

## **National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement**

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*Abstract: Private commercial activity in outer space has grown robustly in recent decades. In order to fulfill their international obligations, protect the public from harm, shield their treasuries from liability, and encourage and foster the development of commercial space activities, a growing number of States have promulgated national space legislation that establish space regulatory institutions with jurisdiction to license private actors and enforce compliance with regulatory requirements. This Article provides a comparative analysis of State legislative and regulatory requirements in the area of licensing, registration, safety and environmental obligations, liability, insurance, indemnification as well as enforcement.*

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## I. INTRODUCTION

Notwithstanding the cardinal principle of Space Law that outer space is the “province”<sup>1</sup> and “common heritage”<sup>2</sup> of mankind, throughout much of the twentieth century, space exploration and development has been the province of governments. Increasingly, however, private for-profit firms began investing in commercial space development.

In its early years, commercial activities in outer space were focused mostly on satellite communications, particularly telephone and television communications. More recent commercial activities have focused on weather and geological assessment, launching, remote sensing, and global positioning. We stand on the threshold of the mining of asteroids and other near-Earth celestial bodies, as well as space tourism and aerospace transportation.<sup>3</sup> At the same time, governments are turning to the private sector to provide launch and satellite capacity.

Private-sector commercial space activity is growing at a brisk pace, while governmental activity is declining. Global space activity of governments and private companies grew to \$314 billion in 2013.<sup>4</sup> Between 2012 and 2013, commercial space products and services revenue grew 7%; commercial infrastructure and support industries grew by nearly 5%; while government spending decreased by almost 2%.<sup>5</sup> Thus, commercial development of outer space is outpacing governmental activities in space. As private firms launch commercial space activities, the legal obligations

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<sup>1</sup> See Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies art. 1, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. 6347 (entered into force Oct. 10, 1967) [hereinafter Outer Space Treaty] (describing outer space as the “province of all mankind”). See also Brian Wessel, *The Rule of Law in Outer Space: The Effects of Treaties and Nonbinding Agreements on International Space Law*, 35 HASTINGS INT’L & COMP. L. REV. 289, 292 (2012); Marietta Benkö & Kai-Uwe Schrogel, *Article I of the Outer Space Treaty Reconsidered After 30 Years*, in OUTLOOK ON SPACE LAW OVER THE NEXT 30 YEARS 67, 69 (Gabriel Lafferranderie & Daphné Crowther eds., 1997).

<sup>2</sup> See Agreement Governing the Activities of States on the Moon and Other Celestial Bodies art. 11, *opened for signature* Dec. 18, 1979, 18 I.L.M. 1434, 1363 U.N.T.S. 3 (entered into force July 11, 1984) [hereinafter Moon Agreement] (describing the moon and its natural resources as the “common heritage of mankind”); Outer Space Treaty, *supra* note 1. See also Brian M. Hoffstadt, Comment, *Moving the Heavens: Lunar Mining and the “Common Heritage of Mankind” in the Moon Treaty*, 42 UCLA L. REV. 575, 580–81 (1994) (observing that the Moon Agreement “declares the mineral resources of the moon the ‘common heritage of mankind,’” a phrase whose “ambiguity and ramifications . . . have left space law one of the most unstable areas of international law.”).

<sup>3</sup> Paul Stephen Dempsey, *Foreword* to SPACE SAFETY REGULATIONS AND STANDARDS, at xxi (Joseph Pelton & Ram S. Jakhu eds., 2010).

<sup>4</sup> SPACE FOUNDATION, THE SPACE REPORT 2014: THE AUTHORITATIVE GUIDE TO GLOBAL SPACE ACTIVITY 4 (2014).

<sup>5</sup> See Press Release, Space Foundation’s 2014 Report Reveals Continued Growth in the Global Space Economy in 2013 (May 19, 2014), <http://www.spacefoundation.org/media/press-releases/space-foundations-2014-report-reveals-continued-growth-global-space-economy>.

and liability exposure of space-faring States proliferate as well, for under international law, States incur responsibility for their non-governmental activities in space. The major explosions of the unmanned launch rocket Antares and the manned Virgin Galactic Space Craft Two in the United States in October 2014 revealed that the safety margin of space activities arguably merits enhanced attention.<sup>6</sup>

A growing number of States are becoming space-faring nations. In order to fulfill their international obligations, to protect their citizens from harm, to protect their treasuries from liability, and to encourage and foster the development of commercial space activities,<sup>7</sup> many States are enacting national space legislation,<sup>8</sup> establishing governmental space regulatory institutions, and giving them jurisdiction to license private actors and ensure compliance with regulatory requirements.<sup>9</sup> Legislation and regulation is an important means of providing certainty, stability, and predictability in the legal regime essential for commercial investment. Licensing also is important as a governmental seal of approval to facilitate equity investment and finance of commercial space enterprise, and to assuage customers' concerns about the safety of aerospace vehicles and rockets. Further, with the absence of an international regulatory regime addressing safety and navigation of aerospace vehicles, a growing number of space-faring States fill that regulatory void with domestic legislation.<sup>10</sup> Though a number of commentators have urged the International Civil Aviation Organization (ICAO) to regulate the safety and navigation of aerospace vehicles,<sup>11</sup> to

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<sup>6</sup> See *Virgin Galactic Spacecraft Crash Kills Pilot*, BBC NEWS (Nov. 1, 2014), <http://www.bbc.com/news/world-us-canada-29857182>.

<sup>7</sup> See MATXALEN SÁNCHEZ ARANZAMENDI, EUR. SPACE POL'Y INST, ECONOMIC AND POLICY ASPECTS OF SPACE REGULATIONS IN EUROPE PART I 5 (2009), <http://www.espi.or.at/images/stories/dokumente/studies/espi%20report%2021.pdf> ("In view of the growing commercial activity, legislators have sought the need to establish governmental control over commercial operators in order to ensure compliance with their international obligations and their own security and safety concerns.")

<sup>8</sup> See Paul Stephen Dempsey, *The Emergence of National Space Law*, in 38 ANNALS OF AIR & SPACE LAW 303 (Paul Stephen Dempsey ed., 2013).

<sup>9</sup> See, e.g., Michael Gerhard, *National Space Legislation—Perspectives for Regulating Private Space Activities*, in 2 ESSENTIAL AIR AND SPACE LAW 75–76 (Marietta Benkő & Kai-Uwe Schroggl eds., 2005); Ronald L. Spencer, Jr., *State Supervision of Space Activity*, 63 A.F. L. REV. 75, 78 (2009).

<sup>10</sup> See Adrian Taghdiri, *Flags of Convenience and the Commercial Space Flight Industry: The Inadequacy of Current International Law to Address the Opportune Registration of Space Vehicles in Flag States*, 19 B.U. J. SCI. & TECH. L. 405, 514 (2013); Frans von der Dunk, *As Space Law Comes to Nebraska, Space Comes Down to Earth*, 87 NEB. L. REV. 498, 507 (2008). Paul Fitzgerald notes, "while it is true that domestic law is probably sufficient to cover 'up and down' SATV [suborbital aerospace transportation vehicle] flights, international carriage by SATV will require legal infrastructure, and such a requirement will likely be necessary within the next decade. Unless States begin to consider this issue, it is not inconceivable that such a lack of action could become an impediment to intercontinental flights by SATVs." P. Paul Fitzgerald, *Inner Space: ICAO's New Frontier*, 79 J. AIR L. & COM. 3, 5 (2014).

<sup>11</sup> See e.g., Paul Stephen Dempsey & Michael Mineiro, *The ICAO's Legal Authority to Regulate Aerospace Vehicles*, in SPACE SAFETY REGULATIONS AND STANDARDS 251 (Joseph Pelton & Ram S. Jakhu eds., 2010); P. Paul Fitzgerald, *Inner Space: ICAO's New Frontier*, 79 J. AIR L. & COM. 3, 5

date, it has not yet exerted jurisdiction.<sup>12</sup> Moreover, the world community has failed to draft a multilateral treaty addressing space issues since 1979. That inaction, too, inspires the promulgation of domestic space legislation.

The U.N. General Assembly has encouraged States to “consider enacting and implementing national laws authorizing and providing for continuing supervision of the activities in outer space of non-governmental entities under their jurisdiction.”<sup>13</sup> The rapid emergence of national space legislation is the fastest growing area of Space Law.

## II. INTERNATIONAL OBLIGATIONS OF STATES

Space Law consists of a growing number of international, multilateral, and bilateral agreements and conventions, U.N. resolutions, decrees by international organizations, national legislation and regulations, and court decisions.<sup>14</sup> Five multilateral conventions, drafted in a dozen years, place

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(2014). See generally Paul Stephen Dempsey & Michael Mineiro, *Space Traffic Management: A Vacuum in Need of Law*, in OUTER SPACE: WARFARE AND WEAPONS (P. Kumar, ed. 2010); THE NEED FOR AN INTEGRATED REGULATORY REGIME FOR AVIATION AND SPACE: ICAO FOR SPACE? (Ram S. Jakhu, Tommaso Sgobba & Paul Stephen Dempsey eds., Springer 2011).

<sup>12</sup> See THE NEED FOR AN INTEGRATED REGULATORY REGIME FOR AVIATION AND SPACE: ICAO FOR SPACE? *supra* note 11; Dempsey & Mineiro, *ICAO's Legal Authority to Regulate Aerospace Vehicles*, *supra* note 11, at 251; Ruwantissa Abeyratne, *ICAO's Involvement in Outer Space Affairs — A Need for Closer Scrutiny?*, 30 J. SPACE L. 185, 185–86 (2004); Peter van Fenema, *Suborbital Flights and ICAO*, 30 AIR & SPACE L. 396, 399–403 (2005); Dean N. Reinhardt, *The Vertical Limit of State Sovereignty*, 72 J. AIR L. & COM. 65, 69 (2007).

<sup>13</sup> G.A. Res. 59/115, Application of the Concept of the Launching State (Dec. 10, 2004).

<sup>14</sup> For a dozen years commencing in 1967, the world community drafted five major multilateral conventions establishing the basic principles of Space Law:

- The “Outer Space Treaty” of 1967. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. 6347 (entered into force Oct. 10, 1967).
- The “Rescue Agreement” of 1968. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, *opened for signature* Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 (entered into force Dec. 3, 1968).
- The “Liability Convention” of 1972. Convention on International Liability for Damage Caused by Space Objects, *opened for signature* Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 (entered into force on Sept. 1, 1972).
- The “Registration Convention” of 1976. Convention on Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 (entered into force on Sept. 15, 1976).
- The “Moon Agreement” of 1979. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, *opened for signature* Dec. 18, 1979, 18 I.L.M. 1434, 1363 U.N.T.S. 3 (entered into force July 11, 1984).
- Other conventions are also of significance, including the Nuclear Test Ban Treaty, International Telecommunications Convention of 1984/1992, and the Convention of the International Maritime Satellite Organization of 1979, for example.

numerous obligations upon States.<sup>15</sup> Collectively, these multilateral conventions require States to adhere to principles of international law, assume responsibility and liability for activities in space (whether governmental or non-governmental), authorize and supervise the activities of their nationals in space, and notify the United Nations, the public, and the scientific community of their activities in space.<sup>16</sup>

In negotiating the Outer Space Treaty, the United States supported involvement of private players;<sup>17</sup> but this proposal was opposed by the Soviet Union which wanted only States to undertake space activities.<sup>18</sup> Ultimately, Article VI of the Outer Space Treaty<sup>19</sup> was drafted to allow private activity in outer space on the condition that the appropriate State exercises authorization and continuing supervision over its non-governmental entities.<sup>20</sup> The State is made responsible for its national activities, even those by private parties. Generally, authorization is done through establishment of a licensing system, and supervision is done through regulatory oversight after the issuance of the license. Other requirements imposed by the Outer Space Treaty of 1967 include the following:

- States must carry on space activities in accordance with principles of international law;<sup>21</sup>
- States bear international responsibility for national activities in

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<sup>15</sup> See PAUL STEPHEN DEMPSEY, PUBLIC INTERNATIONAL AIR LAW 743–45 (McGill 2006).

<sup>16</sup> See e.g., Outer Space Treaty, *supra* note 1, art. III, VI, VIII, XI. See also JULIAN HERMIDA, LEGAL BASIS FOR NATIONAL SPACE LEGISLATION 30 (Springer 2004).

<sup>17</sup> See, e.g., John A. Johnson, *Freedom and Control in Outer Space*, in PROCEEDINGS OF THE CONFERENCE ON SPACE SCIENCE AND SPACE LAW 138, 139 (Mortimer D. Schwartz, ed., 1963) (citing Ambassador Stevenson's statement to Comm. I (Political and Security) of the General Assembly on Dec. 4, 1961). See also Rand Simberg, *Property Rights in Space*, THE NEW ATLANTIS, Fall 2012, at 20, 22, <http://www.thenewatlantis.com/publications/property-rights-in-space>.

<sup>18</sup> See Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on the Work of Its First Session, U.N. Doc. A/AC.105/C.2/L.2, at 4 (1962); Report of the Comm. on the Peaceful Uses of Outer Space, U.N. Doc. A/5181, annex 3, at 8 (1962).

<sup>19</sup> Article VI provides: "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." Outer Space Treaty, *supra* note 1, art. VI.

<sup>20</sup> The U.S.S.R. subsequently agreed that "it would be possible to consider the question of not excluding from the declaration the possibility of activity in outer space by private companies, on the condition that such activity would be subject to the control of the appropriate State, and the State would bear international responsibility for it." Comm. on the Peaceful Uses of Outer Space, 22d mtg. at 23, U.N. Doc. A/AC.105/PV.22 (Sept. 13, 1963). See Frans von der Dunk, *Report of the 3rd Eilene M. Galloway Symposium on Critical Issues in Space Law—Article VI of the Outer Space Treaty: Issues and Implementation*, in PROCEEDINGS OF INTERNATIONAL INSTITUTE OF SPACE LAW 531, 532 (Corinne M. Contant Jorgenson ed., 2008).

<sup>21</sup> Outer Space Treaty, *supra* note 1, art. III.

- space, on the moon, and on celestial bodies, including activities of both governmental and non-governmental entities;
- The “appropriate State”<sup>22</sup> must authorize and supervise the activities of its nationals in space,<sup>23</sup>
  - States are internationally liable for damage to another State, or its national or juridical persons, caused by an object launched into the air or space when: (a) the State launches said object,

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<sup>22</sup> *Id.* Article VI provides that authorization and supervision should be done by the “appropriate State.” However, neither the Outer Space Treaty nor any other convention defines the term. There have been several views on this. Dr. Ricky J. Lee defines the “appropriate State” as the State that is in the best position to assert jurisdiction over the non-governmental entity engaged in space activity and which physically can authorize and continuously supervise the space activities of both government and private entities of the State. Thus, if a State’s national engages in space activity, it is not the State of nationality but rather the State having territorial jurisdiction which is the appropriate State. Ricky J. Lee, *Liability Arising from Article VI of the Outer Space Treaty: States, Domestic Law and Private Operators*, in PROCEEDINGS OF THE FORTY-EIGHTH COLLOQUIUM ON THE LAW OF OUTER SPACE 216 (2005). See also Stephen Gorove, *Liability in Space Law: An Overview*, 8 ANNALS AIR & SPACE L. 373, 377 (1983); Buurely, *Rules of International Law Governing the Commercialisation of Space Activities*, 29 PROC. COLLOQ. L. OUTER SPACE 157, 159 (1986). Dr. Karl-Heinz Bockstiegel asserts that a “functional interpretation” is best, and the “appropriate State” should be defined from case to case; no single interpretation is sufficiently overwhelming to exclude all others. Dr. Karl-Heinz Bockstiegel, *The Term ‘Appropriate State’ in International Space Law*, 37 PROC. COLLOQ. L. OUTER SPACE 77, 79 (1994). Prof. Stephen Gorove took the position that the drafters used the term “appropriate State” and not the “State of nationality”; so “at least in some cases it could refer to the launching state.” Stephen Gorove, *Liability in Space Law: An Overview*, 8 ANNALS AIR & SPACE L. 373, 377 (1983). Herczeg states that (a) state of seat of the non-governmental entity, (b) the launching State, and (c) the State of production all are appropriate States. Herczeg, *Interpretation of the Space Treaty of 1967* (Introductory Report), 10 PROC. COLLOQ. L. OUTER SPACE 105, 107 (1967). Prof. Bin Cheng also states that there may be more than one appropriate State and the words used in The Declaration of Legal Principles, “states concerned,” perhaps would have been a better term. Bin Cheng, *Article VI of the 1967 Space Treaty Revisited: “International Responsibility”, “National Activities”, and “The Appropriate State”*, 26 J. SPACE L. 7, 28–29 (1998).

Therefore, several authors have expressed different views regarding which is the “appropriate State.” One question that arises is whether there is only one “most appropriate State,” or if there can be many appropriate States. Unlike the “state of registry” which can be only one State pursuant to the Registration Convention, the “appropriate State” has not been demarcated as one State under the Outer Space Treaty. Several States can be involved in a space activity and all of them can therefore be “appropriate” States. Moreover, States have to bear responsibility for all their national activities in space; also, launching States are liable for damage caused by their space objects. In this light, it is doubtful whether States would agree to allow only one State to be in charge of supervision and authorization, while they themselves continue to be responsible and liable under the space treaties. Thus, all States involved in a space activity, including the launching State(s), would be “appropriate” States.

