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NEWSPACE: THE RISE OF THE PRIVATE SPACE INDUSTRY IS  
THREATENING THE CURRENT LEGAL FRAMEWORK GOVERNING  
OUTER SPACE

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**I. Introduction**

In an age of increasing optimism surrounding outer space settlement and resource extraction, the romantic pursuit of celestial colonization has become progressively more popular in the private sector.<sup>1</sup> The current legal framework for the exploration and use of outer space was developed amidst the backdrop of the Cold War when the international Outer Space Treaty—which declared the Moon and other celestial bodies “the province for all mankind”—was

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<sup>1</sup> See Kate Wheeling, *Outer Space Treaties Didn't Anticipate The Privatization Of Space Travel. Can They Be Enforced?*, PACIFIC STANDARD (Aug. 14, 2019), archived at <https://perma.cc/L3PD-CQ4T> (indicating the inevitability of human inhabitation on other planets). The inevitability of human spaceflight is a product of the destruction of our home planet as described by billionaire Jeff Bezos, who wants to put humans in space as permanent inhabitants. *Id.* Moreover, resource extraction from unknown reservoirs of rare metals presents another compelling reason for private actors to venture to the cosmos. *Id.* See also Monica Grady, *Private companies are launching a new space race – here's what to expect*, THE CONVERSATION (Oct. 3, 2017), archived at <https://perma.cc/5TLS-LV9D> (naming the three companies – SpaceX, Virgin Galactic, and Blue Origin – at the forefront of private space exploration). The primary goal for all three of these companies is to reduce costs of space exploration, ultimately making it accessible to the general public. *Id.*

signed and ratified.<sup>2</sup> As a product of its time, the Outer Space Treaty primarily addressed issues relevant to its era, including concerns over nuclear proliferation, at the dawn of the space age.<sup>3</sup> Over the last decade, however, the landscape for space exploration has changed dramatically.<sup>4</sup> The emergence of private actors such as Elon Musk,

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<sup>2</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. I, Oct. 10, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter *The Outer Space Treaty*] (highlighting the international collaboration in the furtherance of outer space exploration).

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

*Id.* See also Jason Krause, *The Outer Space Treaty turns 50. Can it survive a new space race?*, ABA JOURNAL (Apr. 1, 2017), archived at <https://perma.cc/K49Y-K5WB> (defining the era in which the Outer Space Treaty was born); see also Jerry Coffey, *Celestial Body*, UNIVERSE TODAY (Dec. 27, 2009), archived at <https://perma.cc/S9NP-FCGL> (defining a celestial body as “any natural body outside of the Earth’s atmosphere” including the Moon, the Sun, and any asteroid found in outer space).

<sup>3</sup> See Cristin Finnigan, *Why the Outer Space Treaty remains valid and relevant in the modern world*, THE SPACE REVIEW (Mar. 12, 2018), archived at <https://perma.cc/4VJJ-4H5C> (outlining relevant activities during the era including the fight for dominance in spaceflight and nuclear proliferation as a product of the Cold War). See also Dimitra Stefoudi, *50 years of Space Law: The 1967 Outer Space Treaty*, LEIDENLAWBLOG (Dec. 20, 2017), archived at <https://perma.cc/C9RB-LMLM> (exposing the adoption of the Outer Space Treaty as a “small miracle” for the international community amidst a tumultuous backdrop of conflict and war). “The significance of the Treaty is proven by its contemporary character, even five decades after its entry into force, thanks to its general set of principles, constituting an example of international collaboration in the field of international law.” *Id.* See also discussion *infra* Section II.B.

<sup>4</sup> See Finnigan, *supra* note 3 (contrasting the present outer space activities with those of the Cold War era). Those at the head of the technological wave of commercial outer space activity boast plans for asteroid resource extraction, planet

Jeff Bezos, and Richard Branson joining the race means that outer space exploration no longer exists purely in the governmental domain.<sup>5</sup>

Amid competitive aspirations to be the first to reach the stars, the original space race emerged between the United States and the Soviet Union.<sup>6</sup> In an effort to regulate each other's activities in

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colonization, and outer space tourism. *Id.* Despite rapid technological advancement in recent years, the primary concerns surrounding outer space during the Cold War era – such as nuclear proliferation and peaceful cooperation among space-faring nations – provided a catalyst for the governing legal framework. *Id.* See also Celia Cornec, *The post-Cold War issues of the space conquest* (2019) (Honors Collegium 14) (articulating the catalyst for competition between the Americans and the Soviets). During the War, the Nazis established themselves at the forefront of technological advancement when they developed V2 rocket which was capable of traveling 50 miles above the earth. *Id.* The Americans and the Soviets quickly realized their respective lack of technological advancement, spurring competitive arena in outer space exploration. *Id.*

<sup>5</sup> See Grady, *supra* note 1 (recounting the executives of the private companies interested in human spaceflight). Targeting the space tourism industry, Blue Origin, founded in 2000 by Jeff Bezos, aims to achieve human spaceflight that is commercially available. *Id.* Virgin Galactic, founded by technology entrepreneur Richard Branson in 2004, aims to be the first commercial spaceline, launching consumers into space from a jet airplane. *Id.* SpaceX, founded in 2002 by billionaire Elon Musk, hopes to someday enable people to live on other planets by revolutionizing space technology. *Id.* See Steven J. Markovich et al., *Space Exploration and U.S. Competitiveness*, COUNCIL ON FOREIGN RELATIONS (Nov. 18, 2020), archived at <https://perma.cc/2G8T-PUMJ> (depicting NASA's collaboration with the private sector for small-scale projects in addition to the hope for larger-scale endeavors such as human spaceflight). The United States remains the only country to send people beyond low Earth orbit. *Id.* Some fear that the U.S.'s activities in space could be internationally challenged, despite efforts to advance U.S. leadership in space. *Id.* The "Trump administration's push to create a space force within the military could be a sign that an era of cooperation in space is ending." *Id.* Competition between the U.S. and other space-faring nations could threaten the outdated legal framework if those involved fail to recognize clear rules and boundaries set forth for all. *Id.*

