applications, to point to point passengers transport and space tourism.³⁴ From a regulatory point of view, many questions remain open and a new impetus to traditional space law topics (such as the definition of the boundary between airspace and the outer space) as well as other themes (like the definition of the legal status of passengers or participants in sub-orbital

OneWeb proposed a constellation of approximately 648 satellites expected to provide global Internet broadband service to individual consumers; (ii) SpaceX plans to launch a high-speed broadband constellation of more than 4,000 satellites beginning in 2019; (iii) Boeing plans to operate a 2.000 satellite constellation. In the Earth Observation sector, Planet Labs Inc, on February 15, 2017, launched 88 satellites, with the ability to image all of Earth's landmass every day.

31 IADC is an international forum of national and international Space Agencies for the worldwide technical/scientific coordination of activities related to the issues of space debris in Earth orbit and provides technical recommendations. In September 2007, the IADC has approved a set of Space debris mitigation guidelines.

32 Holger Krag, Technical presentation at the 2017 Session of the Scientific and Technical Sub Committee of the UN COPUOS, www.unoosa.org/documents/pdf/copuos/stsc/2017/tech-16E.pdf.

33 S. Mirmina, *The Regulation of Orbital Debris through National Measures*, in *Air & Space Law*, 2004, 137-146. See also G.G. Nucera, *Osservazioni in tema di legislazioni nazionali sulle attività spaziali*, in *La Comunità Internazionale*, 2016, pp. 423-449.

34 Examples of private sub-orbital projects: Virgin Galactic LLC, Space Ship Two (SS2); Blue Origin LLC, New Shepard; Sierra Nevada Corporation, Dream Chaser.

flights) have arisen.³⁵ The issue of qualifying the exact nature of those activities, which are not explicitly regulated neither under international air law nor under space law, is still under debate. In general, there is a lack of internationally recognized definition of “sub-orbital flight” and “sub-orbital vehicle”: on the one hand, it is considered doubtful if sub-orbital activities may be regulated under space law; on the other hand, the definition of aircraft as contained in the Annex of the Chicago Convention on International Civil Aviation,³⁶ seems not to cover, for example, the rocket powered sub-orbital vehicles.³⁷

The topic of whether the sub-orbital flights should be governed by space law or air law has been debated for quite a long time:³⁸ amendments or combination of both laws, leading to the definition of an *ad hoc* regime, are also under examination. At international level, a major initiative has been taken by the International Civil Aviation Organization (ICAO) and the United Nations Office for Outer Space Activities (UNOOSA) which held three aerospace Symposia,³⁹ gathering together the aviation and space communities, to focus on the technical and regulatory aspects of those initiatives. In the absence of a specific international regime, the USA remain the only country to have adopted dedicated legislation on private human sub-orbital flights.⁴⁰ However, in February 2017, United Kingdom presented a comprehensive Draft Spaceflight Bill⁴¹ which provides for the creation of a regulatory framework to enable commercial space flight activities (both launch to orbit and sub-orbital

35 T. Masson-Zwaan, S. Freeland, *Between Heaven and Earth: The Legal Challenges of Human Space Travel*, in *Acta Astronautica*, 2010, 1597-1607.

36 Chicago Convention on International Civil Aviation – signed on 7 December 1944, see Annex 7, Chapter: “*Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth’s surface*”.

37 T. Masson-Zwaan, Raphael Moro-Aguilar, *Regulating private human suborbital flight at the international and European Level: tendencies and suggestions*, in *Acta Astronautica* 92 (2013), 243-254.

38 See, *inter alia*, International Civil Aviation Organization – Legal Committee – 36th Session, Commercial Space Flights 2015, and attached working paper C-WP/12436 “*Concept of Suborbital Flights*”, 30 May 2005; UN COPUOS Legal Sub Committee, *Questions on suborbital flights for scientific missions and/or for human transportation*, A/AC.105/1039 and Addenda. European Space Agency position paper on privately-funded suborbital space flight, 10 April 2008.