<sup>23</sup> Outer Space Treaty, *supra* note 1, art. VI. Article VI of the Outer Space Treaty imposes upon States international responsibility to provide “authorization and continuing supervision” of national activities in space, including the activities of both governmental and non-governmental entities. Dr. Ricky Lee observes: “It is clear from the terms of Article VI that states are required to ensure that activities of private entities are subject to ‘authorization’ and ‘continuing supervision’ and that they are to bear international responsibility for such activities.” Ricky J. Lee & Sarah L. Steele, *Military Use of Satellite Communications, Remote Sensing, and Global Positioning Systems in the War on Terror*, 79 J. AIR L. & COM. 69, 111 (2014).

- (b) the State procures the launch for said object, or (c) the object is launched from the State's territory or facility;<sup>24</sup>
- States on whose registry an object is launched must retain jurisdiction and control over the object and any personnel thereon;<sup>25</sup>
- States must avoid harmful contamination and adverse environmental consequences from the introduction of extraterrestrial matter; if a State believes an activity or experiment by it or its nationals in space would potentially harm or interfere with activities of other States in space, it must consult with such States before proceeding;<sup>26</sup> and
- States must inform the U.N. Secretary General of the "nature, conduct, locations and results" of their activities in space.<sup>27</sup>

According to Manfred Lachs who was the Chairman of the Legal Subcommittee of the COPUOS at the time when the Outer Space Treaty was drafted, and who later became Judge and the President of the International Court of Justice, under Article VI of the Outer Space Treaty:

States bear international responsibility for any activity in outer space, irrespective of whether it is carried out by governmental agencies or non-governmental entities. This is intended to ensure that any outer space activity, no matter by whom conducted, shall be carried on in accordance with the relevant rules of international law, and to bring the consequences of such activity within its ambit. The acceptance of this principle removes all doubts concerning imputability . . . . States are under obligation to take appropriate

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<sup>24</sup> Outer Space Treaty, *supra* note 1, art. VII. Article VII provides that States that (a) launch, (b) procure the launch, or (c) from whose territory or (d) facility an object is launched, are internationally liable for damage caused to another State or its national or juridical persons by such object whether in the air or in space.

<sup>25</sup> Outer Space Treaty, *supra* note 1, art. VIII. See PAUL STEPHEN DEMPSEY, AVIATION LIABILITY LAW § 6.64 (Lexis Nexis 2d ed. 2013). Article VIII of the Outer Space Treaty also requires that space objects and component parts found in a State shall be returned to the State of registry. Article VIII of the Outer Space Treaty provides that the State of registry shall retain jurisdiction and control over a space object and any personnel thereon, whether in space or on a celestial body. But it does not define the "State of registry." The Registration Convention of 1976 provides elaboration. Convention on Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. 8480, 1023 U.N.T.S. 15, G.A. Res. 3235 (XXIX) (entered into force Sept. 15, 1976). The Registration Convention defines the "State of registry" as the launching State (recall the definition above) on whose registry a space object is carried. *Id.* art. I. The Convention requires that every space object launched be entered in an appropriate registry that the launching State shall maintain. *Id.* art. II. It defines the information that shall be carried on the registry. The Convention also requires that the State of registry must notify the UN Secretary General of space objects which were, but no longer are, in Earth orbit. *Id.* art. IV(3).

<sup>26</sup> Outer Space Treaty, *supra* note 1, art. IX.

<sup>27</sup> *Id.* art. XI.



steps in order to ensure that natural or juridical persons engaged in outer space activity conduct it in accordance with international law. States have taken upon themselves the explicit obligation that such activity will require their “authorization and continuing supervision.”<sup>28</sup>

Similarly, another source notes:

By creating an affirmative obligation to authorize and supervise non-governmental actors in space in addition to making states responsible for the activities of these entities, Article VI makes it a high risk activity for a state to allow commercial actors to operate in the space environment. In the past legislation has been written so as to help states effectively fulfill Article VI obligations. Traditionally this has been through licensing regimes for nongovernmental actors.<sup>29</sup>

Several of the provisions of the Outer Space Treaty are elaborated upon by the Liability Convention of 1972.<sup>30</sup> Building on Article VII of the Outer Space Treaty, the Liability Convention imposes liability upon a launching State (i.e., the State that launches, procures the launch, or from whose territory or facility a space object is launched)<sup>31</sup> to pay compensation for personal injury and property damage caused by its space objects on the surface of the Earth, or to aircraft.<sup>32</sup> The Convention establishes a two-tier liability regime,<sup>33</sup> providing that the “launching State” is absolutely liable

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<sup>28</sup> MANFRED LACHS, THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING 122 (Sijthoff 1972).

<sup>29</sup> P.J. Blount, *Renovating Space: The Future of International Space Law*, 40 DENV. J. INT’L L. & POL’Y 515, 530–31 (2012).

<sup>30</sup> Convention on International Liability for Damage Caused by Space Objects, *opened for signature* Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. 7762, 961 U.N.T.S. 187, 10 I.L.M. 965, G.A. Res. 2777 (XXVI) (entered into force Sept. 1, 1972) [hereinafter Liability Convention].

<sup>31</sup> *Id.* art. I.

<sup>32</sup> See generally Marc S. Firestone, *Problems in the Resolution of Disputes Concerning Damage Caused in Outer Space*, 59 TUL. L. REV. 747 (1985); Paul Stephen Dempsey, *Liability for Damage Caused by Space Objects in International and National Law*, 37 ANNALS AIR & SPACE L. 333 (2011).

<sup>33</sup> The Liability Convention adopted “a two-tiered tort regime for injury or damage inflicted by a satellite: absolute liability for harm caused on earth or to aircraft, and liability for ‘fault’ for injuries to other countries’ space objects.” David A. Koplow, *ASAT-Isfaction: Customary International Law and the Regulation of Anti-Satellite Weapons*, 30 MICH. J. INT’L L. 1187, 1199 (2009). One source notes:

“The [Liability Convention] established a basic framework of tort law applicable to space activities. The Liability Convention was a response to concerns about the danger that space objects pose on Earth when they re-enter the atmosphere. Damage caused by space objects while they are in space, on the other hand, did not motivate the formation of the Liability Convention, which explains why terrestrial damage has a stricter liability scheme under the Liability Convention than damage that occurs in space. The Liability Convention instituted an absolute liability policy for damage on the Earth’s surface, or in airspace, caused by space objects. However, a state is only liable for damage to another state’s space objects if ‘the damage is due to [the state’s] fault or the

for damage caused by its space objects on the surface of the Earth or to an aircraft in flight,<sup>34</sup> and liable in negligence<sup>35</sup> for damage<sup>36</sup> caused to a space object of another State or to persons or property on board.<sup>37</sup> Where there is more than one launching State, they shall be jointly and severally liable for the damage they cause.<sup>38</sup>

Hence, by ratifying or acceding to either the Outer Space Treaty of 1967, or the Liability Convention of 1972, the launching or launch-procuring State becomes potentially liable for damages caused by itself and its commercial launch sector.<sup>39</sup> A ratifying State incurs absolute liability for damage on the ground or to aircraft in flight outside its territory when a launch takes place from its territory or facilities, or when it procures a launch from another State.<sup>40</sup> A State incurs fault-based liability for damage caused in outer space.<sup>41</sup>

The Registration Convention is another of the core space treaties. Article II thereof requires a launching State<sup>42</sup> or one of the launching States

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fault of persons for whom [the state] is responsible.’ An injured party cannot recover compensation under this Convention if another entity of the same state harmed its space object. In that case, the injured party would most likely have a remedy under national tort law . . . .”

Natalie Pusey, *The Case for Preserving Nothing: The Need for a Global Response to the Space Debris Problem*, 21 COLO. J. INT’L ENVTL. L. & POL’Y 425, 438–39 (2010) (citations omitted).

<sup>34</sup> Liability Convention, *supra* note 30, art. II.

<sup>35</sup> See generally Ezra J. Reinstein, *Owning Outer Space*, 20 NW. J. INT’L L. & BUS. 59, 77 (1999) (criticizing the failure of the treaty to define “fault”).

<sup>36</sup> It is unclear whether recoverable damages include lost wages, lost profits, or non-economic damages such as pain and suffering. Punitive damages are not envisaged. See Joseph J. MacAvoy, *Nuclear Space and the Earth Environment: The Benefits, Dangers, and Legality of Nuclear Power and Propulsion in Outer Space*, 29 WM. & MARY ENVT. L. & POL’Y REV. 191, 226 (2004).

<sup>37</sup> Liability Convention, *supra* note 30, art. III. The Convention outlines a limited number of defenses. The launching State may be wholly exonerated from liability if it proves that the damage resulted from the “gross negligence or from an act or omission done with intent to cause damage on the part of a claimant State or of natural or juridical persons it represents,” unless the launch was not in conformity with principles of international law, including in particular, the United Nations Charter or the Outer Space Treaty. See DEMPSEY, AVIATION LIABILITY LAW, *supra* note 25, §§ 6.62–6.71.

<sup>38</sup> See generally HOWARD A. BAKER, SPACE DEBRIS: LEGAL AND POLICY IMPLICATIONS (Martinus Nijhoff Publishers 1989); see also DEMPSEY, AVIATION LIABILITY LAW, *supra* note 25, § 6.65. The Liability Convention also establishes specific procedures for the settlement of damage claims, including a one year statute of limitations and, where necessary, establishment of a Claims Commission. Claims must be presented through diplomatic channels by a State on its behalf, or on behalf of its nationals.

<sup>39</sup> Ronald Spencer Jr., *International Space Law: A Basis for National Legislation*, in NATIONAL REGULATION OF SPACE ACTIVITIES 1, 9 (Ram Jakhu ed., Springer 2010).

<sup>40</sup> Extension of Public Meeting; Commercial Launch Industry, 66 Fed. Reg. 48311-01 (2001), 2001 WL 1089331 (F.R.) US Federal Aviation Administration.

<sup>41</sup> Henry Hertzfeld & Ben Baseley-Walker, *A Legal Note on Space Accidents*, ZEITSCHRIFT FÜR LUFT-UND WELTRAUMRECHT [GERMAN J. OF AIR & SPACE L.] 230, 233 (2010).

<sup>42</sup> UN General Assembly Resolution 59/115 Application of the Concept of the “Launching State,” recommends that in cases of joint launches or cooperation programmes, where there are more than one

to register space objects with a national registry and to inform the United Nations of the establishment of the registry. It provides that if there is more than one launching State, then the States would jointly decide as to which one of them would be the “state of registry.”<sup>43</sup>

In addition to these multilateral conventions, additional legal obligations are imposed upon States through customary international law,<sup>44</sup> an array of United Nations Security Council and General Assembly Resolutions,<sup>45</sup> and a growing body of “soft law.”<sup>46</sup>

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launching State, States should consider entering into agreements in accordance with the Liability Convention. *Application of the Concept of the Launching State*, G.A. Res. 59/115, U.N. GAOR, 59th Sess., U.N. Doc. A/RES/59/11 (2004). This resolution basically presents the recommendations of Legal Subcommittee’s Working Group.

<sup>43</sup> Convention on Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. 8480, 1023 U.N.T.S. 15, G.A. Res. 3235 (XXIX) (entered into force Sept. 15, 1976) [hereinafter the Registration Convention]. Since Article VIII of the Outer Space Treaty provides that the “state of registry” must maintain control and jurisdiction over its space objects and personnel, it appears that registering is the only source of exercising “jurisdiction and control” over space objects and personnel by a State. See Setsuko Aoki, *In Search of the Current Legal Status of the Registration of Space Objects*, in PROCEEDINGS OF INTERNATIONAL INSTITUTE OF SPACE LAW 245, 246 (2010).

<sup>44</sup> The 1978 crash of the *Cosmos 954* satellite into Canada, creating damages totaling \$14 million, led Canada to file a \$6 million claim with the (then) Soviet Union, of which \$3 million was eventually paid. MacAvoy, *supra* note 36, at 227. The settlement agreement declared, “The standard of absolute liability for space activities, in particular activities involving the use of nuclear energy, is considered to have become a general principle of international law.” *Canada’s Claim Against the U.S.S.R. Arising Out of the Cosmos 954 Incident and the Claim’s Settlement*, in SPACE LAW § IV.B.Canada 1–4, ¶ 22 (Paul Stephen Dempsey ed. 2004). See also DEMPSEY, AVIATION LIABILITY LAW, *supra* note 25, § 6.69.

Several sources contend that several core concepts from the international Space Law conventions have evolved into customary international law. For example, “[T]he consensus has developed that a few principles of customary international law apply to space activities. These include the ‘essential principles of the Outer Space Treaty’ . . . .” Peter Malanczuk, *Space Law as a Branch of International Law*, 1994 NETH. Y.B. INT’L L. 143, 159 (1995); Robert A. Ramey, *Armed Conflict on the Final Frontier: The Law of War in Space*, 48 A.F. L. REV. 1, 74 (2000). See also ANTHONY AUST, HANDBOOK OF INTERNATIONAL LAW 339 (2d ed. 2010) (“The [Outer Space] Treaty’s basic principles . . . can now be regarded as representing customary international law.”). “Despite the relative youth of space law, several core concepts have crystallized into customary international law through state practice.” Dan St. John, *The Trouble with Westphalia in Space: The State-Centric Liability Regime*, 40 DENV. J. INT’L L. & POL’Y 686, 690–91 (2012). See also, I.H. PH. DIEDERIKS-VERSCHOOR & V. KOPAL, AN INTRODUCTION TO SPACE LAW 6 (3d ed. 2008); FRANCIS LYALL & PAUL B. LARSEN, SPACE LAW: A TREATISE 11–12, 71, 308–10 (2009).

But this view is not universally shared: “It is not clear, however, that customary international law even exists. At first glance, a lack of space custom undermines the entire concept of a customary international law of space. According to one estimate in 2000, only six to ten countries had been sufficiently involved in space relations to consider their actions as contributing to international space law.” Jacob M. Harper, *Technology, Politics, and the New Space Race: The Legality and Desirability of Bush’s National Space Policy Under the Public and Customary International Laws of Space*, 8 CHI. J. INT’L L. 681, 690 n.42 (2008).

<sup>45</sup> In 1961, the U.N. General Assembly declared that international law applies to outer space and celestial bodies. It also declared outer space and celestial bodies free for exploration and use by all

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nations, and not subject to national appropriation. G.A. Res. 1721 (XVI) (Dec. 20, 1961). The following year, the General Assembly called upon nations “to co-operate in the further development of law for outer space.” G.A. Res. 1802 (XVII) (Dec. 14, 1962). The U.N. General Assembly has passed numerous resolutions addressing space, of which the most prominent include:

- *The Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space* (the “Legal Principles Declaration”);
- *The Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting* (the “Direct T.V. Broadcasting Principles”);
- *The Principles Relating to Remote Sensing of the Earth from Outer Space* (the “Remote Sensing Principles”);
- *The Principles Relevant to the Use of Nuclear Power Sources in Outer Space* (the “Nuclear Power Principles”); and
- *The Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries* (the “International Cooperation Declaration”);
- *Application of the Concept of the “Launching State”*;
- *Recommendations on Enhancing the Practice of States and Intergovernmental Organizations in Registering Space Objects*; and
- *Recommendations on National Legislation Relevant to the Peaceful Exploration and Use of Outer Space*.

General Assembly Resolutions are not binding upon U.N. member States, *per se*, even those that voted in favor of them, unless they reaffirm existing—or eventually evolve into—general principles of customary international law. Nonetheless, they do offer some indication of consensus of where international law may be headed.

<sup>46</sup> Dr. Gérardine Goh writes: “The complexity of space activities has quickly outrun traditional methods of lawmaking. This has led to the necessitation of action from international organizations, specialized agencies, private bodies and professional associations that do not nicely fit into the State-centric paradigm of international lawmaking.” Gérardine Meishan Goh, *Softly, Softly Catchee Monkey: Informalism and the Quiet Development of International Space Law*, 87 NEB. L. REV. 725, 726 (2009). Christine Chinkin writes that, “[t]he complexity of international legal affairs has outpaced traditional methods of law-making, necessitating management through international organizations, specialized agencies, programmes, and private bodies that do not fit the paradigm of Article 38(1) of the Statute of the [International Court of Justice]. Consequently the concept of soft law facilitates international co-operation by acting as a bridge between the formalities of law-making and the needs of international life by legitimating behavior and creating stability.” COMMITMENT AND COMPLIANCE: THE ROLE OF NON-BINDING NORMS IN THE INTERNATIONAL LEGAL SYSTEM (Dinah Shelton ed., 2000). See generally IRMGARD MARBOE, *SOFT LAW IN OUTER SPACE: THE FUNCTION OF NON-BINDING NORMS IN INTERNATIONAL SPACE LAW* (2012).

But the view that non-binding “soft law” agreements such as the *Space Mitigation Guidelines of UNCOPUOUS* (endorsed by GA Res. 62/217 of 22 Dec. 2007), the *IADC Space Mitigation Guidelines*, or the *EU International Code of Conduct for Space Activities* have become customary international law is not universally shared. Brian Wessel observes:

The final potential source of international space law that must be considered is customary international law. Many commentators argue that the content of the nonbinding agreements . . . from the Principles through the codes of conduct, could become, or even already have become, binding norms of customary international law. . . . However, closer analysis of the requirements for customary international law demonstrates that nonbinding space agreements are unlikely to evolve into binding customary rules. . . . The practices contained in nonbinding international space agreements do not meet the requirements of either the traditional or the modern approach to custom formation. State practice in outer space is not

Space Law is the *lex specialis* of the much older body of customary international law. Under the general international law of State responsibility,<sup>47</sup> a State can be held responsible only for acts imputable to it.<sup>48</sup> However, the State owes an indirect responsibility to use due diligence to prevent and suppress any violation of rights of other States and their nationals, originating within its jurisdiction.<sup>49</sup> But, pursuant to the Outer Space Treaty,<sup>50</sup> States assume direct responsibility for all actions connected or linked to them, including that of non-governmental entities; all acts causing damage by such private entities are deemed to be acts of the State.<sup>51</sup> The space treaties also explicitly obligate the States to regulate and supervise national activities in space, and to register their space objects.<sup>52</sup> Therefore, States would be well advised to promulgate laws providing for licensing and enforcement to govern the space activities of non-governmental actors.