<sup>6</sup> See Grady, *supra* note 1 (outlining the start of the space race with the launch of the Sputnik satellite). See also Michael Garcia, *The Space Race: The U.S. – Soviet/Russian Relationship in Regards to Space Exploration* (May 30, 2005) (Ethics in Dev. In a Global Environment) (asserting Germany's technological rocket advancement as the precursor for competition between the U.S. and Soviet Union). After WWII ended, the major allied powers made efforts to exploit Germany's missile technology, ultimately leading to further research on satellite and launch vehicles. *Id.* The Soviets quickly gained recognition with their fast-advancing ballistic missiles and rocket technology, fueling fear within the U.S. that the Soviets would soon dominate the outer space arena. *Id.*

space, the countries created a set of governing rules in the Outer Space Treaty, which has since been signed and ratified globally by every country with a presence in space.<sup>7</sup> Over the last decade, a new space race has gained momentum; one whose actors are private companies, and whose activities are fueled by competition for customers and revenue instead of by the desire to be the first nation in space.<sup>8</sup> This new age of space exploration comes after decades of seemingly harmonious international collaboration.<sup>9</sup> However, as conflicts between private sector activities and the current governing legal framework arise, the structure will inevitably have to change, and the durability of the international fabric of the system will be tested.<sup>10</sup>

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<sup>7</sup> See Wheeling, *supra* note 1 (describing the treaty as a result of concerns that the Cold War would extend into space). The treaty bans “weapons of mass destruction and military installations on celestial bodies” in an effort to preserve outer space for peaceful endeavors. *Id.*

<sup>8</sup> See Grady, *supra* note 1 (describing the key players in the arguably new space race consisting of private space exploration). The initial space race between the U.S. and Soviet Union, began with the launch of a satellite and ended almost two decades later. *Id.* However, in recent years, a new space race has begun with the emergence of private companies competing against government organizations and vying for private space exploration. *Id.* See also Cornec, *supra* note 4, at 16 (postulating space tourism as the next commercial activity in space that will spur competition amongst private companies worldwide).

<sup>9</sup> See Grady, *supra* note 1 (portraying the years of space activity collaboration between the United States and the Soviet Union and space programs that “complemented each other beautifully.”). Throughout the 1970s, 1980s, and 1990s, the U.S. space program focused on further exploration of the solar system, revealing dazzling images of several planets, while Russia pursued human spaceflight. *Id.* The United States ultimately revived its goal of human spaceflight by establishing the International Space Station (ISS), of which many space-faring nations, not the least of which is Russia, continue to utilize, contribute to, and benefit from. *Id.*

<sup>10</sup> See Wheeling, *supra* note 1 (describing how many of the plans for outer space exploration directly conflict with the principles in the treaties). *Id.* Historically, treaties governing relations between the United States and American Indian nations were broken as a result of colonization. *Id.* This trend tells us that we must decide whether we want to “continue to do things the way we’ve always done things, or whether we want to try and uphold some of those high-minded principles that are in the Outer Space Treaty.” *Id.* See also JULIAN HERMIDA, LEGAL BASIS FOR A NATIONAL SPACE LEGISLATION 70–71 (2004) (proffering the recommendation that State parties to the international treaties adopt a licensing system to regulate the private space industry).

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This Note will explore the potential legal ramifications that arise when the privatization of space exploration and exploitation collides with the outdated framework of governing treaties. By exploring the history of the space race and the manifestation of the legal framework through adoption of international treaties, this Note demonstrates the core principles crucial to the treaties through the first several decades of the space age. By analyzing specific language in the Outer Space Treaty, and examining potential issues posed by commercial space activity, this Note emphasizes that, while deliberately vague in nature, the language of the Treaty does not, and will not, support the outer space activities undertaken by private actors. In conclusion, this Note emphasizes the recent shift from governmental space exploration to private sector involvement, highlighting the urgency for an amended legal framework to reflect the changing landscape.

## II. History

### A. *Overview of the Outer Space Legal Framework*

The legal framework governing outer space exploration started to take shape shortly after the space race began in the late 1950s.<sup>11</sup> In 1957, the Soviet Union launched the first artificial satellite into Earth's orbit, officially signaling to the rest of the world

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Since an ample and continuous access to outer space would fortify the strength of the private sector industry, it is recommended that those States which seek the encouragement and development of their private space industry as one of their space policy objectives extend this freedom to their non-governmental national entities—to the maximum possible extent—by adopting a licensing system that will not impose unnecessary and excessive restrictions to private firms to access outer space, provided, of course, that they comply with international law and safety standards.