39 ICAO/UNOOSA Aerospace Symposia started with the first one held in Montréal, Canada, from 18 to 20 March 2015; the second one held in Abu Dhabi, United Arab Emirates, from 15 to 17 March 2016; the third one “*Emerging Space Activities and Civil Aviation Challenges and Opportunities*” was held in Vienna from 29 to 31 August 2017. See web site: www.unoosa.org/oosa/events/data/2017/third_icaounoosa_symposium.html.

40 Public Law No. 108-492-DEC. 23, 2004 “*Commercial Space Launch Amendments Act*”.

41 UK Draft Spaceflight Bill, presented to Parliament by the Secretary of State for Transport by Command of Her Majesty, February 2017.

space flight) to be carried out from space ports in the United Kingdom. National laws can contribute to define an *opinio juris*, but international coordination efforts, aimed at outlining a suitable legal framework, would be advisable to rule the operations of sub-orbital flights.

Finally, new projects pertaining to the possibility to mine utilize and exploit rare metals and other valuable resources lying untouched in the Moon and near-Earth asteroids, have been announced by some private companies.⁴² Even though related technology is not mature, the promotion and support to the development of private capabilities for space resource mining activities has been the subject of *ad hoc* national measures.⁴³ Those national interventions triggered controversial discussions at international level. In that respect, States opinions deeply differ on various points, including the interpretation and application of the current international legal regime to those private initiatives and conditions for the exploration, utilization and exploitation of space resources. The issue of the compliance of some specific national provisions with current international space law has also been raised, in particular with reference to art. II of the OST.⁴⁴ In addition, the need has been expressed to consider in a wider perspective, environmental, economic, social and political aspects⁴⁵ associated to those activities.

4. Italian Legislative Framework and the Current Debate

4.1 General Overview

Italy is considered one of the world leaders in space activities. In fact, Italy was one of the first countries in the world to send a satellite into orbit and it is one of the few countries that has the complete production chain in this field.⁴⁶ The Italian space industry numbers up to approximately 250 companies (of which

42 Examples of US companies, Deep Space industries; Moon Express; Planetary resources. In Europe, the “Space resource.LU” initiative has been set up in Luxemburg, see www.spaceresources.public.lu/en.html.

43 See U.S.A – Commercial Space Launch Competitiveness Act (H.R. 2262), Title IV; Luxemburg – Law on the exploration and use of space resources, approved by the Parliament on 13 July 2017 and entered into force on 1 August 2017.

44 S. Marchisio, *Lo sfruttamento delle risorse minerarie dei corpi celesti nel diritto internazionale*, in E. Triggiani, F. Cherubini, I. Ingravallo, E. Nalin, R. Virzo (a cura di), *Dialoghi con Ugo Villani*, Cacucci Editore, Bari, 2017, pp. 881-890. See also, International Institute of Space Law, Position Paper on Space Resource Mining, 20 December 2015, available at www.iislweb.org/docs/SpaceResourceMining.pdf. See also: International Institute of Space Law, “*Position paper on space resource mining*”, adopted by consensus by the Board of Directors on 20 December 2015.

45 S. Freeland, *Common heritage, not common law: How international law will regulate proposals to exploit space resources*, in *Questions of International Law*, Zoom-in 35, 2017, p. 32.

46 See the Strategic Vision Document (SVD) elaborated by the Italian Space Agency for the decade 2016 – 2025 www.asi.it/en/agency/institutional-documents.

150 have space activities as the core business), although few large industrial groups are predominant.

The interest in the potential of the space sector and its development is confirmed by the recent adoption of the *Space Economy Strategic Plan*⁴⁷ and the *Space Economy Excerpt Plan* (Piano Stralcio) – originated under the coordination of the Steering Committee (“Cabina di Regia Spazio”) set up at the Presidency of the Council of Ministers. Those documents provide for a Plan associated with financial measures and guidelines, whose principal goal is to allow Italy to transform the national space sector into one of the driving forces for the growth of the country. The Plan addresses the possibility to exploit jointly different founding sources, including both public (national funds and additional channels, e.g. European structural funds) and private ones. The main objective is to foster space initiatives considered to be a priority, throughout *inter alia*, the establishment of public-private partnerships.