Further, the Chicago Convention of 1944—which established the International Civil Aviation Administration (ICAO) to harmonize State regulation of aircraft safety and navigation in—may apply to vehicles

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long-term enough to be the driving force behind the formation of international custom, especially with regard to the more recent technical agreements, and statements of *opinio juris* have been far from the strong and nearly unanimous sentiment needed for *opinio juris* to be the leading factor. When considering the legal effects of nonbinding agreements for the purposes of rule of law, we must thus acknowledge that they are truly nonbinding and will not likely become otherwise through customary international law.

Brian Wessel, *The Rule of Law in Outer Space: The Effects of Treaties and Nonbinding Agreements on International Space Law*, 35 HASTINGS INT'L & COMP. L. REV. 289, 297–98 (2014) (citations omitted). Similarly, Professor Freeland notes, “[t]hese soft law instruments provide guidelines or standards of conduct that may often influence the actions of States . . . , but they do not in and of themselves have the legal ‘force’ of binding treaties. . . . [I]t is not appropriate to convert in our mind something that is not binding ‘hard’ law, and not intended to be such, into a binding rule or obligation.” Steven Freeland, *For Better or Worse? The Use of ‘Soft Law’ Within the International Legal Regulation of Outer Space*, 36 ANNALS AIR & SPACE L. 409, 434, 444 (2011).

<sup>47</sup> The term “responsibility” is derived from the Latin word *respondere* which means to answer. Responsibility means answerability or accountability. Bin Cheng, *International Responsibility and Liability for Launch Activities*, 20 AIR & SPACE L. 297, 299 (1995).

<sup>48</sup> International Law Commission, Draft Articles on Responsibility of States for Internationally Wrongful Acts, Nov. 2001, Supplement No. 10 (A/56/10), chp.IV.E.1, arts. 1–2, <http://www.unhcr.org/refworld/docid/3ddb8f804.html> [hereinafter the Draft Articles on States Responsibility].

<sup>49</sup> Bin Cheng, *Article VI of the 1967 Space Treaty Revisited: “International Responsibility,” “National Activities,” and “The Appropriate State,”* 26 J. SPACE L. 7, 12 (1998).

<sup>50</sup> Outer Space Treaty, *supra* note 1, arts. VI and VIII. For a current list of ratifying States, see STATUS OF INTERNATIONAL AGREEMENTS RELATING TO ACTIVITIES IN OUTER SPACE, <http://www.oosa.unvienna.org/oosa/en/SpaceLaw/treatystatus/index.html> (last visited Sept. 30, 2012) (100 ratifications as of April 2009).

<sup>51</sup> Cheng, *supra* note 49, at 15.

<sup>52</sup> Outer Space Treaty, *supra* note 1, arts. VI, VIII.

transporting space objects through air space.<sup>53</sup> But to date, ICAO has promulgated no Standards and Recommended Practices governing aerospace vehicles or rockets, though in time, it may.<sup>54</sup> This creates a regulatory void for air traffic management of the launch of space objects as they pass through air space that, at present, only States can regulate.

### III. STATE REGULATION OF SPACE ACTIVITIES: AN OVERVIEW

The United Nations Committee on the Peaceful Use of Outer Space (COPUOS) recommends:

Space activities should require authorization by a competent national authority; the authorities and procedures, as well as the conditions for granting, modifying, suspending and revoking the authorization should be set out clearly to establish a predictable and reliable regulatory framework. . . . The conditions for authorization should be consistent with the international obligations and commitments of States, in particular under the United Nations treaties on outer space. . . .<sup>55</sup>

As a consequence of the aforementioned international obligations and the liability exposure created thereby, as well as a desire to protect the health and safety of their citizens, their property, and the environment, a growing number of States have promulgated national legislation to regulate commercial space activities. The obligation of States to authorize space activities and provide for continued supervision generally requires the establishment a licensing and regulatory regime under domestic law, along with a system of enforcement.<sup>56</sup> However, neither the Outer Space Treaty nor any of the other space conventions identify the contours of any particular licensing regime. One source observes:

The Outer Space Treaty does not articulate or designate any specific form of legal regime to be adopted by states for the purpose of providing such authorization, nor are there detailed requirements or guidelines in the treaty for states to follow to discharge their obligations of continuing supervision. States have the right to adopt any form of domestic regulatory oversight as they may deem appropriate, and consistent with their national interests and policies,

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<sup>53</sup> See PAUL STEPHEN DEMPSEY, PUBLIC INTERNATIONAL AIR LAW 741, 764 (2008); P. Paul Fitzgerald, *Inner Space: ICAO's New Frontier*, 79 J. AIR L. & COM. 3, 22 (2014).

<sup>54</sup> See THE NEED FOR AN INTEGRATED REGULATORY REGIME FOR AVIATION AND SPACE: ICAO FOR SPACE? (R. Jakhu, T. Sgobba & P. Dempsey eds., Springer 2011).

<sup>55</sup> COPUOS, Legal Subcomm., 52d Sess., A/AC.105/C.2/2012/LEG/L.1 (Mar. 2012).

<sup>56</sup> See Application of the Concept of the Launching State, G.A. Res. 59/115, U.N. GAOR, 59th Sess., U.N. Doc. A/RES/59/11 (2004).

subject to international treaty obligations. Although the Outer Space Treaty does not require that states implement any formal structure for authorization and continuing supervision whatsoever, a small but growing number of states have done so, and have established a procedure for the licensing of entities and/or projects.<sup>57</sup>

States are free to determine the level and extent of their domestic laws so long as they are consistent with their international obligations.<sup>58</sup> Licensing can be a single license for all activities, or more commonly, different licenses for different activities, such as the launch or re-entry of a space object, operating a launch facility, or operating a space object. Jurisdiction may be imposed on the basis of where the object is launched (e.g., the State, its territory, or facility) or the identity of the person regulated (a State's national or citizen wherever the launch occurs, or a foreign national launching within the State's territory or from its facility). The American Astronautical Society recommended:

That in developing, implementing and reviewing their domestic legal regimes, governments, keeping in mind the desire of the private sector for reasonable predictability and certainty, should first ensure that legal regimes are open and transparent; they should provide the private sector clear and timely access to the decision-making process; they should actively seek private sector input to the decision-making process; they should ensure that the decision-making process is balanced, reasoned and fair; and they should provide for a process to review adverse decisions.<sup>59</sup>

Some States regulate the launch site, some regulate the launch provider, and still others may regulate the satellite operator. As one source notes, “[s]ince a government can only act on the basis of laws or respective regulations, the establishment of national space laws is the most effective way of providing the State with the means to authorize and supervise non-governmental space activities.”<sup>60</sup> At least 26 States<sup>61</sup>—about 14% of the

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<sup>57</sup> Leslie I. Tennen, *Towards a New Regime for Exploitation of Outer Space Mineral Resources*, 88 NEB. L. REV. 794, 802 (2010).

<sup>58</sup> Outer Space Treaty, *supra* note 1, art. III.

<sup>59</sup> AMERICAN ASTRONAUTICAL SOCIETY, FINAL REPORT WORKSHOP ON INTERNATIONAL LEGAL REGIMES GOVERNING SPACE ACTIVITIES (2001), referred in Comm. on the Peaceful Uses of Outer Space, Legal Subcomm., 670th Meeting, Apr. 2002, Vienna, COPUOS/LEGAL/T.670.

<sup>60</sup> ARANZAMENDI, *supra* note 7, at 7.

<sup>61</sup> One source asserts a smaller number: “eighteen countries have passed forty-five relevant space acts or executive orders since the beginning of the Space Age as of 2005. The most active governments, defined as those that have enacted three or more laws, resolutions, edicts, decrees, or other legal acts during this period, have been Australia (enacting four laws during this period), Brazil (three), France (three), Italy (four), Russia, (six), Ukraine (three), and the United States (seven).” Scott J. Shackelford, *Governing the Final Frontier: A Polycentric Approach to Managing Space Weaponization and Debris*,

members of the United Nations—regulate space activities. Among the States that have enacted national space legislation are Algeria,<sup>62</sup> Argentina,<sup>63</sup> Australia,<sup>64</sup> Austria,<sup>65</sup> Belgium,<sup>66</sup> Brazil,<sup>67</sup> Canada,<sup>68</sup> Chile,<sup>69</sup> the People's Republic of China (PRC),<sup>70</sup> Colombia,<sup>71</sup> France,<sup>72</sup> Germany,<sup>73</sup>

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51 AM. BUS. L.J. 429, 477 (2014).

<sup>62</sup> Comm. on the Peaceful Uses of Outer Space (COPUOS), Rep. of the Legal Subcomm. on Its Fifty-Third Session, *Schematic Overview of National Regulatory Frameworks for Space Activities*, at 2, U.N. Doc. A/AC.105/C.2/2010/CRP.12 (Mar. 17, 2014), [http://www.unoosa.org/pdf/limited/c2/AC105\\_C2\\_2014\\_CRP05E.pdf](http://www.unoosa.org/pdf/limited/c2/AC105_C2_2014_CRP05E.pdf).

<sup>63</sup> National Decree No. 995/91, May 28, 1991, Creation of the National Commission on Space Activities [June 3, 1991] B.O., <http://www.infojus.gob.ar/995-nacional-creacion-comision-nacional-actividades-espaciales-dn19910000995-1991-05-28/123456789-0abc-599-0000-1991soterced> (Arg.); National Decree No. 125/95, July 19, 1995, Establishment of the National Registry of Space Objects Launched into Outer Space [25 July 1995] B.O., <http://www.infojus.gob.ar/125-nacional-creacion-registro-nacional-objetos-lanzados-al-espacio-ultraterrestre-dn19952000125-1995-07-19/123456789-0abc-521-0002-5991soterced> (Arg.).

<sup>64</sup> *Space Activities Act 1998* (Cth) (Austl.); *Statutory Rules No. 186, Space Activities Regulations 2001* (Cth) (Austl.); *Civil Aviation Safety Regulations 1998* (Cth) (Austl.); *Unmanned Aircraft and Rockets Regulations 2002* (Cth) (Austl.).

<sup>65</sup> Bundesgesetz über die Genehmigung von Weltraumaktivitäten und die Einrichtung eines Weltraumregisters [Weltraumgesetz] [Federal Law on the Authorization of Space Activities and the Establishment of a National Space Registry (Space Law)] BUNDESGESETZBLATT I [BGBl.] No. 132/2011, [https://www.ris.bka.gv.at/Dokument.wxe?Abfrage=BgblAuth&Dokumentnummer=BGBLA\\_2011\\_I\\_132](https://www.ris.bka.gv.at/Dokument.wxe?Abfrage=BgblAuth&Dokumentnummer=BGBLA_2011_I_132) (Austria) [hereinafter Austrian Space Law].

<sup>66</sup> Loi relative aux activités de lancement, d'opération de vol ou de guidage d'objets spatiaux [Law on the Activities of Launching, Flight Operations or Guidance of Space Objects] of Sept. 17, 2005, MONITEUR BELGE [M.B.] [Official Gazette of Belgium], Nov. 4, 2008, [https://www.belspo.be/belspo/space/doc/beLaw/Loi\\_fr.pdf](https://www.belspo.be/belspo/space/doc/beLaw/Loi_fr.pdf) (Belg.); Koninklijk besluit houdende uitvoering van sommige bepalingen van de wet van 17 september 2005 met betrekking tot de activiteiten op het gebied van het lanceren, het bedienen van de vlucht of het geleiden van ruimtevoorwerpen [Royal Decree Implementing Certain Provisions of the Law Of 17 September 2005 on the Activities of Launching, Flight Operations and Guidance of Space Objects from the Legal Basis for the Regulation of Space Activities] of Mar. 19, 2008, MONITEUR BELGE [M.B.] [Official Gazette of Belgium], Apr. 11, 2008, [http://www.etaamb.be/nl/koninklijk-besluit-van-19-maart-2008\\_n2008021031.html](http://www.etaamb.be/nl/koninklijk-besluit-van-19-maart-2008_n2008021031.html) (Belg.).

<sup>67</sup> Lei No. 8.854, de 10 de fevereiro de 1994, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 11.2.1994, [http://www.planalto.gov.br/ccivil\\_03/leis/L8854.htm](http://www.planalto.gov.br/ccivil_03/leis/L8854.htm) (Braz.); Lei No. 9.112, de 10 de outubro de 1995, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 11.10.1995 (Braz.); Decreto No. 1.953, de 10 de julho de 1996, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 10.7.1996, [http://www.planalto.gov.br/ccivil\\_03/decreto/1996/D1953.htm](http://www.planalto.gov.br/ccivil_03/decreto/1996/D1953.htm) (Braz.); Portaria 51 de 26 de janeiro de 2001 (Braz.); Portaria No. 27, de 20 de junho de 2001, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 29.06.2001, *reprinted in* PAUL STEPHEN DEMPSEY, SPACE LAW § 13 (2015) (Braz.); Resolução No. 5, de 21 de fevereiro de 2002, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 25.02.2002 (Braz.); Portaria No. 96, de 30 de novembro de 2011, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 01.12.2011 (Braz.).

<sup>68</sup> Canadian Space Agency Act, S.C. 1990, c. 13; *see also* Canadian Aviation Regulations, SOR/96-433, §§ 602.43, 602.44, <http://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/page-180.html>.

<sup>69</sup> Supreme Decree No. 338, Establishment of a Presidential Advisory Committee known as the Chilean Space Agency, Agosto 17, 2001, DIÁRIO OFICIAL [D.O.] (Chile), *reprinted in* PAUL STEPHEN DEMPSEY, SPACE LAW § 14 (2015).

<sup>70</sup> Kongjian Wuti Dengji Guanli Banfa (空间物体登记管理办法) [Measures for the Administration of Registration Space Objects] (promulgated by PRC Nat'l Def. Sci. & Tech. Indus. Comm. and PRC Ministry of Foreign Affairs, Feb. 8, 2001, effective immediately),



India,<sup>74</sup> Ireland,<sup>75</sup> Italy,<sup>76</sup> Japan,<sup>77</sup> Kazakhstan,<sup>78</sup> Netherlands,<sup>79</sup> Nigeria,<sup>80</sup>

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<http://www.miit.gov.cn/n11293472/n11505629/n11506225/n11508136/n12005940/12009757.html> (China); Minyong Hangtian Fashe Xiangmu Xukezheng Guanli Zaxing Banfa (民用航天发射项目许可证管理暂行办法) [Interim Measures on the Administration of Permits for Civil Space Launch Projects] (promulgated by PRC Nat'l Def. Sci. & Tech. Indus. Comm., Nov. 21, 2001, effective Dec. 21, 2002), <http://www.miit.gov.cn/n11293472/n11505629/n11506225/n11508136/n12005940/12140084.html> [hereinafter Chinese License Measures] (China); *see also* Interim measures on Administration of Mitigation of and Protection against Space Debris (promulgated by PRC Nat'l Def. Sci. & Tech. Indus. Comm., effective Jan. 1, 2010).

<sup>71</sup> L. 2442, julio 8, 2006, DIARIO OFICIAL [D.O.] 46,336, [https://www.cancilleria.gov.co/sites/default/files/Normograma/docs/decreto\\_2442\\_2006.htm](https://www.cancilleria.gov.co/sites/default/files/Normograma/docs/decreto_2442_2006.htm) (Colom.)

<sup>72</sup> Loi 2008-518 du 3 juin 2008 relative aux opérations spatiales [Law 2008-518 of June 3, 2008 on Space Operations], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], June 4, 2008, p. 9169 [hereinafter French Space Operations Act]. For more detailed implementing regulations, see Décret n° 2009-640 du 9 juin 2009 portant application des dispositions prévues au titre VII de la loi 2008-518 du 3 juin 2008 relative aux opérations spatiales [Decree 2009-640 of June 9, 2009 applying the provisions of Title VII of Law No. 2008-518 of June 3, 2008 on Space Operations], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], June 10, 2009, p. 9387 (providing for restrictions on remote sensing); Décret 2009-643 du 9 juin 2009 relatif aux autorisations délivrées en application de la loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales [Decree 2009-643 of June 9, 2009 concerning the authorizations issued pursuant to Law 2008-518 of June 3, 2008 on Space Operations], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], June 10, 2009, p. 9406 (creating a space launch and operations license application process); Décret 2009-644 du 9 juin 2009 modifiant le décret 84-510 du 28 juin 1984 relatif au Centre national d'études spatiales [Decree 2009-644 of June 9, 2009, modifying Decree 84-510 of June 28, 1984, relating to CNES], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], June 10, 2009, p. 9409 (integrating prior space laws with the new statute and decrees).

<sup>73</sup> Gesetz zum Schutz vor Gefährdung der Sicherheit der Bundesrepublik Deutschland durch das Verbreiten von hochwertigen Erdfernerkundungsdaten [SatDSiG] [Act to give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote Sensing Data], Nov. 23, 2007, BUNDESGESETZBLATT, Teil I [BGBl I] at 2590, *reprinted in* PAUL STEPHEN DEMPSEY, SPACE LAW § 19 (2015).