*Id.*

<sup>11</sup> See Louis de Gouyon Matignon, *SPACE LAW HISTORY 101*, SPACE LEGAL ISSUES (July 9, 2019), archived at <https://perma.cc/WNJ6-9BS8> [hereinafter *SPACE LAW HISTORY 101*] (outlining the historical background of space law and the rise of governing framework). Although space law was contemplated long before the 1950s, the launch of the Sputnik satellite showed that access to space was practicable and previous discussions had to be converted into actual rules and practices. *Id.*

that the space race had commenced.<sup>12</sup> The satellite launch, which could have been viewed as a clear violation of international air law, instead sparked international aspirations, effectively establishing that rules governing outer space would differ from those governing aircraft activities.<sup>13</sup> In a strategic effort to secure the United States' rights in outer space as well, President Eisenhower accepted the Soviet Union's right to launch a satellite in orbit over United States territory.<sup>14</sup> Less than two years later, the United Nations General Assembly established the Committee on the Peaceful Uses of Outer Space ("COPUOS") for the purpose of fostering international outer space discussion.<sup>15</sup>

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<sup>12</sup> See 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, 290 (2012) (explaining the start of the space race with the official signal from the Soviet Union). In the fall of 1957, the Soviet Union announced that it had "placed the first artificial satellite in Earth orbit." *Id.* The satellite, named Sputnik 1, had a distinctive beeping sound which could be heard worldwide by anyone with a radio receiver. *Id.*

<sup>13</sup> See Krause, *supra* note 2 (describing how "man entered outer space before law did," creating a potential for military confrontation with the launch of the Sputnik satellite); Wessel, *supra* note 12, at 290–91 (describing the launch of the Sputnik satellite as a "wake-up call not only to the international political and scientific communities, but also to the international legal community."). See also David Koplow, *Legal Challenges in Outer Space*, U. OF VA. SCHOOL OF LAW (June 6, 2019), archived at <https://perma.cc/8AUF-XZ9W> (differentiating between air law and outer space law). None of the constellation of treaties that govern outer space define what geographical area they apply to. *Id.* The laws of air differ from the laws of outer space in that each country has (1) a complete right to control its airspace, and (2) a right to exclude others from entering its airspace, whereas, according to the international treaties, nobody is allowed to control space above their territory. *Id.*

<sup>14</sup> See Krause, *supra* note 2 (explaining the United States' tacit acceptance of the satellite's orbit officially establishing that spacecraft and aircraft law would be governed differently). International air law, which "extends a nation's sovereignty vertically to the airspace over its territory," was clearly violated when the Soviet's satellite orbited the globe. *Id.* Instead of rejecting the Soviet's actions and creating a military confrontation, President Eisenhower accepted this violation with the preemptive knowledge that the United States would one day want to send satellites over Soviet territory as well. *Id.*

<sup>15</sup> See Wessel, *supra* note 12, at 291 (describing COPUOS as one of the largest United Nation's committees with seventy-one member states). See also Paul B. Larson, *Outer Space: How Shall the World's Government's Establish Order Among Competing Interests?*, 29 WASH. INT'L L. J. 1, 8 (2019) (highlighting the role of COPUOS as the major forum for discussion on international activity in outer space).

The Committee, which meets annually to discuss issues raised by the General Assembly, has been instrumental in the birth and negotiation of international space treaties.<sup>16</sup> As one of the largest United Nations Committees, COPUOS is comprised of seventy-one member States tasked with preserving international cooperation and peaceful uses of outer space.<sup>17</sup> COPUOS consists of two subsidiary bodies—the Scientific and Technical Subcommittee, and the Legal Subcommittee—whose primary concerns revolve around the complex issues that arise as a product of the development of space technology.<sup>18</sup> Since its inception, COPUOS has been instrumental in

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<sup>16</sup> See Wessel, *supra* note 12, at 291 (explaining that most “multilateral space agreements have been negotiated through COPUOS and adopted by the General Assembly.”); *Committee on the Peaceful Uses of Outer Space, History*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (Oct. 20, 2019), archived at <https://perma.cc/Z4F3-RJJ7> [hereinafter COPUOS] (providing background on the formation of COPUOS with the creation of an ad hoc committee and then its establishment as a permanent body). The mandate of the Committee, and its various subcommittees, aims to strengthen the international legal aspect of outer space activity, with specific emphasis on current and future activities in outer space by cooperative space-faring nations. COPUOS, *supra*. See also *Reopening the American Frontier: Exploring how the Outer Space Treaty will Impact American Commerce and Settlement in Space: Hearing Before the Subcomm. on Space, Science, and Competitiveness of the Comm. on Commerce, Science, and Transportation*, 115th Cong. 85 (2017) [hereinafter *Reopening the American Frontier*] (giving historical background to the rise of COPUOS). Amidst geopolitical tensions, COPUOS was instrumental in drafting the Outer Space Treaty, and subsequent treaties that expanded on provisions of the Outer Space Treaty. *Id.*

<sup>17</sup> See Wessel, *supra* note 12, at 291 (outlining the committee’s makeup). The committee meets annually to discuss issues raised by the General Assembly, and routinely makes recommendations to the General Assembly. *Id.* See COPUOS, *supra* note 16 (delineating how the committee has continued to expand since its inception in 1959). See also Joseph A. Bosco, *International Law Regarding Outer Space – An Overview*, 55 J. OF AIR L. AND COM. 609, 613–14 (1990) (describing the role and significance of the Committee). COPUOS has drafted many treaties concerning the use of outer space and submitted them to the General Assembly for approval. *Id.* at 614. Eventually, these important multilateral treaties were ratified by space-faring nations across the globe, forming the legal framework of international space activity. *Id.*

<sup>18</sup> See Wessel, *supra* note 12, at 291 (describing the subcommittees of COPUOS and outlining their roles of discussing the “complex issues which have arisen alongside the development of space technology”). “Decisions within COPUOS are usually made by unanimous consensus among committee member states.” *Id.* See also HERMIDA, *supra* note 10, at xvi (stressing the important role the United Nations played in developing space law). The committee’s two subcommittees –

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the development of five international treaties and four principles that form the basis of outer space law.<sup>19</sup>

The brief history of outer space law can be categorized into three phases.<sup>20</sup> The first phase, spanning the 1960s and 1970s, marked the era of binding international space treaties; five treaties were enacted during this period.<sup>21</sup> The Outer Space Treaty, which provides the general basis for international space law, was signed and ratified in 1967.<sup>22</sup> The three treaties that followed were adopted in an effort to expand on certain provisions of the Outer Space Treaty, while the fifth was ratified to address exploitation of the Moon.<sup>23</sup>

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the Legal subcommittee and the Technical Subcommittee – function to discuss and codify international space law. *Id.*

<sup>19</sup> See *Space Law Treaties and Principles*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (Oct. 20, 2019), archived at <https://perma.cc/J48R-7DRQ> (setting forth the committee as the forum for the development of international space law).