Despite the important competences and excellences of the Italian industries, both at up-stream manufacture and down-stream level, up to now there have been few national non-governmental space activities. This is one of the main reasons why a comprehensive national space law has not yet been enacted, but only pieces of legislation are in force, mainly implementing specific provisions of the UN Liability Convention and the Registration Convention. In this respect, we may say that the Italian context is in line with the general relationship existing between the national industry landscape and regulatory aspects observed also in other countries, where the presence of private space undertakings has usually led to the adoption of national space laws.

4.2 Italian Legal Framework in the Space Field

The national legal framework relevant to space activities is composed by various acts through which Italy implemented four United Nations space treaties. The *corpus iuris* includes the following acts: (i) Law No. 87, 28 January 1970 “Ratification and Implementation 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”; (ii) Presidential Decree No. 965, 5 December 1975 “Ratification and Implementation of the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space”; (iii) Law No. 426, 5 May 1976, “Ratification and Implementation of the Convention on International Liability for Damage Caused by Space Objects”; (iv) Law No. 23, 25 January 1983, “Norms for the implementation of the Convention on International Liability for Damage Caused by Space Objects”; (v) Law No. 153, 12 July 2005, “Adhesion to the Convention on Registration of Objects Launched into Outer Space and its

47 See the Space Economy Strategic Plan www.agenziacoessione.gov.it/it/S3/Piani_strategici/Space_economy.html.

implementation”, further effected by (vi) the Regulation establishing the national Registry of objects launched into outer space.

Coming to the contents, Law No. 23/1983 implements the Liability Convention regime in the national law system, addressing the issue of compensation for damages caused by space objects. According to this Law, Italian natural and legal persons shall obtain compensation from the Italian State for damages caused by space objects launched by a foreign launching State party to the Liability Convention, when: i) Italy requested and obtained compensation by that foreign launching State; ii) the Italian State has presented no claim for compensation, provided that, the State on whose territory the damage occurred or the State where those natural and legal persons concerned are permanent resident, have not presented a claim to the launching State and have not received any compensation. Additionally, Law 23/1983 recognizes a right for compensation also to foreign natural and legal persons, in accordance with art. VIII. 2 and VIII.3 of the Liability Convention.

Law No. 153/2005 provides for the adhesion of Italy to the Registration Convention. Under this Law, the Italian Space Agency (ASI) is entrusted with the institution and maintenance of the National Registry of objects launched into outer space, as well as the collection of the information required under the Convention. According to art. 3, paragraph 3 of the Law, in the National Registry shall be filed any space object launched by Italian natural or legal persons that launches or procures the launch of that space object and any object launched into outer space from a launch site located in the national territory or under Italian jurisdiction, by foreign natural or legal persons. Italian natural or legal persons shall notify ASI about the launches carried out and transmit all the information required. ASI communicates the information entered into the national Registry to the Ministry of Research, the Ministry of the Economic Development and the Ministry of Foreign Affairs; the latter is responsible to fulfil the international requirements under art. IV.1 of the 1975 Registration Convention, by forwarding the information to UNOOSA.

ASI adopted a specific Regulation, upon approval by the competent Ministries, to establish the National Registry and define the procedures for the registration of objects launched into outer space. The National Registry was set up in 2014 and it is publicly available on the ASI web site. Under the Regulation, the persons who provide the information are responsible for its correctness, although ASI reserves the right to ask for clarifications. It is worth to mention that, through the national Regulation, the information required on the launched objects includes those provided by art. IV of the Registration Convention, together with additional ones, foreseen by the UN Resolution 62/101 on Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects.