<sup>74</sup> Though India has not promulgated legislation, India's government has issued policies on space, remote sensing, and satellites. *See* PAUL STEPHEN DEMPSEY, SPACE LAW § 21 (2015).

<sup>75</sup> Irish Aviation Authority (Rockets and Small Aircraft) (SI 25/2000) (Ir.), <http://www.irishstatutebook.ie/eli/2000/si/25/>.

<sup>76</sup> Legge 25 gennaio 1983, n.35, G.U. Feb. 5, 1983, n.35 [Norms for the Implementation for the Convention on International Liability for Damage Caused by Space Objects] (It.); Legge 12 luglio 2005, n.153, G.U. Aug. 1, 2005, n.177 [Registration of Objects Launched into Outer Space] (It.).

<sup>77</sup> Uchūkaihatsujigyōdan-hō [Law Concerning The National Space Development Agency of Japan], Law No. 50 of 1969, [http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/japan/nasda\\_1969E.html](http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/japan/nasda_1969E.html); Kokuritsu kenkyū kaihatsu hōjin uchūkōkūkenkyūkaihatsukikō-hō [Law concerning Japan Aerospace Exploration Agency], Law No. 161 of 2002.

<sup>78</sup> Law of the Republic of Kazakhstan on Space Activities, 6 January, 2012, No. 528-IV, [http://www.unvienna.org/pdf/spacelaw/national/kazakhstan/528-IV\\_2012-01-06E.pdf](http://www.unvienna.org/pdf/spacelaw/national/kazakhstan/528-IV_2012-01-06E.pdf).

<sup>79</sup> Wet ruimtevaartactiviteiten 24 januari 2007, Stb. 2007, 80 [Rules Concerning Space Activities and the Establishment of a Registry of Space Objects] (Neth.), *reprinted in* PAUL STEPHEN DEMPSEY, SPACE LAW § 26 (2015); Besluit register ruimtevoorwerpen 13 november 2007, Stb. 2007, 475 [Decree Containing Rules With Regard to a Registry of Information Concerning Space Objects] (Neth.);

Norway,<sup>81</sup> Russian Federation,<sup>82</sup> South Africa,<sup>83</sup> the Republic of Korea (South Korea),<sup>84</sup> Spain,<sup>85</sup> Sweden,<sup>86</sup> Ukraine,<sup>87</sup> United Kingdom,<sup>88</sup> United

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Regeling aanvraag vergunning ruimtevaartactiviteiten en registratie 7 februari 2008, Stcrt. 2008, 13 [Order of the Minister of Economic Affairs, Containing Rules Governing License Applications for the Performance of Space Activities and the Registration of Space Objects] (Neth.).

<sup>80</sup> National Space Research and Development Agency (NASDRA) Act 2010; National Space Policy and Programs, *reprinted in* PAUL STEPHEN DEMPSEY, *SPACE LAW* § 27 (2015).

<sup>81</sup> Act on Launching Objects from Norwegian Territory into Outer Space, 13 June. No. 38. 1969, [http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/norway/act\\_38\\_1969E.html](http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/norway/act_38_1969E.html).

<sup>82</sup> Federal'nyi Zakon RF o Gosudarstvennoj korporacii po kosmicheskoi dejatel'nosti "Roskosmos" [Federal Law of the Russian Federation on the "Roscosmos" State Corporation for Space Activities], ROSSIISKAIA GAZETA [ROS. GAZ.], July 16, 2015, art. 7(11), <http://www.rg.ru/2015/07/16/roskosmos-dok.html>. Law of the Russian Federation about Space Activity, Federal Law No. 5663-1 (1993, as amended), <http://www.federalspace.ru/2881/> (last visited Jan. 8, 2016), *translated in* United Nations Office for Outer Space Affairs, *Selected Examples of National Laws Governing Space Activities: Russian Federation*, [http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/russian\\_federation/decre\\_5663-1\\_E.html](http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/russian_federation/decre_5663-1_E.html) (last visited Jan. 8, 2016) [hereinafter Russian Space Activity Law]; Postanovlenie Pravitel'stva RF Ob Utverzhdenii Polozhenija o Licenzirovanii Kosmicheskoi Dejatel'nosti [Federal Regulations of the Russian Federation Approving of Provisions on Licensing of Space Activities], ROSSIISKAIA GAZETA [ROS. GAZ.], July 11, 2006, <http://www.rg.ru/2006/07/11/kosmos-site-dok.html> [hereinafter Russian Space Licensing Law]. These regulations repealed RF Decree No. 422 of June 14, 2002, which in turn had given legal effect to older licensing requirements contained in RF Decree No. 104 of February 2, 1996; fortunately for readers, the new Russian Space Licensing Law contains similar substantive provisions. See Postanovlenie RF o Utverzhdenii Polozhenija o Licenzirovanii Kosmicheskoi Dejatel'nosti [Federal Regulations of the Russian Federation Approving of Provisions on Licensing of Space Activities], SOBRANIE ZAKONODATEL'STVA ROSSIISKOI FEDERATSII [SZ RF] [RUSSIAN FEDERATION COLLECTION OF LEGISLATION], 2002, No. 25, Item 2454, <http://pravo.gov.ru/ipsdata/?docbody=102039439&backlink=1&&nd=102076603> (promulgated as Decree No. 422); Postanovlenie RF o Utverzhdenii Polozhenija o licenzirovanii kosmicheskoi dejatel'nosti [Federal Regulations of the Russian Federation on Licensing Space Operations], SOBRANIE ZAKONODATEL'STVA ROSSIISKOI FEDERATSII [SZ RF] [Russian Federation Collection of Legislation], 1996, No. 6, Item 591 (promulgated as Decree No. 104), <http://pravo.gov.ru/ipsdata/?docbody=&prevDoc=102076603&backlink=1&&nd=102039439>.

<sup>83</sup> Space Affairs Act 84 of 1993, *as amended by* Space Affairs Amendment Act 64 of 1995 (S. Afr); South African National Space Act 36 of 2008.

<sup>84</sup> Space Development Promotion Act, Act No. 7538, May 31, 2005, *amended by* Act No. 7538, May 31, 2005 *and* Act No. 8714, Dec. 21, 2007, *translated in* Korea Legislation Research Institute online database, [http://elaw.klri.re.kr/eng\\_service/lawView.do?hseq=32594](http://elaw.klri.re.kr/eng_service/lawView.do?hseq=32594); Act on Compensation For Damage Caused By Space Objects, Act No. 8714, Dec. 21, 2007, *amended by* Act 8852, Feb. 29, 2008, *translated in* Korea Legislation Research Institute online database, [http://elaw.klri.re.kr/eng\\_service/lawView.do?hseq=28237](http://elaw.klri.re.kr/eng_service/lawView.do?hseq=28237).

<sup>85</sup> Law establishing in the Kingdom of Spain the Registry Foreseen in the Convention Adopted by the United Nations General Assembly (B.O.E. 1995, 58), <https://www.boe.es/buscar/pdf/1995/BOE-A-1995-6058-consolidado.pdf> (Spain).

<sup>86</sup> 2 § LAG OM RYMDVERKSAMHET [ACT ON SPACE ACTIVITIES] (Svensk författningssamling [SFS] 1982:963) (Swed.); 1 § FÖRORDNING OM RYMDVERKSAMHET [REGULATION ON SPACE ACTIVITIES] (Svensk författningssamling [SFS] 1982:1069) (creating license application process) (Swed.).

<sup>87</sup> Law of Ukraine on Space Activity of 1996, Ordinance of the Supreme Soviet of Ukraine on Space Activity, <http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/index.html> (last visited Sept. 30, 2015), *reprinted in* PAUL STEPHEN DEMPSEY, *SPACE LAW* § 33 (2015); Decree of the President of Ukraine on the establishment of the National Space Agency of Ukraine (Feb. 29, 1992, No.

States,<sup>89</sup> and Venezuela.<sup>90</sup> Hong Kong also regulates space activities.<sup>91</sup> Typically, these States require the issuance of a license or permit for space operations within its territory or by its residents, citizens or corporations anywhere in the world for a launch, re-entry, or operation of a launch facility. Typically also, these statutes and other governmental materials identify the policies of the State with respect to outer space activities.<sup>92</sup>

Governmental oversight of space activities is essential to protect public safety, property, and the environment, and to fulfill State obligations under international law. Licensing is the bedrock of governmental regulation of commercial space activities.

#### A. The License as a Prerequisite to Space Operations: Jurisdictional Limits

A growing number of States require a license as a prerequisite to space activity. Many require a permit for each individual launch of a space object, while some require separate licenses for an overseas launch or re-entry. Most States that have enacted national Space Law legislation require a license for a launch from their territory, or by their citizens from any location. Some States also regulate launch facilities (a.k.a. spaceports).<sup>93</sup> The popular trend is that domestic Space Laws define national activities on the basis of both nationality and territorial principles.<sup>94</sup> Several examples

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117), [http://www.unoosa.org/documents/pdf/spacelaw/national/decree\\_1992U.pdf](http://www.unoosa.org/documents/pdf/spacelaw/national/decree_1992U.pdf) (last visited Sept. 30, 2015).

<sup>88</sup> Outer Space Act 1986, c. 38 (Gr. Brit.), <http://www.legislation.gov.uk/ukpga/1986/38>; SCIENCE AND TECHNOLOGY COMMITTEE, 2007: A SPACE POLICY, 2006–07, HC 66-I, <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmsctech/66/66i.pdf> (UK).

<sup>89</sup> 51 U.S.C. (2010). See generally Meredith Blasingame, *Nurturing the United States Commercial Space Industry in an International World: Conflicting State, Federal, and International Law*, 80 MISS. L.J. 741 (2010); Joanne Irene Gabrynowicz, *One Half Century and Counting: The Evolution of U.S. National Space Law and Three Long-Term Emerging Issues*, 4 HARV. L. & POL'Y REV. 405 (2010).

<sup>90</sup> Law on the Establishment of the Bolivarian Agency for Space Activities, Gaceta No. 38.796 (Oct. 25, 2007); Decreto No. 3.389 (Dec. 2004); Decreto No. 4.114 (Nov. 28, 2005).

<sup>91</sup> Hong Kong Outer Space Ordinance, (2005) Cap. 523, art. 5(2) (H.K.), reprinted in PAUL STEPHEN DEMPSEY, *SPACE LAW* § 20:1 (2012). See also, U.N. Comm. on the Peaceful Uses of Outer Space, *Review of Existing National Space Legislation Illustrating How States are Implementing, as Appropriate, Their Responsibilities to Authorize and Provide Continuing Supervision of Non-governmental Entities in Outer Space*, U.N. Doc. A/AC.105/C.2/L.224, § I(2) (2001).

<sup>92</sup> See generally Graham Gibbs, *An Analysis of the Space Policies of the Major Space Faring Nations and Selected Emerging Space Faring Nations*, 37 ANNALS AIR & SPACE L. 237 (2012); Paul Stephen Dempsey, *Overview of United States Policy and Law*, in NATIONAL REGULATION OF SPACE ACTIVITIES 373 (R. Jakhu ed. 2010).

<sup>93</sup> Thomas Brannen, *Private Commercial Space Transportation's Dependence on Space Tourism and NASA's Responsibility To Both*, 75 J. AIR L. & COM. 639, 656–67 (2010); Michael C. Mineiro, *Law and Regulation Governing U.S. Commercial Spaceports: Licensing, Liability, and Legal Challenges*, 73 J. AIR L. & COM. 759, 760–65 (2008).

<sup>94</sup> See Steven Freeland, *Matching Detail with Practice: The Essential Elements of National Space*

follow.

Brazil regulates launches from its territory.<sup>95</sup> Kazakhstan also requires a license prior to carrying out space activities.<sup>96</sup>

Australia imposes a requirement that an applicant procure a space license, launch permit or overseas launch certificate prior to operations.<sup>97</sup> Both Space activities in the territory of Australia and those activities undertaken by Australians outside Australia are covered under its licensing regime.<sup>98</sup> In Australia, launching a space object is defined as launching an object into an area beyond 100 km above mean sea level, or attempting to do so.<sup>99</sup> A launch permit is required to launch a particular space object or a particular series of launches of space objects from a launch facility located in Australia.<sup>100</sup> An Overseas Launch Certificate is required if an Australian national is engaged in a launch of space object from a facility in an overseas territory.<sup>101</sup> A launch permit is granted after the licensing authority is satisfied that the applicant demonstrates competence to carry on the launch and connected returns without substantial harm to public health, public safety, or property.<sup>102</sup> The launch of a space object must not contravene Australia's national security, foreign policy, or international obligations, and the applicant must meet necessary financial and insurance requirements

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*Legislation*, in PROCEEDINGS OF INTERNATIONAL INSTITUTE OF SPACE LAW 540, 541 (2010); Frans G. von der Dunk, *Liability Versus Responsibility in Space Law: Misconception or Misconstruction?*, in PROCEEDINGS OF THE THIRTY-FOURTH COLLOQUIUM ON THE LAW OF OUTER SPACE 363, 367(1991). Professor Bin Cheng posits that a State has three kinds of jurisdiction: territorial, quasi-territorial (over its aircrafts, ships and space objects), and personal (i.e. over its nationals, both natural and artificial). But jurisdiction has two elements: jurisdiction (i.e., the power of State to enact laws) and jurisdiction (i.e., the power of State to execute and enforce its laws). There is a clear hierarchy between jurisdictions in the order territorial, quasi-territorial and personal and the more important ones can override the less important ones. Effective jurisdiction exists when the State's jurisdiction is not overridden by that of any other State; the State is responsible under Article VI of the Outer Space Treaty for all activities over which State has effective jurisdiction. Thus, though a State is responsible not only for acts within its territorial jurisdiction but also for all acts precipitated by its space objects, ships and aircrafts and for activities by its nationals, it should exert effective jurisdiction over those activities. Cheng, *supra* note 49, at 25.

<sup>95</sup> Portaria 27 de 20 de junho de 2001, art. 6 (Braz.).

<sup>96</sup> Law of the Republic of Kazakhstan on Space Activities, art. 13 (Jan. 6, 2012), No. 528-IV, [http://www.oosa.unvienna.org/pdf/spacelaw/national/kazakhstan/528-IV\\_2012-01-06E.pdf](http://www.oosa.unvienna.org/pdf/spacelaw/national/kazakhstan/528-IV_2012-01-06E.pdf).

<sup>97</sup> *Space Activities Act 1998* (Cth) divs 3 & 4 (Austl.); see ARANZAMENDI, *supra* note 7, at 16.

<sup>98</sup> *Space Activities Act 1998* (Cth) s 6 (Austl.). The licensing regime for launching activities has been laid down in Australia by the Space Activities Act 1998 and the Space Activities Regulation 2001 and have extraterritorial application.

<sup>99</sup> *Id.* s 8.

<sup>100</sup> *Id.* ss 11, 26(1). However, if the Minister instead grants an exemption certificate, the applicant need not obtain a launch permit. Exemption certificate covering specified conduct that might otherwise be prohibited under law on launch permit. *Id.* s 46.

<sup>101</sup> *Id.* s 35.

<sup>102</sup> *Id.* s 32.

(as discussed below).<sup>103</sup>

France requires a license of a French national or juridical persons headquartered in France who intend to launch or procure a launch of a space object from French territory.<sup>104</sup> In France, those who must apply for a license include:

- (1) [anyone who] launches from the French territory *or* from a facility under the jurisdiction of France, or who plans to reenter an object into national territory *or* onto a facility under French jurisdiction;
- (2) any French operator, regardless of where they launch from;
- (3) any French person or corporation headquartered in France, operator or not, that will launch or even just command a space object; and
- (4) anyone previously authorized under French law who wants to transfer control or command of a space object.<sup>105</sup>

The United Kingdom requires a license from any U.K. national, subject or body incorporated under U.K. law who seeks to launch or procure the launch of a space object, operate a space object, or engage in any activity in outer space (other than the leasing of space segment satellite capacity, i.e., transponders).<sup>106</sup> The Outer Space Act of 1986<sup>107</sup> applies to

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<sup>103</sup> *Id.* s 18.

<sup>104</sup> French Space Operations Act, *supra* note 72, art. 2. The French Space Operations Act was adopted in 2008 and entered into force in 2010. Before this legislation, a legal framework existed through agreements and contracts with Arianespace and European Space Agency existed to govern the authorization of national activities of France. Centre spatial guyanais (CSG) used to control space activities through the safety mission of Centre national d'études spatiales (CNES) which is the national space agency of France and therefore, CNES exercised indirect control.

<sup>105</sup> See Giugi Carminati, *French National Space Legislation: A Brief "Parcours" of a Long History*, 36 HOUS. J. INT'L L. 1 (2014). The French Space Operations Act established a national regime for authorization and monitoring space operations by private entities. The act governs "space operation" which is defined as "any activity consisting in launching or attempting to launch an object in Outer space, or in ensuring the command of a space object during its journey in Outer space . . . , as well as during its return on Earth." French Space Operations Act, *supra* note 72, art. 1.3. Thus, the Act distinguishes between launching phase and command phase, and also addresses transfer of control to a third party which requires a second authorization. The competent administrative authority for authorizing and monitoring space operations is the Minister in charge of Space Affairs. Prior authorization for space operations is required for any operator intending to launch space object from or on French territory or facilities under French jurisdiction, any French national intending to launch space object from or on a place under sovereignty of no State, or any French person intending to procure launching whose headquarters are in France. *Id.* art. 2. Further, the operations should not be likely to jeopardize national security or international obligations of France. *Id.* art. 4. In case of foreign operations, a simplified procedure of authorization is followed. The applicant may be exempted from complying with technical requirements provided that the foreign State provides sufficient legal guarantees or equivalent standards as regards the safety of persons and property, the protection of public health and the environment, and liability matters. *Id.* art. 4.4.