<sup>20</sup> See Wessel, *supra* note 12, at 292 (outlining the three phases of international space law as categorized by the passage of treaties and resolutions). See GENNADY ZHUKOV & YURI KOLOSOV, *INTERNATIONAL SPACE LAW* 30–33 (2nd ed. 2014) (stressing the committee’s emphasis on reaffirming the importance of resolutions and treaties adopted by the international community). “It should be remembered that the Assembly’s resolutions on space also facilitate the formation of customary rules of international space law.” *Id.* at 30.

<sup>21</sup> See Wessel, *supra* note 12, at 292–93 (outlining the five binding treaties). The Outer Space Treaty was the first of the five binding agreements and is widely ratified internationally. *Id.* The following three treaties expand upon provisions of the Outer Space Treaty such as the rescue of astronauts, a state’s liability for damage caused by its space object, and registration requirements for space objects. *Id.*

<sup>22</sup> See generally The Outer Space Treaty, *supra* note 2 (giving historical background of the Outer Space Treaty). See also Stefoudi, *supra* note 3 (characterizing the Outer Space Treaty’s ratification as a small miracle amidst a tumultuous time in history). “The Outer Space Treaty was concluded one decade after the launch of the first artificial satellite into orbit around the Earth . . .” resulting in the space race. *Id.*

<sup>23</sup> See Wessel, *supra* note 12, at 293–94 (outlining the final four treaties as part of the first phase of international space law); see also G.A. Res 2345 (XXII), Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Dec. 19, 1967) [hereinafter Rescue Agreement] (defining the requirements of the 1968 Rescue Agreement as requiring states to provide astronauts assistance in cases of emergencies). See also Convention on Registration of Objects Launched into Outer Space, Sept. 15, 1976, 3235 (XXIX) [hereinafter Registration Convention] (describing the fourth widely ratified treaty as the 1975 Registration Convention). Expanding on the Outer Space Treaty to provide states with “additional means and procedures to assist in the identification of space objects.” *Id.*



The second, third, and fourth treaties addressed issues related to State liability, space object registration, and astronaut assistance in the event of an emergency.<sup>24</sup> The fifth and final treaty to open for signature in 1979 was the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (“Moon Agreement”) which, like the Outer Space Treaty, provides a general framework for the peaceful use of the Moon and other celestial bodies.<sup>25</sup>

Additionally, the Moon Agreement describes the resources of the Moon as common property to mankind and establishes that international regimens should govern the exploitation of any such resources.<sup>26</sup> While all four of the first treaties have been widely ratified across the globe, the Moon Agreement remains sparsely

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<sup>24</sup> See Wessel, *supra* note 12, at 292 (describing the elements of the 1968 Rescue Agreement, the 1972 Liability Convention, and the 1975 Registration Convention). The Rescue Agreement defines a state’s requirements for providing astronauts assistance in the event of an emergency. *Id.* The Liability Convention established a launching state’s liability for damage caused by its space objects to aircrafts or to Earth’s inhabitants. *Id.* The Registration Convention provided further detailed instruction for registering a space object. *Id.* See also G.A. Res 2777 (XXVI), Convention on the International Liability for Damage Caused by Space Objects (Nov. 29, 1971) [hereinafter Liability Convention] (highlighting a state’s liability for objects launched into outer space). See also Rescue Agreement, *supra* note 23 (expressing the committee’s desire to further “concrete expression to the rights and obligations” in the Outer Space Treaty). See also Francis H. Esposito, *The Commercial Exploitation of Space*, 25 A.F. L. REV. 159, 163 (1985) (referencing Article II of the Registration Convention as designed to clarify uncertain details in the Outer Space Treaty). The treaty requires the United States to “register and report any launch by a private firm.” *Id.*

<sup>25</sup> See G.A. Res 34/68, Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, (Dec. 5, 1979) [hereinafter Moon Agreement] (recognizing the important role the Moon plays in the exploration of outer space). See also Wessel, *supra* note 12, at 293–94 (explaining the purposes of the Moon Agreement and the reasons for its scarce acceptance). State parties shy away from adopting the Moon Agreement due to the potential for personal gain from resource extraction. *Id.*

<sup>26</sup> See Moon Agreement, *supra* note 25 (recognizing the “common interest of all mankind in furthering the exploration and use of outer space for peaceful purposes.”); ZHUKOV & KOLOSOV, *supra* note 20, at 161 (reaffirming the notion that the Moon Agreement acknowledges the need for “measures to prevent upsetting the established balance of the environment of the Moon and other celestial bodies by making adverse changes in that environment, specifically by harmful contamination through delivering substances alien to that environment or otherwise . . .”).

accepted due to controversy surrounding its implications on future national space programs.<sup>27</sup>

The second phase of outer space law, spanning the 1980s and 1990s, is defined by the adoption of nonbinding principles which expand on more specific areas of space law.<sup>28</sup> Of particular significance is the 1996 Benefits Declaration which elaborates on the international nature of space exploration.<sup>29</sup> Highlighting the importance of outer space activities for the benefit of all participating nations, the Benefits Declaration emphasizes the underlying theme of international collaboration in outer space.<sup>30</sup> Although not binding on any State party, a crucial, and respected, element to all four of the nonbinding principles is the adherence to nondiscrimination by any individual State.<sup>31</sup>

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<sup>27</sup> See Wessel, *supra* note 12, at 293 (describing the crux of the Moon Agreement as the “requirement that any exploitation of lunar resources be carried out through an international regime that would ensure all states share equitably in the benefits of those resources.”).