Provision of telecommunication satellites network and services is another area governed by various instruments – also of administrative nature – addressing the authorizations and licenses to operate space telecommunication systems, in

accordance with the Electronic Communication Code (Legislative Decree No. 259/2003) and the relevant European Union directives on telecommunications operations⁴⁸ as well as in compliance with the ITU Radio Regulations. As a general rule, authorizations and rights of use of radio frequencies are issued and allocated by the Ministry of Economic Development, while the National Authority for Telecommunications (AGCOM) contributes to the regulation of the telecommunication sector.⁴⁹

4.3 Non-Governmental Space Activities

Italian space activities, including launching or launch commissioning and management of in-orbit space objects, have been mainly undertaken by entities, such as the National Research Council – National Space Plan (CNR/PSN), to which the Italian Space Agency (ASI) succeeded since its establishment in 1988⁵⁰ [55], and the Italian Ministry of Defence. In particular ASI has been established by law to conduct and manage national space programmes.⁵¹

There are few examples of activities carried out by different subjects which may be qualified as non-governmental entities. In particular, the launches of two microsattellites, TEMISAT, by the Telespazio S.p.A. and ITAMSAT, by the AMSAT radio amateur organization, both in 1993, represent some examples. Starting in the years 2000, a growing interest of public universities, still in the area of micro satellites can be observed. In this domain, we can quote, the cases of the set of UNISAT microsattellites (UNISAT 1, 2, 3, 4),⁵² developed by the Sapienza University of Rome and launched respectively in 2000, 2002, 2004, 2006, and the E-st@r I and II missions, developed by the Polytechnic of Turin. The European Space Agency (ESA) procured the launch, respectively, in 2012 for E-st@r I and in 2016 for E-st@r II, in this case, within the framework of the ESA initiative “Fly Your Satellite”.

More recently, examples of private enterprises space activities can be spotted. These include the launch of the UNISAT 5 (in 2013) and UNISAT 6 (in 2014) small platforms, developed by the company G.A.U.S.S. S.r.l.⁵³ and the launch

48 See, for example, Directive 2002/19/EC, Directive 2002/20/EC, Directive 2002/21/EC, Directive 2002/22/EC and Directive 2009/140/EC.

49 The most relevant legal instruments are: the AGCOM Resolution No. 127/00/CONS (Authorization for broadcasting of satellite audiovisual services); the AGCOM Resolution No. 131/01/CONS (Provisions on authorization for satellite services); the AGCOM Resolution No. 380/16/CONS (Regulation on procedures for the allocation and use of frequencies for satellite broadcasting services).

50 Law No. 186/1988, of 30 May 1988, establishing the Italian Space Agency, as amended. ASI is currently governed by the Statute entered into force in 1 May 2011, as amended.

51 See M. Gerhard, *Article VI of the Outer Space Treaty*, p. 110, already mentioned in reference [1].

52 See <https://directory.eoportal.org/web/eoportal/satellite-missions/u/unisat>.

53 See GAUSS S.r.l., Group of Astrodynamics for the use of Space Systems, <https://www.gaussteam.com/>.

of the D-SAT cubesat mission, developed by the D ORBIT company, in June 2017.⁵⁴ In some of these launching activities, the entities procuring the launches have requested assurances that Italy would have registered the satellites in the National Registry of Objects Launched into Outer Space, which have been provided in written by ASI.

A new area of interest is that of sub-orbital flights. In fact, Italy is exploring the possibility to host a spaceport to run sub-orbital experimental activities and international collaborations have been started to this effect. The Italian Civil Aviation Authority – Ente Nazionale per l’Aviazione Civile (ENAC), in charge of defining the regulation of the numerous aspects of the civil aviation sector (including certification, supervision and control of compliance with those regulations) is at the forefront for these objectives. In addition, the Ministry of Defence through the Italian Air Force is involved.⁵⁵ In March 2014, a Memorandum of Cooperation for the Development of Commercial Space Transportation was signed between the Federal Aviation Administration (“FAA”) of the Department of Transportation of the United States of America and ENAC. Against this background, first efforts have been undertaken to define a national legal and regulatory framework to allow sub-orbital flights in Italy and guidelines for the authorization of the experimental phase of those activities are under definition.⁵⁶ In 2016, ASI was invited to join the collaboration and a new *Memorandum of Cooperation in the development of Commercial Space Transportation* was signed among FAA, ENAC and ASI. Based on this framework, discussions started also at industry level, leading in December 2016 to the signature of a Memorandum of Understanding between Virgin Galactic LLC and the Italian company ALTEC S.p.A. (a public-private company, whose 36,25% of shares are owned by ASI⁵⁷).