<sup>106</sup> UK SPACE AGENCY, REVISED GUIDANCE FOR APPLICANTS, OUTER SPACE ACT 1986, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/320158/Guidance\\_for\\_applicants\\_-\\_June\\_2014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/320158/Guidance_for_applicants_-_June_2014.pdf) [herein after, REVISED GUIDANCE]. The lease of space segment satellite

U.K. nationals,<sup>108</sup> Scottish firms, and bodies incorporated in United Kingdom and their launching activities both within the territory of U.K. and elsewhere.<sup>109</sup> Thus, U.K. law appears not to apply to non-nationals carrying out launching activities in the U.K. Licensed space activity may not jeopardize public health or safety of persons or property, may not impair national security, and must be conducted in a manner consistent with international obligations.<sup>110</sup>

In Belgium, a natural or legal person must obtain prior authorization to engage in space activities in zones under the jurisdiction or control of the State, or using installations or property of the State, or from an area under the jurisdiction or control of Belgium.<sup>111</sup> The Netherlands requires licensing for launching, flight operations or guidance of space objects performed in or from Dutch soil or a Dutch ship.<sup>112</sup>

Canada regulates launches under its Aeronautics Act, which principally governs the operation of aircraft.<sup>113</sup> Pursuant thereto, the Canadian Aviation Regulations define standards for aeronautical activities in Canada. Transport Canada's Launch Safety Office is responsible for the safety oversight of all civilian rocket launches in Canada, except for model

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capacity (transponders) from international inter-governmental satellite organizations or privately owned entities for use by the lessee or by a person sub-letting the capacity need not be licensed. Further, utilization of space segment capacity using earth stations for either transmission or reception purposes also does not require license. However, this exception does not apply to persons involved in telemetry, tracking and control of satellites in orbit. *Id.* at 1. Those who intend to carry out launches must understand the hazards involved and make reasonable attempt to limit them. *Id.* annex A. The applicant must insure himself against liability. Further, the launching activities may not jeopardize public health, the safety of persons or property, national security or U.K.'s ability to meet its international obligations. License can be transferred with written consent of Secretary of State. REVISED GUIDANCE, at 4. The United Kingdom does not have a licensing procedure or law specifically addressing a launching facility or launching site. However, the application for licensing for a launch includes detailed questions on the ground segment. *Id.* annex A.

<sup>107</sup> Outer Space Act 1986, §1 (Gr. Brit.), <http://www.legislation.gov.uk/ukpga/1986/38>.

<sup>108</sup> United Kingdom national for the purposes of Outer Space Act has been defined in Section 2 as (a) a British citizen, a British Dependent Territories citizen, a British National (Overseas), or a British Overseas citizen, (b) a person who under the British Nationality Act 1981 is a British subject, or (c) a British protected person within the meaning of that Act.

<sup>109</sup> Bin Cheng, *International Responsibility and Liability for Launch Activities, in THE USE OF AIR AND OUTER SPACE COOPERATION AND COMPETITION* 159, 171 (Chia-Jui Cheng ed., 1995).

<sup>110</sup> Outer Space Act 1986, § 4.

<sup>111</sup> Loi relative aux activités de lancement, d'opération de vol ou de guidage d'objets spatiaux [Law on the Activities of Launching, Flight Operations or Guidance of Space Objects] of Sept. 17, 2005, MONITEUR BELGE [M.B.] [OFFICIAL GAZETTE OF BELGIUM], Nov. 4, 2008, art. 1, § 1, [https://www.belspo.be/belspo/space/doc/beLaw/Loi\\_fr.pdf](https://www.belspo.be/belspo/space/doc/beLaw/Loi_fr.pdf).

<sup>112</sup> Wet ruimtevaartactiviteiten 24 januari 2007, Stb. 2007, 80 (Neth.).

<sup>113</sup> In Canada, launching activities are governed by Aeronautics Act of 1985 and Canadian Aviation Regulations. Laws governing licensing of space activities in Canada apply to all persons and to all aeronautical products and other things in Canada, to all persons outside Canada who hold Canadian aviation documents and to all Canadian aircraft and passengers and crew members thereon outside Canada. Aeronautics Act, R.S.C. 1985, c A-2.

rockets, which are exempt from regulation.<sup>114</sup> The launch of a “high power rocket” (a term most often referring to the largest model rockets) requires prior authorization.<sup>115</sup> Applicants must submit a one page application<sup>116</sup> to the nearest regional office of Transport Canada, General Aviation. Transport Canada’s regional staff reviews the application to ensure that the location and launch activities will be safe and consistent with regulatory requirements. Rather than promulgate elaborate rules to govern licensing and operations, Canada defers to the standards adopted by the Canadian Association of Rocketry, a non-profit organization.<sup>117</sup> The guidelines established by that Association have been deemed acceptable by the Canadian Minister of Transport<sup>118</sup> as launch site requirements for these so-called “high power rockets.”<sup>119</sup>

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<sup>114</sup> Canadian Aviation Regulations, SOR/96-433.

<sup>115</sup> *Id.* Canada’s Aeronautics Act defines “aircraft” as including any machine capable of deriving support in the atmosphere from reactions of the air, and includes a rocket. Aeronautics Act, R.S.C. 1985, c. A-2. In turn, “rocket” means “a projectile that contains its own propellant and that depends for its flight on a reaction set up by the release of a continuous jet of rapidly expanding gases.” Canadian Aviation Regulations, SOR/96-433. Authorization from the Minister of Transport is required for the launch of rockets, other than a model rocket or a rocket of a type used in a fireworks display. *Id.* The minister may issue the authorization when launch of rocket is in public interest and is not likely to affect safety of aviation. Canadian Aviation Regulation § 101.01 provides that a “model rocket” is a rocket that (a) is equipped with model rocket motors that will not generate a total impulse exceeding 160 N.s, (b) has a gross weight, including motors, not exceeding 1 500 g (3.3 pounds), and (c) is equipped with a parachute or other device capable of retarding its descent. In Canada, the law confers on the Minister of Transport the regulatory oversight of rocket launches in Canada and the Minister of Transport has delegated this function to Canadian Launch Safety Office. Applications for authorization of launch of rockets are made to the Launch Safety Office of Transport Canada which reviews such requests. Launch applicants have to submit a launch application describing the plan of operation, safety processes, mission, environmental issues and other information for the same. Launch authorization may be for the launch of a rocket or series of rockets of similar type. As in several other countries, launch applicants have to obtain liability insurance or demonstrate financial capability to compensate maximum probable loss from third party claims arising out of launch activities. PAUL STEPHEN DEMPSEY, *SPACE LAW*, Vol. 3, § 14-126.

<sup>116</sup> TRANSPORT CANADA, APPLICATION FOR AUTHORIZATION TO LAUNCH HIGH POWER AND ADVANCED HIGH POWER ROCKET(S), <http://www.tc.gc.ca/media/documents/ca-standards/26-0660.pdf> (last visited Oct. 16, 2014).

<sup>117</sup> See CARWEB: THE CANADIAN ASSOCIATION OF ROCKETRY, <http://www.canadianrocketry.org/> (last visited Oct. 16, 2014); NAPAS: HOME OF THE NORTH AMERICAN PROPULSION AND AEROSPACE SOCIETY, <http://www.napas.net/> (last visited Oct. 16, 2014).

<sup>118</sup> *About the Canadian Association of Rocketry*, CARWEB: THE CANADIAN ASSOCIATION OF ROCKETRY, [http://www.canadianrocketry.org/car\\_about.php](http://www.canadianrocketry.org/car_about.php) (last visited Oct. 16, 2014).

<sup>119</sup> A “high power rocket” is a launch vehicle that is (a) equipped with one or more rocket engines/motors contributing to an installed total impulse between 160 and 40,960 newton-seconds, (b) weighing more than 1.5 kg (3.3 pounds), (c) equipped with a parachute or similar device, and (d) whose primary uses are for purposes of education and/or recreation. Generally speaking, the launch area must be at least 500 meters removed from any overhead obstacles (depending on estimated maximum altitude) and be located so as to avoid generating hazards to people or property, particularly air traffic. TRANSPORT CANADA, REQUIREMENTS FOR LAUNCHING HIGH POWER ROCKETS IN CANADA, §§ 6–8 [http://www.canadianrocketry.org/files/tc\\_hpr\\_reqs\\_jan00.pdf](http://www.canadianrocketry.org/files/tc_hpr_reqs_jan00.pdf) (last visited Oct. 16, 2014).

In South Korea, a person who seeks to launch a space vehicle must first obtain a license from the Ministry of Science and Technology.<sup>120</sup> In issuing the license, the Minister must consider the purpose of the launch, the safety management of the vehicles, and the existence of liability insurance.<sup>121</sup>

Similarly, Hong Kong requires a license for an entity seeking to launch, procure a launch, to operate a space object, or engage in any activity in space. The operations must not jeopardize public health or safety of persons or property. Activities must be conducted consistently with international obligations, and must not impair national security.<sup>122</sup>

Norway promulgated a succinct piece of space legislation.<sup>123</sup> No Norwegian citizen or resident may launch a space object without permission, whether the launch takes place from Norway, from Norwegian territory, vessels or aircraft, or in areas not subject to sovereignty.<sup>124</sup>

South Africa requires a license for a launch from its territory, or on behalf of a South African incorporated or registered company, or for the operation of a launch facility.<sup>125</sup> Launching is defined as “the placing or attempted placing of any spacecraft into a suborbital trajectory<sup>126</sup> or into outer space, or the testing of a launch vehicle or spacecraft in which it is foreseen that the launch vehicle will lift from the earth’s surface.”<sup>127</sup> In South Africa, the Space Affairs Act governs launches from the territory of South Africa, in the territory of another State by or on behalf of a juristic person incorporated or registered in South Africa or operation of a launch facility or participation of a juristic person in launch activity that would entail State obligations of South Africa under international conventions or any other launch related space activities prescribed by the Minister.<sup>128</sup> The national space policy of South Africa provides that “in order to build an industrial base to support South Africa’s requirements for space technology,” involvement of the private sector is necessary and possibilities of private-public partnership should be explored.<sup>129</sup> The legislation imposes

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<sup>120</sup> Ujugaebaljinheungbeop [Space Development Promotion Act], Act No. 7538, May 31, 2005, art. 11, *reprinted in* PAUL STEPHEN DEMPSEY, SPACE LAW § 25:1 (2015).

<sup>121</sup> *Id.*

<sup>122</sup> Hong Kong Outer Space Ordinance, (2005) Cap. 523, art. 5(2) (H.K.), *reprinted in* Paul Stephen Dempsey, Space Law § 20:1 (2012).

<sup>123</sup> *Act on Launching Objects from Norwegian Territory into Outer Space* No. 38. (June 13, 1969).

<sup>124</sup> *Id.*

<sup>125</sup> Space Affairs Act 84 of 1993, *as amended by* Space Affairs Amendment Act 64 of 1995 (S. Afr.); South African National Space Act 36 of 2008.

<sup>126</sup> “‘Suborbital trajectory’ means the trajectory of any object which leaves the surface of the earth due to a launch, but returns to the surface of the earth without completing an orbit around the earth.” Space Affairs Act 84 of 1993, § 1 (S. Afr.).

<sup>127</sup> *Id.*

<sup>128</sup> *Id.* § 11.

<sup>129</sup> SOUTH AFRICAN DEP’T OF TRADE & INDUS., NATIONAL SPACE POLICY OF 2008 § 7.5.2 (2008),



safety standards, and requires compliance with international obligations and responsibilities.<sup>130</sup>

No space activity is permitted on Swedish territory or by a Swedish person without a license.<sup>131</sup> An application must be submitted in writing to the National Board for Space Activities (now the Swedish National Space Board). The license may be restricted in a manner deemed appropriate.<sup>132</sup> However, the legislation does not specify the formal procedures, nor does it explain how the public interest, security, public health or environment are to be protected.<sup>133</sup>

In the United States, the Commercial Space Launch Act of 1984 (CSLA)<sup>134</sup> authorized the Federal Aviation Administration (FAA) to license the launch and re-entry of expendable and reusable vehicles, as well as the operation of a launch or reentry site by a U.S. citizen irrespective of whether the launch site is within or without the United States.<sup>135</sup> The United States Commercial Space Launch Act of 1984 applies to launch activities, including operation of a launch site, by U.S. citizens or any other person within the territory of United States.<sup>136</sup> The process is intended to be “light handed” so as to promote commercial space development. The U.S. licenses launches for commercial space flights, but does not engage in the safety certification of launch or aerospace vehicles.<sup>137</sup> However, the FAA has published a document identifying “best practices” in the design, manufacture and operations of human space flight vehicles.<sup>138</sup> Unless the launch and reentry is exempt from regulation,<sup>139</sup> the applicant may apply

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<http://www.unoosa.org/documents/pdf/spacelaw/national/safrica/nat-policyE.pdf>.

<sup>130</sup> Space Affairs Act 84 of 1993, § 11(2)(a), (c).

<sup>131</sup> 2 § LAG OM RYMDVERKSAMHET [ACT ON SPACE ACTIVITIES] (Svensk författningssamling [SFS] 1982:963) (Swed.); 1 § FÖRORDNING OM RYMDVERKSAMHET [REGULATION ON SPACE ACTIVITIES] (Svensk författningssamling [SFS] 1982:1069) (creating license application process) (Swed.).

<sup>132</sup> The statute specifies that receiving signals from space is not considered to be a space activity, nor is a sounding rocket launch. 1 § RYMDVERKSAMHET (1982:963).

<sup>133</sup> ARANZAMENDI, *supra* note 7, at 16.

<sup>134</sup> 51 U.S.C. § 50906 (2010); 14 C.F.R. pts. 400–450 (1988); *see generally* Catherine E. Parsons, *Space Tourism: Regulating Passage to the Happiest Place Off Earth*, 9 CHAP. L. REV. 493 (2006); Ronald L. Spencer, Jr., *State Supervision of Space Activity*, 63 A.F. L. REV. 75 (2009).

<sup>135</sup> *See generally* Maria-Vittoria “Giugi” Carminati, *Breaking Boundaries By Coming Home: The FAA’s Issuance of a “Reentry License” to SpaceX*, 24 AIR & SPACE L., no. 2, 2011, at 8; Joanne Irene Gabrynowicz, *One Half Century and Counting: The Evolution of U.S. National Space Law and Three Long-Term Emerging Issues*, 4 HARV. L. & POL’Y REV. 405 (2011); Henry R. Hertzfeld, *Legal and Policy Considerations for Commercial Reusable Launch Vehicles*, 15 AIR & SPACE L. 1 (2000).

<sup>136</sup> 51 U.S.C. § 50904(a)(1).

<sup>137</sup> Claudia Pastorius, *Law and Policy in the Global Space Industry’s Lift-Off*, 19 BARRY L. REV. 201, 234 (2013).

<sup>138</sup> *Recommended Practices for Human Space Flight Occupant Safety*, FED. AVIATION ADMIN. [http://images.spaceref.com/docs/2014/Recommended\\_Practices\\_for\\_HSF\\_Occupant\\_Safety-Version1.pdf](http://images.spaceref.com/docs/2014/Recommended_Practices_for_HSF_Occupant_Safety-Version1.pdf) (last visited Nov. 1, 2014).

<sup>139</sup> “An exemption applies if the vehicle is launched from a private site and the rocket: (1) has (a)

for: (1) a launch- or reentry-specific license; or (2) a launch or reentry operator license.<sup>140</sup> The process contemplates pre-filing consultations with the FAA.<sup>141</sup> A U.S. citizen must obtain FAA authorization to launch, reenter, or operate a launch or reentry site anywhere in the world.<sup>142</sup> Any person seeking to conduct commercial space transportation in the U.S. must also obtain FAA authorization.<sup>143</sup> Once filed, the FAA has 180 days to process a license application.<sup>144</sup> The FAA prescribes the terms and conditions for conducting authorized activity by the vehicle or site operator.<sup>145</sup> A launch or reentry operator license authorizes the licensee to launch or re-enter a space object from one launch or reentry site.<sup>146</sup> An operator license remains in effect for two to five years from issuance. Regulatory review of a launch application focuses on public health and safety, safety of property, and U.S. national security and foreign policy concerns and obligations.<sup>147</sup> The licensing process consists of several steps:

- Pre-application consultation;
- Policy review and approval;
- Safety review and approval;
- Payload review and determination;
- Financial responsibility determination;
- Environmental review; and
- Compliance monitoring.<sup>148</sup>

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motor(s) with a total impulse of 200,000 pound-seconds or less; (2) and a total burning time of less than 15 seconds; and (3) has a ballistic content of less than 12 pounds per square inch.” 1 J. SPACE & SAFETY ENGINEERING 44, 57 n.89 (2014) (citing 14 C.F.R. § 400.2 (1988)).

<sup>140</sup> 14 C.F.R. § 415 (1988).

<sup>141</sup> Licensing and Safety Requirements for Operation of a Launch Site, 65 Fed. Reg. 62812 (Oct. 19, 2000) (codified at 14 C.F.R. pts. 401, 417, 420).

<sup>142</sup> 51 U.S.C. § 50904 (2010); The United States Code confers upon the U.S. Secretary of Transportation authority to issue launch vehicle and site certificates and permits as well as to regulate their operations. This authority, in turn, has been delegated to the Secretary to the FAA.