<sup>28</sup> See *id.* at 294 (outlining the nonbinding agreements such as the Remote Sensing Principle and the Nuclear Power Source Principle). See also Dionysia-Theodora Avgerinopoulou & Katerina Stolis, *Current Trends and Challenges in International Space Law*, EESC (Mar. 28, 2020), archived at <https://perma.cc/59C7-7XEH> (discussing the many non-binding resolutions adopted in the wake of the treaty era, and the lack of cohesion among the guidelines).

<sup>29</sup> See G.A. Res. 51/122, 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 (Feb. 4, 1997) [hereinafter Declaration on International Cooperation] (highlighting international collaboration and the needs of developing countries in space activities). “National and international agencies, research institutions, organizations for development aid, and developed and developing countries alike should consider the appropriate use of space applications and the potential of international cooperation for reaching their development goals.” *Id.*

<sup>30</sup> See *id.* (setting forth the resolutions adopted by the United Nations). The Declaration on International Cooperation recognizes the importance of international collaboration in the exploration and use of outer space. *Id.*

<sup>31</sup> See *id.* (discussing the States’ roles in giving particular attention to “the benefit for and the interests of developing countries with incipient space programmes stemming from such international cooperation conducted with countries with more advanced space capabilities.”). See also INGO BAUMANN, *SPACE LAW: CURRENT PROBLEMS AND PERSPECTIVES FOR FUTURE REGULATION* 65–67 (Marietta Benko & Kai-Uwe Schrogl eds., 2005) (highlighting the complications of the diverse landscape of States who participate in outer space activity). Cooperation, amongst

The third, and most recent, phase of international space law emerged in the 2000s and encompasses current trends in space activity.<sup>32</sup> Addressing issues such as orbital debris, nuclear power sources, and clarification on the definition of a “launching state,” these nonbinding resolutions and guidelines focus on the technical areas of space law.<sup>33</sup> Although not binding on State parties, these resolutions provide valuable guidance for space exploration.<sup>34</sup> However, unlike the five treaties, these resolutions often contain clauses allowing the space flight operator to act within his or her discretion when deciding whether to deviate from general rules and guidelines.<sup>35</sup>

### B. *The Outer Space Treaty*

Among the binding treaties born out of international collaboration, the Outer Space Treaty is often considered the Constitution for outer space.<sup>36</sup> The Treaty focuses on the common

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those States who have a vested interest in outer space activity and exploration, is often carried out only through communication and passive participation in international conferences. *Id.* at 66. Increased levels of cooperation and coordination among States would foster harmonization of outer space activities along with a more coherent legal framework. *Id.* at 67.

<sup>32</sup> See Wessel, *supra* note 12, at 294–95 (describing the catalyst for the third phase of international space law as a direct reaction to excess space debris caused by modern space exploration). See also Ken Hodgkins, *Spacewatchgl Opinion: COPUOS at a Crossroad – Challenges and Achievements from the Past Guide us to the Future*, SPACEWATCH EUROPE (Mar. 12, 2021), archived at <https://perma.cc/5EB3-GSC9> (articulating the different phases of international space law, particularly, the non-binding principles phase which clarified space activities not explicitly discussed in the Outer Space Treaty).

<sup>33</sup> See Wessel, *supra* note 12, at 294–95 (setting forth the resolutions passed in 2004 and 2007 interpreting specific portions of the Outer Space Treaty); Hodgkins, *supra* note 32 (depicting the areas of space law, such as debris mitigation, remote sensing, and nuclear power, that the non-binding principles address).

<sup>34</sup> See Wessel, *supra* note 12, at 296–97 (outlining the trend of nonbinding resolutions and codes of conduct). “Most proposed codes of conduct would provide a set of ‘rules of the road’ for space, covering areas such as orbital debris mitigation, notification of space activities, and space situational awareness.” *Id.* at 296.

<sup>35</sup> See *id.* (explaining the notion of self-judging in technical guidelines “allowing a party to deviate from otherwise applicable rules in various circumstances”).

<sup>36</sup> See *id.* at 292 (describing how the first of the five treaties sets out the basic principles governing outer space activities). See generally Louis de Gouyon

global interest in space exploration and reaffirms a contribution to international collaboration in space.<sup>37</sup> Of the seventeen articles in the Outer Space Treaty, a select few have garnered significant attention and debate.<sup>38</sup> Specifically, Articles I, II, and VI, which are widely considered to be vague in nature, have been the focus of differing interpretations.<sup>39</sup>

Article I sets forth the general encompassing principle that outer space exploration should benefit international interests free from discrimination of any kind.<sup>40</sup> Furthermore, Article I establishes

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Matignon, *The Universe, A Zone of Lawlessness*, SPACE LEGAL ISSUES (Jan. 23, 2020), archived at <https://perma.cc/K5S6-7RFH> [hereinafter *The Universe, A Zone of Lawlessness*] (touching upon key aspects of the international Treaties).