4.4 The Current Debate

Increased activities of universities and private actors described above show a relevant evolution in the Italian space sector and industrial context. Consequently, a new stimulus on the on-going reflections about the advisability to complement and enhance the current national legal framework on space activities, emerged. The analysis is focussed on the review of the current national regulation with the aim of fully addressing the requirements

54 D-SAT, provided with the “D3” decommissioning device, is the first satellite capable of removing itself from the orbit autonomously and, at the end of the satellite operative lifecycle, the “D3” device drives the high speed fall through the atmosphere determining the disintegration over a safe zone. <https://directory.eoportal.org/web/eoportal/satellite-missions/d/d-sat>.

55 ICAO/UNOOSA Space Symposium, Abu Dhabi, 15 March 2016, <https://www.icao.int/Meetings/SPACE2016/Presentations/Dolce/Italian/AirForce.pdf>.

56 ICAO/UNOOSA Space Symposium <https://www.icao.int/Meetings/SPACE2016/Presentations/DiAntonio/ENAC/Italy.pdf>, Abu Dhabi 15-17 March 2016.

57 See www.asi.it/it/news/accordo-altec-virgin-galactic.

established by art. VI of the Outer Space Treaty, defining technical regulation and creating a clear legal framework that could promote private efforts and possible public-private-partnership initiatives. In this frame, considerations pertain to, *inter alia*, the scope of application, the definition of measures for authorization and control of non-governmental space activities, insurance policies, space debris mitigation, transfer of ownership and control over satellites in orbit. Possible provisions to address specific topics (e.g. small satellites activities) or emerging space activities could also be taken into account.

To this end, on an Italian Space Agency and *Sapienza* University of Rome initiative, two research grant projects (one at ASI and one at the *Sapienza* University) have been started for preliminary studies on a possible draft proposal for an Italian legislation on space activities; these research projects are carried out under the coordination of a joint working group.

Upon consultation of the national stakeholders and public administrations, the final aim should be the elaboration of a comprehensive space law project, in compliance with Italian international obligations, to be submitted to the national competent authorities. The law project should consider (i) the Italian legal framework applicable to space activities currently in place and the overall national legal system; (ii) the state of the art of the national industry and its potential, (iii) the national interests and needs, including the aim to support the development of new activities.

5. Conclusions

As can be drawn from the preceding paragraphs, evolution of space activities has led to new dynamics in the exploration and use of outer space, the main trend being the worldwide increase and diversifications of areas of activities and actors involved. In our view, in order to face the challenges caused by this overall evolutions, adequate regulatory responses, both at national and international level, may be beneficial.

At national level, laws may play a crucial role in translating into internal requirements the principles set in binding and non-binding international legal instruments. In this way, States provide a significant contribution to the safe and diligent use of outer space by the increasing varieties of non-governmental entities who are active in the space arena. With regards to emerging activities, in some cases, national laws intervened in parallel to the ongoing international debate (e.g. on sub-orbital flights), expressing an *opinio juris* and outlining practical models for the implementation of new projects. In other cases (e.g. on exploration, exploitation and utilization of natural space resources), domestic interventions have introduced authorization regimes for private enterprises before the legal framework applicable to those efforts was internationally clarified, thus triggering a substantial debate on this domain.

Meanwhile, at international level an ongoing tendency to establish non-legally binding instruments can be observed. Those instruments complement principles set by space law treaties and address new developments in the exploration and use of outer space. In a wider perspective, international collaboration and coordination efforts are advisable, if not necessary, to define possible solutions to cope with issues associated to the evolution of the space context. For these purposes, it would be desirable that States pursue their continuous exchange of views also considering the possibility to enhance the international legal framework currently in place.