<sup>143</sup> 51 U.S.C. § 50905; *see also* 51 U.S.C. § 50906 (an Experimental Airworthiness Certificate may be required under certain circumstances).

<sup>144</sup> 51 U.S.C. § 50905.

<sup>145</sup> However, U.S. government space activities (such as those by NASA and the Defense Department) are not subject to FAA jurisdiction.

<sup>146</sup> *Launch or Reentry Vehicles*, FED. AVIATION ADMIN., [http://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/licenses\\_permits/launch\\_reentry/](http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/) (last visited Nov. 1, 2014).

<sup>147</sup> Commercial Space Transportation; Suborbital Rocket Launch, 68 Fed. Reg. 59977 (Oct. 20, 2003). The CLSA gave the FAA jurisdiction to regulate commercial space activities, “only to the extent necessary to ensure compliance with international obligations of the United States and to protect the public health and safety, safety of property, and national security and foreign policy interest of the United States, . . . encourage, facilitate, and promote commercial space launches by the private sector, recommend appropriate changes in Federal statutes, treaties, regulations, policies, plans, and procedures, and facilitate the strengthening and expansion of the United States space transportation infrastructure.” *Id.*

<sup>148</sup> *Office of Commercial Space Transportation*, FED. AVIATION ADMIN., <http://ast.faa.gov/lrra/> (last

In the United States, the National Oceanic and Atmospheric Administration (NOAA) issues regulations for the licensing, monitoring and compliance of operators of private Earth remote sensing space systems.<sup>149</sup> Similarly, Germany requires licensing of high-grade Earth remote sensing systems, and providers of such remote sensing data.<sup>150</sup> In Canada, the Department of Foreign Affairs, Trade and Development (DFATD) issues licenses for remote sensing space systems under the 2005 Remote Sensing Space Systems Act.<sup>151</sup>

The national law in the Russian Federation establishes a licensing procedure for all space activities.<sup>152</sup> The Russian licensing regime covers both space launches and flight operations by legal and natural persons of the Russian Federation as well as the space operations of foreign citizens and organizations operating under Russian jurisdiction.<sup>153</sup> Licenses are issued by the Roscosmos,<sup>154</sup> and it should render a decision granting or denying the license within 45 days of receipt of application and requisite supporting documentation.<sup>155</sup> Licenses are issued generally for a period of five years, though the license period may be longer for activities conducted pursuant to state contracts.<sup>156</sup>

Some States impose *de minimus* requirements. For example, Argentina

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visited Nov. 1, 2014); *see also* *Office of Commercial Space Transportation: Licenses, Permits, and Approvals*, FED. AVIATION ADMIN., [http://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/licenses\\_permits/](http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/) (last visited Nov. 1, 2014).

<sup>149</sup> National and Commercial Space Programs Act, 51 U.S.C. §§ 60121–60125 (2014); Licensing of Private Remote Sensing Systems, 15 C.F.R. pt. 960 (2012).

<sup>150</sup> Gesetz zum Schutz vor Gefährdung der Sicherheit der Bundesrepublik Deutschland durch das Verbreiten von hochwertigen Erdfernerkundungsdaten [SatDSiG] [Act to give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote Sensing Data], Nov. 23, 2007, BUNDESGESETZBLATT, Teil I [BGBl I] at 2590, *reprinted in* PAUL STEPHEN DEMPSEY, *SPACE LAW* § 19:2 (Thomson Reuters/West 2012) (Ger.).

<sup>151</sup> Remote Sensing Space Systems Act, S.C. 2005, c 45 (Can.); *see generally* Ram Jakhu, Catherine Doldrina & Yaw Nyampong, *Findings of an Independent Review of Canada's Remote Sensing Space Systems Act of 2005*, 37 ANNALS AIR & SPACE L. 399 (2012).

<sup>152</sup> Federal'nyj zakon RF o Licenzirovanii Otdel'nyh Vidov Dejatel'nosti [Federal Law of the Russian Federation on Licensing of Certain Activities], ROSSIISKAIA GAZETA [ROS. GAZ.] May 6, 2011, art. 12(1)(41), <http://www.rg.ru/2011/05/06/license-dok.html> [hereinafter Russian Licensing Law]; Russian Space Activity Law, *supra* note 82, art. 9.

<sup>153</sup> Russian Space Licensing Law, *supra* note 82, arts. 1, 3(e).

<sup>154</sup> Russian Space Licensing Law, *supra* note 82, art. 3(c)–(e). The Roscosmos State Corporation for Space Activities inherited this authority from its predecessor the Russian Federal Space Agency, which was abolished by Presidential Decree No. 666 signed by Vladimir Putin on December 28, 2015, available as of this article's publication at <http://pravo.gov.ru/laws/acts/101/545454.html>. *See also*, ROSCOSMOS STATE CORPORATION, [https://en.wikipedia.org/wiki/Roscosmos\\_State\\_Corporation](https://en.wikipedia.org/wiki/Roscosmos_State_Corporation) (law visited Jan. 17, 2016).

<sup>155</sup> Russian Licensing Law, *supra* note 152, art. 14(1) (setting time limits); Russian Space Licensing Law, *supra* note 82, arts. 3, 5 (specifying informational requirements specific to space licenses).

<sup>156</sup> Russian Space Licensing Law, *supra* note 82, art. 4.

requires merely that those engaging in space activities register with the government.<sup>157</sup> The registering enterprise must submit information on the launch date and location, any joint operations with other launching States, the launch service provider, insurance arrangements, space debris reduction precautions, and end-of-life disposal plans for the space object.<sup>158</sup>

As we have seen, the scope of application of national space legislation differs between jurisdictions. Certain States do not regulate activities by their nationals on the high seas or in the territory of another State. Some States do not regulate space activities of non-nationals even if they happen in the territory of the State.<sup>159</sup> Perhaps, the most comprehensive law on the scope of application of national law is that of France which imposes personal jurisdiction on any type of person engaging in space activities so long as there is a French connection. Similarly, Australia, the United States, South Africa, and the Russian Federation have promulgated legislation with broad jurisdiction. In contrast, India has no law providing for the extraterritorial application of its space activities.

#### B. Technical and Financial Qualifications of Applicants

Many States that license space activities evaluate the technical and financial fitness of the applicant and its facilities to ensure that they will not endanger public health, safety, or property or impose economic burdens on the national treasury. These requirements are similar to the managerial and financial fitness certification requirements imposed upon airlines.<sup>160</sup> Several examples follow.

Australia has promulgated an elaborate and detailed licensing statute.<sup>161</sup> It requires that the launch facility, launch vehicle, and flight path be effective and safe. Applicants must submit design and engineering plans of the launch vehicle. They must identify their organizational structure and financial fitness, their program management plan, their technology security plan, and their emergency plan. Before a license is issued, the Minister must be satisfied with the organizational and financial competency of the applicant. The applicant must have sufficient funding to construct and operate the launch facility and launch vehicle, and must complete an

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<sup>157</sup> National Decree No. 125/95, July 19, 1995, Establishment of the National Registry of Space Objects Launched into Outer Space [25 July 1995] B.O., art. 5 (Arg.).

<sup>158</sup> *Id.*

<sup>159</sup> Also, most statutes do not deal with transfer of satellites, especially inter-State transfer of satellites. For example, Australia has a broad scope of application providing for all activities within its territory and outside its territory by its nationals. However, it is silent regarding inter-State transfer of satellites.

<sup>160</sup> See PAUL STEPHEN DEMPSEY & LAURENCE E. GESELL, AIRLINE MANAGEMENT: STRATEGIES FOR THE 21ST CENTURY 254–57 (3d ed. 2012).

<sup>161</sup> *Space Activities Act 1998* (Cth) (Austl.); *Statutory Rules No. 186, Space Activities Regulations 2001* (Cth) (Austl.); see also ARANZMANEDI, *supra* note 7, at 16.

adequate environmental management plan<sup>162</sup> containing evidence of State and Commonwealth approvals including requirements under the Environment Protection (Impact of Proposals) Act 1974 and the Environment Protection and Biodiversity Conservation Act 1999.<sup>163</sup> Further, both the launch facility<sup>164</sup> and the launch vehicle must be effective and safe for their intended purpose as is reasonably practicable given their design and (proposed) construction.<sup>165</sup> The launch vehicle must also be as effective and safe for its intended purpose as is reasonably practicable. The flight path must also be as effective and safe as is reasonably practicable for its intended purpose.<sup>166</sup>

Brazil requires a license as a prerequisite to engaging in commercial Space Launching Activities from Brazilian territory.<sup>167</sup> The license may contain restrictive or conditioning clauses. Activities of the licensee are controlled, monitored and supervised by the Brazilian Space Agency (AEB). Technical, economic, and financial qualifications are imposed upon licensees.<sup>168</sup> In Brazil, the AEB will issue a license only to “legal persons, associated or affiliated with business or legal representation in the country, with express powers to respond administratively or judicially and considered technically and administratively qualified to perform launching activities.”<sup>169</sup>

In South Korea, an applicant may be disqualified if he is deemed incompetent or quasi-incompetent, bankrupt, if he served a prison sentence in the prior two years, or was on probation for violating the Act.<sup>170</sup> In France, authorizations are granted after the Administrative Authority examines the moral, financial, and professional guarantees of the applicant.<sup>171</sup> In addition, the Administrative Authority will check for

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<sup>162</sup> *Space Activities Act 1998* (Cth) s 18 (Austl.).

<sup>163</sup> Noel Siemon & Stephen Freeland, *Regulation of Space Activities in Australia*, in NATIONAL REGULATION OF SPACE ACTIVITIES 37, 49 (Ram Jakhu ed., 2010).

<sup>164</sup> In Australia, a launch facility is a facility or place from which space objects can be launched, and includes all other components of the facility or place that are necessary to conduct a launch. A license is required to operate a launch facility in Australia, or to do anything directly connected with operating a launch facility in Australia, using a particular kind of launch vehicle or to use particular flight paths. *Space Activities Act 1998* (Cth) ss 15, 18 (Austl.).

<sup>165</sup> *Statutory Rules No. 186, Space Activities Regulation 2001* (Cth) ss 2.02(2), 2.03(2), 2.03A(2) (Austl.).

<sup>166</sup> *Id.*

<sup>167</sup> Lei No. 8.854, de 10 de fevereiro de 1994, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 11.2.1994, art. 3(XIII) (Braz.).

<sup>168</sup> Decreto No. 1.953, de 10 de julho de 1996, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 10.7.1996, [http://www.planalto.gov.br/ccivil\\_03/decreto/1996/D1953.htm](http://www.planalto.gov.br/ccivil_03/decreto/1996/D1953.htm) (Braz.).

<sup>169</sup> COPUOS, *supra* note 62, at 4.

<sup>170</sup> Space Development Promotion Act, Act No. 7538, May 31, 2005, art. 12, *amended by* Act No. 7538, May 31, 2005 *and* Act No. 8714, Dec. 21, 2007, *translated in* Korea Legislation Research Institute online database, [http://elaw.klri.re.kr/eng\\_service/lawView.do?hseq=32594](http://elaw.klri.re.kr/eng_service/lawView.do?hseq=32594) (S. Kor.).

<sup>171</sup> French Space Operations Act, *supra* note 72, art. 4. An applicant must provide: “(1) a description

compliance of the systems and procedures that the applicant intends to implement with the applicable technical regulations, particularly those relating to the safety “of persons and property” and “the protection of public health and the environment.”<sup>172</sup>

In the Netherlands, eligibility for a license depends on the applicant’s knowledge and experience.<sup>173</sup> An applicant must submit detailed information identifying the space activities planned, a financial risk analysis, liability insurance, authorization of radio frequency, and the applicant’s knowledge and experience with regard to performance of space activities.<sup>174</sup> An application for a license must be denied if necessary for protection of safety of persons or property, protection of the environment, protection of public order, security of the State, or fulfillment of international obligations of the State.<sup>175</sup> An application may be denied if a previously issued license has been revoked, the applicant has not discharged his obligations under a license, if he fails to comply with the rules established governing space activities, or there is good reason to suspect that the applicant will not follow those rules.<sup>176</sup>

In the Russian Federation, Roscosmos (successor of the Russian Space Agency) issues licenses for space operations.<sup>177</sup> Prospective licensees looking to conduct space launches or operations must submit documentation to Roscosmos showing that they have legal title to the necessary facilities and equipment, and that they have sufficient technical expertise and personnel to conduct the planned activities.<sup>178</sup> In addition, Roscosmos must approve the substance of the activity, like the program of research or satellite launch.<sup>179</sup> Approval from Roscosmos and the Ministry of Defense must be granted to work with state secrets, and the licensee must take steps to protect those secrets and other mission critical elements from

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of the space operation to be conducted, as well as systems and procedure that the applicant intends to implement, (2) a general notice of compliance with technical regulations, (3) internal standards and quality management provisions, (4) risk management plans for ensuring the safety of property and people, as well as protection of public health and the environment, (5) hazard studies and environmental impact studies, (6) risk management measures, and (7) planned emergency relief measures.” Giugi Carminati, *French National Space Legislation: A Brief “Parcours” of a Long History*, 36 HOUS. J. INT’L L. 1, 11–12 (2014).

<sup>172</sup> French Space Operations Act, *supra* note 72, art. 4(4).

<sup>173</sup> Wet ruimtevaartactiviteiten 24 januari 2007, Stb. 2007, 80, § 2, art. 4(3), [Rules Concerning Space Activities and the Establishment of a Registry of Space Objects] (Neth.).

<sup>174</sup> Regeling aanvraag vergunning ruimtevaartactiviteiten en registratie 7 februari 2008, Stcrt. 2008, 13, § 4 [Order of the Minister of Economic Affairs, containing rules governing License Applications for the Performance of Space Activities and the Registration of Space Objects] (Neth.), *reprinted in* PAUL STEPHEN DEMPSEY, *SPACE LAW* § 26:1 (2011).

<sup>175</sup> Wet ruimtevaartactiviteiten 24 januari 2007, Stb. 2007, 80, § 6, art. 4(3) (Neth.).

<sup>176</sup> *Id.*

<sup>177</sup> Russian Space Licensing Law, *supra* note 82, arts. 3(c)–(e).

<sup>178</sup> *Id.* arts. 4(c)–(e).

<sup>179</sup> *Id.* art. (e).

harm in both normal and emergency situations.<sup>180</sup> All aspects of any licensed space launch or operation must be conducted in accordance with Russian safety standards with regard for the safety of the crew, the public, and the environment.<sup>181</sup>

### C. Liability, Insurance, & Indemnification Requirements

Related to the financial fitness of the applicant are requirements for insurance and indemnification. Professor Steven Freeland notes that the imposition of joint and several liability via the Outer Space Treaty and the Liability Convention is among the reasons that many States have enacted national space laws to allow them to reduce their liability by imposing financial responsibility on private launching companies.<sup>182</sup> Typically, statutes require that the licensee carry adequate insurance to cover death, injury or property damage, and indemnify the State should it have to pay damages. Ordinarily, the insurer of the satellite vendor covers liability prior to the intentional ignition of the launch vehicle, while the insurer of the satellite purchaser covers liability thereafter. In order to promote commercial development of space, some States cap liability, in effect backing such development with the financial resources of the national treasury.<sup>183</sup>

For example, in South Korea, a person who launches is liable for any damages caused, and must carry sufficient insurance to cover that liability as prescribed by the Ministry of Science and Technology.<sup>184</sup> The launching party must pay compensation for damage caused by launch activities, except in case of armed conflict, hostile activity, civil war or rebellion, in which case he shall only be liable for damage caused by his willful misconduct or negligence.<sup>185</sup> One who procures a launch permit must insure against third party liability.<sup>186</sup> However, the amount of liability is limited to 200 billion won (approximately US \$189 million).<sup>187</sup> Austria is more generous still. In Austria, insurance requirements may be waived if the space activity is deemed to be in the public interest (i.e., if it advances the

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<sup>180</sup> *Id.* arts. (d), (e).

<sup>181</sup> Russian Space Activity Law, *supra* note 82, arts. 9, 22.

<sup>182</sup> Steven Freeland, *Up, Up and . . . Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space*, 6 CHI. J. INT'L L. 1, 16 (2005).

<sup>183</sup> See Paul Stephen Dempsey, *Liability for Damage Caused by Space Objects in International and National Law*, 37 ANNALS AIR & SPACE L. 333, 360–64 (2012).

<sup>184</sup> *Id.* at 355.

<sup>185</sup> Act on Compensation for Damage Caused by Space Objects, Act. No. 8714, Dec. 21, 2007, amended by Act No. 8852, Feb. 29, 2008, art. 4 (S. Kor.), translated in Korea Legislation Research Institute online database, [http://elaw.klri.re.kr/eng\\_mobile/viewer.do?hseq=17043&type=sogan&key=2](http://elaw.klri.re.kr/eng_mobile/viewer.do?hseq=17043&type=sogan&key=2).

<sup>186</sup> *Id.* art. 6.