<sup>37</sup> See The Outer Space Treaty, *supra* note 2 (highlighting the international collaboration element of the Outer Space Treaty). See also *Reopening the American Frontier*, *supra* note 16, at 3 (underscoring the importance of the Outer Space Treaty as crucial to building both international expectations and American interests). The Outer Space Treaty guides all countries in outer space activity by providing a set of governing principles. *Id.* See also Loren Grush, *How an international treaty signed 50 years ago became the backbone for space law*, THE VERGE (Jan. 27, 2017), archived at <https://perma.cc/Z94J-CEQT> (establishing the importance of international collaboration). Exploration and use of outer space should be done for the benefit and in the interest of all countries. *Id.* See also Veronica Delgado-Perez, *Argument | The Commercialization of Space Risks Launching a Militarized Space Race*, THE INTERNATIONAL SCHOLAR (Dec. 14, 2020), archived at <https://perma.cc/88C7-HBJQ> (stressing the lack of attention to commercial activity by the Outer Space Treaty). The failure of the Outer Space Treaty to explicitly address questions of a commercial nature poses challenges to space-faring nations who are forging ahead with extraterrestrial activity for commercial purposes. *Id.* The Outer Space Treaty further reaffirms that outer space is not subject to national appropriation by establishing that national activities in outer space must be carried out for peaceful purposes and for the benefit of all. *Id.*

<sup>38</sup> See Wheeling, *supra* note 1 (outlining the Outer Space Treaty as including seventeen articles). See also Bosco, *supra* note 17, at 631 (juxtaposing the literal language in the text of the Outer Space Treaty and the adherence and actions of space-faring nations). “Major space powers have demonstrably been acting on the premise that was specifically not prohibited under the Treaty is permissible and lawful.” *Id.*

<sup>39</sup> See Wheeling, *supra* note 1 (describing how the intentionally vague Outer Space Treaty does not clearly establish what is meant by the “province of all mankind”).

<sup>40</sup> See The Outer Space Treaty, *supra* note 2, at art. I (highlighting the importance of international collaboration). All States shall be free to explore outer space “without discrimination of any kind, on a basis of equality and in accordance with international law . . .” *Id.* See also *The Universe, A Zone of Lawlessness*, *supra*

freedom of access to all celestial bodies for purposes of space exploration and scientific exploitation in accordance with international law.<sup>41</sup> Article II promotes the international undercurrent of the treaty and has sparked controversy with a prohibition against national jurisdictional claims.<sup>42</sup> While Articles I and II have fomented debate over the correct interpretation of their language, Article VI is perhaps the most controversial portion of the treaty with respect to modern space exploration.<sup>43</sup> In sum, Article VI of the Outer Space Treaty confers international liability to State

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note 36 (depicting original intention of the Outer Space Treaty and uses of outer space). Space is a “good shared by all without being the property of anyone” and a resource that all can enjoy at their leisure. *Id.*

<sup>41</sup> See The Outer Space Treaty, *supra* note 2, at art. I (expanding upon the language in Article I of the Outer Space Treaty). See also *How Do We Rule The Universe?*, BBC NEWS (Jan. 11, 2018), archived at <https://perma.cc/ND3S-M3FJ> (quoting European Space Lawyer Sarah Moons who discusses the need for an updated international legal framework to encompass the modern trends in space exploitation). If the Outer Space Treaty says that nobody can own the moon or other celestial bodies, private companies are logically prohibited from selling any resources they extract from outer space. *Id.*

<sup>42</sup> See The Outer Space Treaty, *supra* note 2, at art. II (describing outer space and other celestial bodies as “not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means”); see also Rand Simberg, *Property Rights in Space*, THE NEW ATLANTIS (Oct. 20, 2019), archived at <https://perma.cc/C7NV-YSEK> (recognizing that property claims would be prohibited under Article II). See also Finnigan, *supra* note 3 (highlighting the debated issues in space law and the relevant articles of the Outer Space Treaty under scrutiny). “In one of the more hotly-debated issues in space law, Article II of the OST appears to prohibit space resource extraction.” *Id.* See also Abigail D. Pershing, *Interpreting the Outer Space Treaty’s Non-Appropriation Principle: Customary International Law from 1967 to Today*, 44 YALE J. OF INT’L L. 149, 158–62 (emphasizing the controversy over the non-appropriation principle due primarily to shifting interpretation of Article II). The reinterpretation of the non-appropriation principle has largely emerged from a change in customary international law spurred by: (1) state practice, (2) adoption of domestic legislation, and (3) legal scholarship. *Id.*

<sup>43</sup> See Brian J. Egan, *The Next Fifty Years of the Outer Space Treaty*, U.S. DEP’T OF STATE (Dec. 7, 2016), archived at <https://perma.cc/6S3M-TD2F> (describing how conversations on the requirements of Article VI can be heard in the Executive Branch of government); Finnigan, *supra* note 3 (explaining how Articles II and VI are two of the most widely debated treaty articles); Simberg, *supra* note 42 (explaining how the Outer Space Treaty does not allow direct attribution because states hold responsibility).

parties' national activities in outer space.<sup>44</sup> Furthermore, Article VI acknowledges non-governmental entities and declares that any outer space activities of such entities will require authorization and continuing supervision by the appropriate State party.<sup>45</sup> While the text of the Outer Space Treaty provides no further explanation for the terms 'authorization' and 'continuing supervision,' many have tried to clarify its applicability to non-governmental actors.<sup>46</sup> In an age of

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<sup>44</sup> See The Outer Space Treaty, *supra* note 2, at art. VI (stating in part that State parties to the Treaty shall be internationally liable for their activities in space).

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

*Id.* But see Finnigan, *supra* note 3 (arguing that private space activity does not necessarily amount to national appropriation and therefore, resource mining is authorized under Articles II and VI of the Outer Space Treaty). See Alexander Lewis, *A Bundle of Sticks in Zero G: Non-State Actor Mining Rights for Celestial Bodies*, 25 SW. J. INT'L. L. 393, 399–400 (describing the scope of Article VI as applying to non-governmental actors only to the extent they act as an agent of a state when engaged in national activities). The activities of private actors "not engaged in national activities only require the authorization and 'continuing supervision by the appropriate State Party to the Treaty.'" *Id.* See also Koplrow, *supra* note 13 (stressing the crucial aspect of outer space law that confers international liability on countries for acts by their private persons or companies). Outer space law is different from international law in that, under Article VI of the Outer Space Treaty, if a private actor does something in space that violates the Outer Space Treaty, the presiding country's government will be held internationally liable for the violation. *Id.*

<sup>45</sup> See The Outer Space Treaty, *supra* note 2, at art. VI (describing how non-governmental activities require "authorization and continuing supervision" by the appropriate State party). See also Frans G von der Dunk et al., *Billion-dollar questions? Legal aspects of commercial space activities*, 23 UNIF. L. REV. 418 (2018) (summarizing the liability for private activity set forth in Article VI of the Outer Space Treaty). Under the Outer Space Treaty, private operators have no formal standing as any private activities are subject to State liability. *Id.*

<sup>46</sup> See Egan, *supra* note 43 (highlighting the ambiguity of Article VI by describing it as the center of dialogue in the nation's Capital). See also Laura Montgomery, *US Regulators May Not Prevent Private Space Activity on the Basis of Article VI of the Outer Space Treaty*, 14 (George Mason Univ., Mercatus Working Paper, 2018),

privatized space exploration, Articles I, II, and VI of the Outer Space Treaty have drawn significant attention and debate in relation to their applicability to commercial space activity.<sup>47</sup>

### C. *Constitutional Treatment of International Treaties*

Article VI of the United States Constitution asserts the effect of a signed international Treaty on the United States as the “supreme Law of the Land.”<sup>48</sup> Specifically, the language of the Article establishes a ratified treaty as having the same legal effect as a signed

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*archived at* <https://perma.cc/8HGR-U7ZP> (discussing the interpretations of Article VI to mean that private actors cannot operate in outer space without federal authorization). “Article VI appears to have originated as a means of addressing liability concerns, and to ensure that some government would be financially responsible for any damage caused by private actors.” *Id.*

<sup>47</sup> See Egan, *supra* note 43 (recounting how the requirements of Article VI have fostered discussions surrounding how to best authorize and supervise future commercial space activities as they become more prevalent). See also Steven Freeland, *Fly me to the Moon: How will International Law Cope with Commercial Space Tourism?*, 11 MELB. J. OF INT’L L. 1, 28 (2010) (discussing the considerable challenges that commercial space tourism will face in cooperating and abiding by international outer space law). The foundational principles of international outer space law include common interest, freedom, and non-appropriation. *Id.* at 10. These principles are reflected in Articles I and II of the Outer Space Treaty and “therefore constitute binding conventional rules, codifying what already amounted to principles of customary international law.” *Id.* at 11.

<sup>48</sup> See Michael J. Listner, *International space law and commercial space activities: the rules do apply*, THE SPACE REVIEW (June 3, 2013), *archived at* <https://perma.cc/VKM8-64WV> (reiterating the legal effect of a ratified treaty as binding on private actors). See also U.S. CONST. art. VI, cl. 2 (highlighting Article VI of the Constitution by depicting the legal effect of a ratified treaty as analogous to the effects of a federal statute passed by Congress and signed by the President).

This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.

*Id.* See also *Des Los Santos Mora v. New York*, 524 F.3d 183, 192 (2d Cir. 2008) (quoting *Edye v. Robertson* where the Court explained that a treaty is a compact between independent nations). “[I]t depends for the enforcement of its provisions on the interest and the honor of the governments which are parties to it.” *Id.* See also *Montgomery*, *supra* note 46, at 12 (establishing the relation between treaty authority and the United States Constitution). “If there is a conflict between a treaty or statute and the Constitution, the Constitution overrides the conflicting statute or treaty.” *Id.*

federal statute.<sup>49</sup> However, not all ratified treaties have immediate binding effect.<sup>50</sup> The nature of any international agreement entered into by the United States determines the legal effect on domestic law.<sup>51</sup> Following the Supreme Court decision in *Medellin v. Texas*, the Court established the appropriate effect of a ratified treaty by distinguishing between a self-executing and non-self-executing treaty.<sup>52</sup> Furthermore, the 10<sup>th</sup> Amendment to the United States Constitution provides that any powers not delegated by the

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<sup>49</sup> See Listner, *supra* note 48 (establishing the effect of a ratified treaty as set forth in the Constitution). The provisions of a ratified treaty have the same legal effect on the United States as a federal statute “passed by Congress and signed into law by the President.” *Id.* See also Jonathan Babcock, *Encouraging private investment in space: does the current space law regime have to be changed? (part 1)*, THE SPACE REVIEW (Jan. 5, 2015), archived at <https://perma.cc/4NBY-AXA7> (proffering an alternative interpretation of Article VI to the Outer Space Treaty whereby private activities are permitted under appropriate State party supervision). “So it seems as if private actors can undertake operations in space and appropriate for all intents and purposes so long as a state takes responsibility for their actions.” *Id.*

<sup>50</sup> See *Medellin v. Texas*, 552 U.S. 491, 504–05 (2008) (distinguishing between those treaties that confer binding legal duties and those that do not). Not all international law automatically constitutes binding legal obligations on the United States. *Id.* at 504. Even those international treaties that, on their own, do not function as binding federal law, constitute good faith international commitments. *Id.*

<sup>51</sup> See STEPHEN P. MULLIGAN, CONG. RESEARCH SERV., RL32528, INTERNATIONAL LAW AGREEMENTS: THEIR EFFECT UPON U.S. LAW 15 (2018) (depicting the effect of international treaties on domestic U.S. law). The legal effect of a treaty depends, in part, on whether it, or a provision of it, is self-executing in nature. *Id.* See also *Medellin*, 552 U.S. at 504 (holding that “not all international law obligations automatically constitute binding federal law enforceable in United States courts).