<sup>187</sup> *Id.* art. 5.

interests of science, education, or research).<sup>188</sup>

Australia also imposes insurance and financial requirements upon licensees.<sup>189</sup> In China, a licensee must carry insurance against liability.<sup>190</sup> Similarly, Hong Kong requires that the licensee insure himself against liability,<sup>191</sup> and indemnify the Hong Kong and PRC governments against claims brought against either.<sup>192</sup>

In the Netherlands, the licensee must maintain “the maximum possible cover for the liability arising from the space activities for which a license is requested,” with account taken of “what can reasonably be covered by insurance.”<sup>193</sup> Some States, such as Kazakhstan, impose general indemnification requirements for damage caused by space activities.<sup>194</sup> In the United Kingdom, conditions may be placed upon a license requiring insurance against loss or damage suffered by third persons.<sup>195</sup> The licensee is obliged to indemnify the U.K. government “against any claims brought against the government in respect of damage or loss . . . .”<sup>196</sup> In Sweden, the State shall be reimbursed as a result of it incurring international damage caused by the licensee.<sup>197</sup>

In order to create a developmental period for the private sector to launch human space flight operations, the U.S. Congress placed a moratorium on the promulgation of safety regulations to protect the health and safety of crew and space flight participants unless they resulted in serious or fatal injury or contributed to a close call. Flight crews and space flight passengers assume all risks under the informed consent provisions of the legislation. Launch providers must issue informed consent notifications to space flight participants providing that “the United States Government has not certified the launch vehicle as safe for carrying crew or space flight participants.”<sup>198</sup> The United States requires those engaging in space activities to enter into reciprocal cross-waivers of claims “with its contractors, subcontractors, and customers, and contractors and

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<sup>188</sup> Austrian Space Law, *supra* note 65, art. 4(4).

<sup>189</sup> *Space Activities Act 1998* (Cth) div 7 (Austl.).

<sup>190</sup> Chinese License Measures, *supra* note 70, art. 19.

<sup>191</sup> Hong Kong Outer Space Ordinance, (2005) Cap. 523, art. 6(2)(f) (H.K.), *reprinted in* Paul Stephen Dempsey, *Space Law* § 20:1 (2012).

<sup>192</sup> *Id.* art. 21(1).

<sup>193</sup> Regeling aanvraag vergunning ruimtevaartactiviteiten en registratie 7 februari 2008, Stcrt. 2008, 13, ch. 2, § 1(3) [Order of the Minister of Economic Affairs, Containing Rules Governing License Applications for the Performance of Space Activities and the Registration of Space Objects] (Neth.), *reprinted in* Paul Stephen Dempsey, *Space Law* § 26:1 (2011).

<sup>194</sup> *Law of the Republic of Kazakhstan on Space Activities*, Art. 27, No. 528-IV (Jan. 6, 2012), [http://www.unoosa.org/documents/pdf/spacelaw/national/kazakhstan/528-IV\\_2012-01-06E.pdf](http://www.unoosa.org/documents/pdf/spacelaw/national/kazakhstan/528-IV_2012-01-06E.pdf).

<sup>195</sup> Outer Space Act 1986, § 5 (Gr. Brit.).

<sup>196</sup> *Id.* § 10.

<sup>197</sup> 6 § LAG OM RYMDVERKSAMHET [ACT ON SPACE ACTIVITIES] (Svensk författningssamling [SFS] 1982:963) (Swed).

<sup>198</sup> 51 U.S.C. § 50905(b)(4)(B) (2012).



subcontractors of the customers, involved in launch services or reentry services under which each party to the waiver agrees to be responsible for property damage or loss it sustains, or for personal injury to, death of, or property damage or loss sustained by its own employees resulting from an activity carried out under the applicable license.”<sup>199</sup> The U.S. also has established three tiers of liability:

**Tier 1: Maximum Probable Loss.** In the first tier, the U.S. caps commercial operator liability (and the requirement to obtain insurance) at the “maximum probable loss” as determined by the Secretary of Transportation. For third persons, the maximum probable loss is the lesser of \$500 million or the “maximum liability insurance available on the world market at a reasonable cost,” and for the Government, the lesser of \$100 million or the maximum insurance available at reasonable cost. The Government may pay the first dollar of loss should the event be declined coverage by the insurer under a policy exclusion deemed “usual.”<sup>200</sup>

**Tier 2: Governmental Coverage of Catastrophic Loss.** If the amount of liability exceeds the amount available in the first tier, the U.S. Congress will be asked pay damages up to \$1.5 billion (in January 1, 1989, dollars, adjusted for inflation) above the first tier, unless the claim for bodily injury or property damage is made by a party whose willful misconduct caused the damage.<sup>201</sup>

**Tier 3: Beyond Governmental Indemnification.** If both the first and second tiers are inadequate to compensate for the loss, and Congress does not act to appropriate funds for compensation, the liability burden reverts to the legally liable party (potentially the licensee or permittee).<sup>202</sup>

#### D. Environmental Protection

Several States use the licensing process to address concerns about environmental contamination of outer space or the Earth. Consistent with the Space Debris Mitigation Guidelines adopted by the United Nations Committee for the Peaceful Uses of Outer Space,<sup>203</sup> and the European Union’s Code of Conduct for Outer Space Activities, Austria places

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<sup>199</sup> 51 U.S.C. § 50914(b)(1) (2012).

<sup>200</sup> *Id.*

<sup>201</sup> 51 U.S.C. § 50915 (2012). *See also* U.S. GOV’T ACCOUNTABILITY OFF., GAO-14-328T, COMMERCIAL SPACE LAUNCHES: FAA’S RISK ASSESSMENT PROCESS IS NOT YET UPDATED 5 (2014), <http://www.gao.gov/assets/670/660635.pdf> (describing the tiers of liability in testimony before Congress).

<sup>202</sup> 51 U.S.C. § 50915 (2012).

<sup>203</sup> G.A. Res. 62/217 (Feb. 1, 2008).

particular emphasis on space debris mitigation in its licensing process. It insists upon compliance with the “state of the art” and “internationally recognized guidelines for the mitigation of space debris.”<sup>204</sup> Similarly, the government of Hong Kong requires that licensees prevent contamination of outer space and avoid interference with others in the peaceful use of space.<sup>205</sup> In Belgium, environmental studies are required as a prerequisite to licensing.<sup>206</sup> Argentina enacted a novel provision requiring that the operator registering a space object provide information on environmental precautions taken, including mechanisms for placement of the space object in a transfer orbit at the end of its useful life, and identify the anticipated date of its recovery, disintegration or loss of contact.<sup>207</sup>

#### E. Other Conditions Imposed Upon Licensees

Several States authorize their regulatory agencies to impose restrictions upon licenses. For example, in the Netherlands, regulations and restrictions may be imposed for the following purposes:

- a. the safety of persons and goods;
- b. protection of the environment in outer space;
- c. financial security;
- d. protection of public order;
- e. security of the State;
- f. fulfillment of the international obligations of the State.<sup>208</sup>

In the Peoples Republic of China, an applicant for a license for the launch of civil space objects is required to abide by its laws, to not endanger public health or safety,<sup>209</sup> endanger national security, damage the national interests, or violate the national diplomatic policies or the international conventions that China has ratified.<sup>210</sup>

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<sup>204</sup> Austrian Space Law, *supra* note 65, § 5.

<sup>205</sup> *Id.* art. 6(2)(d).

<sup>206</sup> Loi relative aux activités de lancement, d’opération de vol ou de guidage d’objets spatiaux [Law on the Activities of Launching, Flight Operations or Guidance of Space Objects] of Sept. 17, 2005, MONITEUR BELGE [M.B.] [OFFICIAL GAZETTE OF BELGIUM], Nov. 4, 2008, art. 8, § 8, [https://www.belspo.be/belspo/space/doc/beLaw/Loi\\_fr.pdf](https://www.belspo.be/belspo/space/doc/beLaw/Loi_fr.pdf).

<sup>207</sup> National Decree No. 125/95, July 19, 1995, Establishment of the National Registry of Space Objects Launched into Outer Space [25 July 1995] B.O., arts. 5(14)–(16) (Arg.).

<sup>208</sup> Wet ruimtevaartactiviteiten 24 januari 2007, Stb. 2007, 80, ch. 2, § 1(3) [Rules Concerning Space Activities and the Establishment of a Registry of Space Objects] (Neth.).

<sup>209</sup> Chinese License Measures, *supra* note 70, arts. 2–5.

<sup>210</sup> *Id.* art. 5. In China, this regulation governs licensing of civil space launch projects in China and excludes launches for military purposes. The regulation applies to the entry of spacecraft such as satellites into outer space over which the natural persons, legal persons or other organizations of the People’s Republic of China have had property or have property by means of on-orbit delivery into outer

In France, restrictions on the license may be imposed to protect the safety of people and property, as well as the protection of public health and the environment.<sup>211</sup> Conditions also may be imposed requiring the prevention of space debris, the protection of the national defense, or advancement of France's international obligations.<sup>212</sup> The operator also must maintain proper insurance coverage throughout the operation.<sup>213</sup>

In the United Kingdom, the license may include conditions permitting inspection by the regulator.<sup>214</sup> In Australia, nuclear weapons and weapons of mass destruction are prohibited, and no fissionable material may be launched without prior approval.<sup>215</sup>

In South Africa, a person seeking to operate a launch facility must procure a license, which is to be granted only if the operation of the launch facility takes into account the minimum safety standards determined by South African Council for Space Affairs, the national interests, and the international obligations and responsibilities of South Africa.<sup>216</sup> Conditions may be imposed addressing the liability of the licensee for damage, security to be given in such cases, and the liability of licensee resulting from international obligations of South Africa.<sup>217</sup> Further, the Council must be informed of any deviation by the licensee from conditions imposed upon the license due to unforeseen circumstances, and of any information that to the licensee's knowledge may affect the conditions of license.<sup>218</sup>

Some States require that before a satellite is launched the proper telecommunications and/or broadcast licenses are acquired from State's telecommunications regulatory authority, and if geostationary orbit is contemplated, authorization from the International Telecommunications Union is procured. For example, the Netherlands requires authorization to use radio frequencies as a prerequisite to the issuance of a license.<sup>219</sup>

### 1. License Duration

Most States that regulate commercial space activities require a license for each individual launch. However, several States issue licenses for longer

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space from outside of the territory of China.

<sup>211</sup> French Space Operations Act, *supra* note 72, art. 4; ARANZAMENDI, *supra* note 7, at 20–21.

<sup>212</sup> French Space Operations Act, *supra* note 72, art. 5.

<sup>213</sup> *Id.* art 6.

<sup>214</sup> Outer Space Act 1986, § 5 (Gr. Brit.), *reprinted in* PAUL STEPHEN DEMPSEY, SPACE LAW § 34:1 (2012); *see also* Sa'id Mosteshar, *Regulation of Space Activities in the United Kingdom*, in NATIONAL REGULATION OF SPACE ACTIVITIES 357, 359–62 (Ram S. Jakhu ed., 2010).

<sup>215</sup> *See* ARANZAMENDI, *supra* note 7, at 16.

<sup>216</sup> Space Affairs Act 84 of 1993, art. 14 (S. Afr.).

<sup>217</sup> *Id.*

<sup>218</sup> *Id.* art. 14(4)(a).

<sup>219</sup> Regeling aanvraag vergunning ruimtevaartactiviteiten en registratie 7 februari 2008, Stcrt. 2008, 13, § 4(d) (Neth).

periods of time. For example, in Australia, one may receive a launch permit or exemption certificate for launch and return and a space license for up to twenty years.<sup>220</sup> In Russia, licenses are valid in most circumstances up to five years.<sup>221</sup> Russian licenses are valid only for the type of space operations specified, and the licensing regulations do not provide any means for transferring a license.<sup>222</sup> In the Netherlands, a time limit may be imposed within which the licensee must begin the proposed space activities.<sup>223</sup>

## 2. Pre-Launch Requirements

Several States impose additional obligations upon licensees prior to launch. For example, in Australia, licensees must receive approval from local ambulance, fire, and police authorities prior to launching. Environmental approvals also are required. Launches must not be conducted in a way likely to cause harm to public health or safety or damage to property.<sup>224</sup>

In China, nine months prior to the month of scheduled launch, the applicant is required to submit relevant legal and technical documents to the Commission of Science, Technology, and Industry for National Defense (COSTIND).<sup>225</sup> The applicant must provide evidence to prove its compliance “with national environmental laws and regulations.”<sup>226</sup> Six months prior to a scheduled launch from a site within China, “the permit holder shall report the launching plan of the project to the COSTIND . . . , and file an application for approval of leaving factory to enter the launching site.”<sup>227</sup> The documents must include, “the information of the scheduled time for launching; the technical requirements of the satellite, the carrier rocket, the launching vehicle, and the Telemetry, Tracking and Command system; the detailed orbital parameters of the carrier rocket; the survey report on the landing area or recovering area; the detailed orbital parameters of the satellite and the use of frequency resources.”<sup>228</sup> If the launch is to take place from a site outside China, “the permit holder shall file an application for approval of leaving factory to the CONSTIND, 60 days

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<sup>220</sup> Space Activities Act 1998 (Cth) s 28 (Austl.).

<sup>221</sup> Russian Space Licensing Law, *supra* note 82, art. 4.

<sup>222</sup> *Id.* art. 4(e) (requiring licensees to submit for approval a plan for space operations or research).

<sup>223</sup> Wet ruimtevaartactiviteiten 24 januari 2007, Stb. 2007, 80, ch. 2, § 1(5) (Neth.).

<sup>224</sup> ARANZAMENDI, *supra* note 7, at 12.

<sup>225</sup> Chinese License Measures, *supra* note 70, art. 6. Any launch of a spacecraft from the territory of China into outer space for civil purposes, and the overseas launch while the spacecraft is owned by, or the ownership of the spacecraft has been transferred to, the natural or juridical persons or the other organizations of China, are subject to these provisions.

<sup>226</sup> *Id.*

<sup>227</sup> *Id.* art. 20.

<sup>228</sup> *Id.* art. 6(c).

prior to the scheduled day of launching.”<sup>229</sup> Also, the applicant for the launch from a foreign site “shall submit the copies of legally binding documents about orbital parameters of the carrier rocket and the satellite, and copies of the permit on the use of the relevant frequency resources.”<sup>230</sup> All applicants must provide “safety design report and related materials on public security,” as well as information addressing the “reliability of critical safety system[s] . . . the effects on the safety of the public and property in the vicinity of the launching site and within the scope of launching path . . . .” For launches outside China, the applicant must also submit materials for evaluation of policy, secrecy, and safety.<sup>231</sup>

### 3. Operational Restrictions

In order to reduce the likelihood of personal, property or environmental damage, a number of States impose operational restrictions on the launch of space objects. For example:

In Australia, no launch is allowed that might create a hazard to aircraft, person or property; no launch is permitted into a prohibited area or restricted area; no launch is allowed higher than 400 feet in controlled airspace except in an approved area or in accordance with air traffic control clearance; and no object may be launched within three nautical miles of an aerodrome.<sup>232</sup> The operator must demonstrate that the launch will impose the lowest practicable risk within the bounds of reasonable cost.<sup>233</sup>

In Hong Kong, no contamination of space is permitted, nor is interference with others; and the disposal of payload upon termination of activities is required.<sup>234</sup> In the United Kingdom, conditions may be imposed requiring the licensee to notify the Secretary of State of the date and location of the launch, its basic orbital parameters, and requiring advance approval of any intended deviation therefrom. Conditions may also be imposed requiring the disposal of the payload in outer space upon termination of operations.<sup>235</sup>

Ireland has promulgated legislation providing that a rocket may not be operated without a license.<sup>236</sup> Seven days prior to launch, the Operating Standards Department of the Irish Aviation Authority must be informed of

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<sup>229</sup> *Id.* art. 21.

<sup>230</sup> *Id.* art. 6(c).

<sup>231</sup> *Id.* art. 6(d).

<sup>232</sup> *Id.*

<sup>233</sup> ARANZAMENDI, *supra* note 7, at 23.

<sup>234</sup> Hong Kong Outer Space Ordinance, (2005) Cap. 523, art. 6 (H.K.), *reprinted in* PAUL STEPHEN DEMPSEY, *SPACE LAW* § 20:1 (2012).

<sup>235</sup> Outer Space Act 1986, § 5 (Gr. Brit.).

<sup>236</sup> Irish Aviation Authority (Rockets and Small Aircraft) (SI 25/2000) (Ir.), <http://www.irishstatutebook.ie/eli/2000/si/25/>.

the identity of the persons responsible for the operation, the number, size, and weight of each rocket, the altitude at which it will be operated, the location, and the date and time of the operation.<sup>237</sup> In Ireland, rocket launches are prohibited if they create a potential collision hazard with an aircraft, or operate in controlled space, within eight kilometers of an airport, at an altitude where horizontal visibility is less than eight kilometers, into a cloud, within 300 meters of any person or property not involved in the operation of the rocket, or at night.<sup>238</sup>

#### IV. REGISTRATION

In order to comply with the Registration Convention, a myriad of States—including Argentina, Australia, Belgium, the People’s Republic of China, France, Japan, Kazakhstan, the Netherlands, the Republic of Korea, the Russian Federation, Spain, Sweden, Ukraine, the United Kingdom, and the United States—require citizens and local corporations to register all launched space objects.<sup>239</sup> For example, Belgium created a National Register in accordance with the Registration Convention.<sup>240</sup>

#### V. ENFORCEMENT

To give their regulatory oversight teeth, many States impose enforcement mechanisms in their national space legislation. Sanctions such as license suspension or revocation, as well as fines and imprisonment, are important regulatory means to ensure compliance with regulatory obligations.

##### A. Suspension & Revocation

In Australia, a licensee may have its license suspended or revoked if it contravenes a license condition, endangers national security, or violates foreign policy or international obligations.<sup>241</sup> In Belgium, a license may be

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<sup>237</sup> *Id.* art. 4(1).

<sup>238</sup> *Id.* art. 4(2).

<sup>239</sup> See ARANZAMENDI, *supra* note 7, at 5. In 2001, China established a registry of space objects launched into Earth orbit or beyond. See UN Doc. ST/SG/SER.E/INF.17. Pursuant to *The Measures for the Administration of Registration of Space Objects*, the registry is maintained by the Chinese National Space Administration (CNSA). On June 8th, 2005, China informed the Secretary General of the United Nations of the establishment of such a registry. Currently, the Chinese registration mechanism consists of two stages of registration: the national registration and the international registration.

<sup>240</sup> Loi relative aux activités de lancement, d’opération de vol ou de guidage d’objets spatiaux [Law on the Activities of Launching, Flight Operations or Guidance of Space Objects] of Sept. 17, 2005, MONITEUR BELGE [M.B.] [OFFICIAL GAZETTE OF BELGIUM], Nov. 4, 2008, art. 14, § 1, [https://www.belspo.be/belspo/space/doc/beLaw/Loi\\_fr.pdf](https://www.belspo.be/belspo/space/doc/beLaw/Loi_fr.pdf) (Belg.)

<sup>241</sup> Space Activities Act 1998 (Cth) pt. 3 div. 2 §§ 18–25 (Austl.); Space Activities Regulation 2001

suspended or revoked if the licensee fails to respect the conditions imposed upon the license, or if the licensee engages in conduct that constitutes an infringement of law, public order, or the safety of people or property.<sup>242</sup>

In China, the COSTIND may revoke the license in a serious situation if the licensee:

- (a) violates the relevant national laws or regulations or the agreement between China and other states on maintaining confidentiality during execution of the project;
- (b) conducts any actions endangering national security, damaging national interests, or violating national diplomatic policies during execution of the project;
- (c) carries out the launch activities beyond the limit approved by the license; or
- (d) conducts other actions in violation of law.<sup>243</sup>

Also in China, the licensee may be subject to administrative penalties if the licensee conceals the truth, engages in fraud, or injures the national interest in its application or during the execution of the project.<sup>244</sup>

In South Korea, a license may be suspended on grounds that the licensee is incompetent, in bankruptcy, in violation of legislation, has delayed a launch for more than a year without cause, has obtained a license by false means, poses a threat to national security or to safety (e.g., “fuel leakage or defects in the communication systems”),<sup>245</sup> or has failed to secure license amendment for changes in the launch.<sup>246</sup>

In the Netherlands, license revocation is required if requested by the license holder if it is necessary to comply with an international obligation or if there is good reason to believe the licensee will jeopardize safety, environmental protection, or the maintenance of public order and national security.<sup>247</sup> The license may be revoked if the rules of the Act or conditions imposed upon the license have been or are being violated, the space activities have not been commenced within the prescribed time period, the purpose of the space activities for which the license was issued have

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(Cth) div. 2.4 (Austl.).

<sup>242</sup> Law on the Activities of Launching, Flight Operation or Guidance of Space Objects, ch. 3, art. 11

(Belg.).

<sup>243</sup> Chinese License Measures, *supra* note 70, art. 16.

<sup>244</sup> Chinese License Measures, *supra* note 70, art. 24.

<sup>245</sup> Space Development Promotion Act, Act No. 7538, May 31, 2005, art. 11, *amended by* Act No. 7538, May 31, 2005 *and* Act No. 8714, Dec. 21, 2007, *translated in* Korea Legislation Research Institute online database, [http://elaw.klri.re.kr/eng\\_service/lawView.do?hseq=32594](http://elaw.klri.re.kr/eng_service/lawView.do?hseq=32594) (S. Kor.).

<sup>246</sup> *Id.*

<sup>247</sup> Wet ruimtevaartactiviteiten 24 januari 2007, Stb. 2007, 80, § 7(1) [Rules Concerning Space Activities and the Establishment of a Registry of Space Objects] (Neth.), *reprinted in* Paul Stephen Dempsey, *Space Law* § 26 (2015).

significantly changed, the technical or financial capabilities of the licensee have changed, the license was improvidently granted on the basis of false information, or if it is necessary to protect safety, the environment, financial security, public order, State security, or fulfill international obligations.<sup>248</sup>

In Russia, a failure to comply with instructions or orders, the discovery of the filing of false data, the dissolution of the legal entity of the licensee, or the violation of license conditions may result in license suspension or revocation.<sup>249</sup> Such suspension or annulment may be imposed immediately if there has been a gross violation of law.<sup>250</sup> Decisions of the licensing authority are subject to appeal.<sup>251</sup>

In South Africa, if a condition was violated or if operations posed an unacceptable safety risk, the State may “amend, suspend, or revoke a license.”<sup>252</sup> In Sweden, if license conditions are ignored, the license may be permanently or temporarily withdrawn.<sup>253</sup> In the United Kingdom, if a condition has issues relating to public health, national security, or compliance with international obligations, then a license may be suspended or revoked.<sup>254</sup>

#### B. Fines and Imprisonment

In South Korea, one who launches without a license may be sentenced to up to five years in prison, and faces fines up to fifty million won. One who fails to comply with an interruption order may serve up to three years in prison and be fined up to thirty million won.<sup>255</sup> Fines of up to ten million won may be imposed for failure to register the space object, or failure to report changes in the launch different from the license. Fines of up to five million won may be imposed on the licensee for failure to report information different than that in the license application and also upon anyone who “denies, interferes or evades investigation of an accident.”<sup>256</sup> One who objects to the imposition of a fine upon oneself may appeal within thirty days, and the court will review the penalty.<sup>257</sup>

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<sup>248</sup> *Id.* § 7(2).

<sup>249</sup> Russian Space Licensing Law, *supra* note 82, arts. 4, 10; Russian Licensing Law, *supra* note 152, art. 20.

<sup>250</sup> Russian Licensing Law, *supra* note 152, art. 20(1)(2).

<sup>251</sup> *Id.* art. 14(8).

<sup>252</sup> Space Affairs Act 84 of 1993, art. 14, *as amended* Space Affairs Amendment Act 64 of 1995, § 3 (S. Afr.).

<sup>253</sup> *See* Outer Space Treaty, *supra* note 1, art. 4.

<sup>254</sup> Outer Space Act 1986, ch. 38, §§ 4–11 (Gr. Brit.).

<sup>255</sup> Space Development Promotion Act, Act No. 7538, May 31, 2005, art. 27, *amended by* Act No. 7538, May 31, 2005 *and* Act No. 8714, Dec. 21, 2007, *translated in* Korea Legislation Research Institute online database, [http://elaw.klri.re.kr/eng\\_service/lawView.do?hseq=32594](http://elaw.klri.re.kr/eng_service/lawView.do?hseq=32594) (S. Kor.).

<sup>256</sup> *Id.* art. 29.

<sup>257</sup> *Id.*



In Japan, failing to file a report, filing a fraudulent report, or failing to register are some activities that may result in a fine not to exceed ¥200,000 (approximately U.S. \$1,900).<sup>258</sup> Other punishable activities include failing to obtain required authorization from the Minister of Education, Culture, Sports, Science and Technology, conducting unauthorized activities, and launching satellites without required insurance.<sup>259</sup>

In France, the administrative authority may at any time give instructions or require any measures deemed necessary to protect the safety of persons or property, or to protect the public health or the environment. Fines of up to €200,000 (approximately U.S. \$257,000) may be imposed for launching a space object without authorization.<sup>260</sup>

In the Netherlands, administrative penalties for failure to possess a license and launch a space object, or endangerment of safety or the environment may be imposed of up to €450,000, or 10% of the relevant annual sales in the Netherlands. Failing to register a space object or follow rules related thereto may result in an administrative penalty of up to €100,000. In Sweden, criminal liability may be imposed for failing to procure a license or disregarding the conditions therein; violations of the national Space Laws may result in imprisonment of up to one year.<sup>261</sup>

## VI. CONCLUSION

Cognizant of their international legal obligations and liability exposure, and mindful of the need to protect life, property, and the environment, at least twenty-six States have promulgated national space legislation and imposed regulatory requirements upon commercial space activities.<sup>262</sup> At the same time, many States are promulgating regulations to facilitate and incentivize commercial use of space, including requiring State payloads to be placed in orbit by commercial rockets, and imposing limits on liability of non-governmental organizations.<sup>263</sup>

Three and a half decades have elapsed since the last international multilateral Space Law convention was drafted. Given the dearth of international regulatory standards governing aerospace safety and

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<sup>258</sup> Uchūkai hatsujigyōdan-hō [Law Concerning The National Space Development Agency of Japan], Law No. 50 of 1969, art. 42, reprinted in PAUL STEPHEN DEMPSEY, *SPACE LAW* § 24:1 (2011).

<sup>259</sup> *Id.* art. 43.

<sup>260</sup> See Outer Space Treaty, *supra* note 1.

<sup>261</sup> *Id.*

<sup>262</sup> Professor Hobe observes, “[b]y virtue of Article VI of the Outer Space Treaty, states are obligated to authorize and to continuously supervise their national space activities. This obligation can best be complied with by enacting national space legislation, preferably with a licensing regime for private activities in outer space, including certification of space vehicles.” Stephan Hobe, *Legal Aspects of Space Tourism*, 86 NEB. L. REV. 439, 445 (2007).

<sup>263</sup> See, e.g., Meredith Blasingame, *supra* note 89.

navigation,<sup>264</sup> States would be well advised to establish regulatory institutions to oversee space activities in order to:

- enhance safety;
- protect their citizenry and their territory and property from injury or environmental harm;
- cover the costs of catastrophic loss when it occurs; and
- provide the stability, predictability, and certainty essential for private commercial investment.

National space laws are an important means of achieving these public policies. Many national space laws focus on common issues through the vehicle of licensing, including:

- the technical and financial qualifications of applicants,
- liability and indemnification,
- environmental protection,
- safety and operational restrictions,
- sanctions and enforcement.

Nonetheless, the law addressing space activities varies extensively from State to State. Some States (e.g., India) have no proper law at all; Canada has no State-promulgated regulation addressing the issue.<sup>265</sup> The licensing procedure varies widely between States. Some issue separate licenses for a launch, re-entry and/or operation of a launch site. Some impose jurisdiction over their nationals for launches domestically and abroad.<sup>266</sup> Only Australia defines the altitude at which a space object should reach for it to be considered a space object.<sup>267</sup> Though States such as China explicitly provide that licenses for launches are non-transferable, most statutes are silent on the issue. Most national Space Laws require that launch activity should not jeopardize public health, safety or property, should not adversely affect national security, and should operate in a manner consistent the State's international obligations. Some State statutes

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<sup>264</sup> See Antoine Pitts, *Space Tourism Policy: Why the World's Space-Faring Nations Should Adopt A Code of Conduct to Control Outer Space Activities*, 18 SW. J. INT'L L. 687, 691-97 (2012); see generally THE NEED FOR AN INTEGRATED REGULATORY REGIME FOR AVIATION AND SPACE: ICAO FOR SPACE? (Ram S. Jakhu, Tommaso Sgobba & Paul S. Dempsey eds., 2011).

<sup>265</sup> Aside from remote sensing, Canada relies on the industry to police itself.

<sup>266</sup> In France and Australia, an easier, separate authorization process exists when the launch is from a site not in territory of the State.

<sup>267</sup> The Australian policy of having a separate license for the ground infrastructure advances the objective of maintaining safety and environmental protection. Further, since safety at the launching site is quite important, it should be monitored by the authority regulating space activities. States would be well advised to promulgate safety guidelines that should be followed by the permit holder of launching site.

require insurance and indemnification, while many others are silent on the question.

Although a growing number of States are promulgating national Space Law legislation, and although many such laws focus on common issues, there is little harmonization between the approaches taken to licensing and regulation. The absence of harmonized standards for safety and navigation portend potential safety risks.<sup>268</sup> Some States (e.g., Australia and the United States) have enacted comprehensive and elaborate regulatory statutes, while others (e.g., Ireland and Norway) have promulgated rather terse laws. Many more (e.g., Switzerland and India)<sup>269</sup> have yet to enact any legislation at all on the subject. States should attempt to harmonize their laws with other States, so that global uniformity might be enhanced, and flag-of-convenience type forum shopping discouraged. It would be shameful if commercial space activities were attracted to the jurisdictions with the lowest taxes and lowest cost regulatory structure, at the expense of safety and environmental harm.<sup>270</sup>

At minimum, States should promulgate domestic space laws establishing a regulatory agency with jurisdiction over licensing and enforcement, as well as addressing liability insurance and damage reimbursement. Further, so as to encourage commercial development of space, the regulatory burden and liability risk exposure should not be onerous. During the embryonic and developmental period of commercial space activity, liability should be capped.<sup>271</sup>

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<sup>268</sup> See P. Paul Fitzgerald, *Inner Space: ICAO'S New Frontier*, 79 J. AIR L. & COM. 3, 23 (2014) (“A space traffic management regime has to consider the question of harmonizing national space legislation (much of which has yet to be established) and national licensing standards and procedures, since they may provide the building blocks for assuring technical safety.”).

<sup>269</sup> Though India is a large space-faring nation, it has promulgated no national law for authorization of launch services. However, all space activities are subject to normative applicable laws in force like the law of contracts, law of torts, etc. Ranjana Kaul & Ram S. Jakhu, *Regulation of Space Activities in India*, in NATIONAL REGULATION OF SPACE ACTIVITIES (Ram S. Jakhu ed., 2010). Further, the *Procedures for SatCom Policy Implementation* dated January 12th, 2000 and the *Norms, Guidelines and Procedures for Satellite Communications* issued on May 8th, 2000 may govern the launch activities of India to some extent. While the existing framework covers launching activities within the territory of India, it does not mention launching activities overseas by Indian nationals. *Procedures for SatCom Policy Implementation*, INDIAN SPACE RES. ORG., <http://www.isro.gov.in/update/08-aug-2014/procedures-satcom-policy-implementation> (last updated Aug. 8, 2014); *The Norms, Guidelines and Procedures for Implementation of the Policy Frame-Work for Satellite Communications in India*, GOV'T OF INDIA DEP'T OF SPACE, <http://dos.gov.in/pdf/SATCOM-norms.pdf> (last visited Sep. 19, 2015).

<sup>270</sup> See Adrian Taghdiri, *Flags of Convenience and the Commercial Space Flight Industry: The Inadequacy of Current International Law to Address the Opportune Registration of Space Vehicles in Flag States*, 19 B.U. J. SCI. & TECH. L. 405, 407 (2014) (noting that if States do not believe that the existing Space Law Conventions have “adequate mechanisms to enforce the signed treaties, they may elect to attract space business by maintaining minimal environmental and safety regulations.”).

<sup>271</sup> See Justin Silver, Note, *Houston, We Have a (Liability) Problem*, 112 MICH. L. REV. 833, 856 (2014) (advocating for federal legislation to limit tort liability arising out of space flight activities);

The space industry is among the fastest growing industries today. It currently generates revenues in excess of \$250 billion annually. In the context of government spending in civil and military applications, it accounts for more than \$50 billion a year. Investments in the space industry are also a major part of communications, weather forecasting and monitoring, and defense infrastructures. This growth will continue to mirror the growth of the global economy. Similar to multinational corporations in other sectors, the global nature of the field makes it difficult for any single nation to regulate the industry alone. Even with individual nations, laws that regulate the space industry come from a multitude of different areas including safety codes, environmental regulations, and liability apportioning statutes, resulting in “a fragmented and unharmonious patchwork”<sup>272</sup> that may hinder the industry from reaching its full potential.

Eventually, one would hope, the growth in domestic regulation might influence the development of both customary and conventional international space law, and motivate the international community to establish harmonized regulatory standards,<sup>273</sup> as it has done in the field of aviation safety and navigation with the promulgation of the Chicago Convention of 1944.<sup>274</sup>

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Michael R. Laisné, *Space Entrepreneurs: Business Strategy, Risk, Law, and Policy in the Final Frontier*, 46 J. MARSHALL L. REV. 1039, 1052–54 (2013); Michael C. Mineiro, *Assessing the Risks: Tort Liability and Risk Management in the Event of a Commercial Human Space Flight Vehicle Accident*, 74 J. AIR L. & COM. 371, 397–98 (2009).

<sup>272</sup> Paul Stephen Dempsey, *Foreword to SPACE SAFETY REGULATIONS AND STANDARDS*, at xxi (Joseph Pelton & Ram S. Jakhu eds., 2010).

<sup>273</sup> See P.J. Blount, *Renovating Space: The Future of International Space Law*, 40 DENV. J. INT’L L. & POL’Y 515, 531 (2012) (“The interplay between domestic legislation and international law will become an increasingly important theme in the development of international space law. This is especially true if the number of commercial actors proliferates as predicted. It should also be noted that as domestic law develops and defines items such as best practices for space flight providers, these developments can have influence at the international level and on the development of soft law mechanisms.”).

<sup>274</sup> See PAUL S. DEMPSEY, PUBLIC INTERNATIONAL AIR LAW 65–160 (2008); Paul S. Dempsey & Michael Mineiro, *ICAO’s Legal Authority to Regulate Aerospace Vehicles*, in *SPACE SAFETY REGULATIONS AND STANDARDS* (J. Pelton & R. Jakhu eds., 2010); Paul S. Dempsey & Michael Mineiro, *ICAO’s Legal Authority to Regulate Aerospace Vehicles*, INT’L ASS’N FOR ADVANCEMENT OF SPACE SAFETY 3 (2008), [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1289547](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1289547); Paul S. Dempsey & Michael Mineiro, *Suborbital Aerospace Transportation and Space Traffic Management: A Vacuum in Need of Law*, INT’L ASTRONAUTICAL FED’N 59 (2008), [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1285623](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1285623).

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