<sup>52</sup> See *Medellin*, 552 U.S. at 505 (quoting *Foster v. Neilson* in distinguishing between a self-executing and non-self-executing treaty). “[A] treaty is equivalent to an act of the legislature, and hence, self-executing, when it operates of itself without the aid of any legislative provision. When, in contrast [treaty] stipulations are not self-executing they can only be enforced pursuant to legislation to carry them into effect.” *Id.* See also *Reopening the American Frontier*, *supra* note 16, at 15 (quoting the *Medellin* Court where the Justices determined that whether a Treaty is self-executing means “comparing laws that individuals are bound to observe as the supreme law of the land versus a mere Treaty dependent on the good faith of the parties.”).



Constitution to the government, are left to the discretion of the states or to the people.<sup>53</sup>

*D. Modern Legislation in the United States*

The controversy surrounding the aforementioned Articles of the Outer Space Treaty has fostered the proposal and development of modern legislation to provide clarity.<sup>54</sup> In 2015, in an effort to provide clarification on existing treaty language related to resource utilization, and to further encourage the private space industry, the United States Congress amended the U.S Commercial Space Launch Competitiveness Act for a second time, titling it the Spurring Private Aerospace Competitiveness and Entrepreneurship Act of 2015 (“SPACE Act”).<sup>55</sup> Among other affirmations of the Treaty language, the Act reaffirms the language in Article VI of the Outer Space Treaty by recognizing that non-governmental space activities must

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<sup>53</sup> See U.S. CONST. amend. X (setting forth the language in the 10th amendment to the Constitution). “The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.” *Id.*

<sup>54</sup> See Egan, *supra* note 43 (discussing proposed legislation that would authorize non-governmental space activity for which the “existing licensing frameworks for launch, communications, and remote sensing are not sufficient for full implementation of our Article VI obligations.”).

<sup>55</sup> See *id.* (depicting how Article VI of the Outer Space Treaty does not support modern commercial space activities). See also Spurring Private Aerospace Competitiveness and Entrepreneurship Act of 2015, H.R. 2262, 114th Cong. (2015) (stating in pertinent part “to facilitate a pro-growth environment for the developing commercial space industry by encouraging private sector investment and creating more stable and predictable regulatory conditions.”). See also Wheeling, *supra* note 1 (characterizing the birth of modern legislation as a product of private actors pushing for reform).

On multiple occasions, Bezos has outlined his vision for moving heavy polluting industries off of Earth, leaving the planet to be “zoned residential.” Other smaller start-ups with less stable capital but equally ambitious plans to mine the moon or asteroids for precious metals and water helped to shepherd through legislation in the U.S. giving private industry more leeway in space. Such bills include the SPACE Act, which President Barack Obama signed into law in 2015—a piece of legislation that, for the first time, gave corporations a right to the resources they extract from other celestial bodies.

*Id.*

continue to be subject to State party authorization and supervision.<sup>56</sup> However, the Act further encourages the development of the commercial space industry by granting US citizens and private actors the right to claim resources mined in outer space.<sup>57</sup>

In recent years, it has become increasingly apparent that the scope of non-governmental space activity does not fit within the framework of Article VI of the Outer Space Treaty, which in turn has prompted proposals for further legislation.<sup>58</sup> In discussing these

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<sup>56</sup> See H.R. 2262 (setting forth the specific rights of private actors).

A U.S. citizen engaged in commercial recovery of an asteroid resource or space resource shall be entitled to any asteroid resources or space resources obtained, including to possess, own, transport, use, and sell in accordance with applicable law, including U.S. international obligations.

*Id.* See also Egan, *supra* note 43 (describing the legislative bill passed in an effort to clarify portions of the Outer Space Treaty). See also Kurt Taylor, *Fictions of the Final Frontier: Why the United States SPACE Act of 2015 is Illegal*, 33 EMORY INT'L L. REV. 653, 655 (highlighting the key aspects of the SPACE Act). "Among other things, the Act provides that United States citizens have the right to appropriate property in outer space for commercial purposes, and to do so 'free from harmful interference.'" *Id.* See also Nick Stockton, *Congress Says Yes to Space Mining, No to Rocket Regulations*, WIRED (Nov. 18, 2015), *archived at* <https://perma.cc/PQ2U-AZS3> (depicting key provisions of the bill). "This bill gives a company working under a US license the ability to own resources that they might obtain from celestial bodies." *Id.*

<sup>57</sup> See Kasey Tuttle, *Senate approves bill to legalize space mining*, JURIST (Nov. 13, 2015), *archived at* <https://perma.cc/5B8E-M4RN> (exposing the intentions behind the Act to promote the exploitation of outer space by the commercial sector). "The passage of this Act is a boon for companies that have already invested millions of dollars into the concept of deep space mining . . . Asteroids could one day be a vast new source of scarce material if the financial and technological obstacles can be overcome." *Id.* However, "[t]he Act does not permit private companies to 'own' the asteroids they mine, but allows them the right to claim the material they mine from it." *Id.* See also H.R. 2262 (describing the privileges afforded to private actors under the Act, including the possession, use, and distribution for profit of asteroids).

<sup>58</sup> See Egan, *supra* note 43 (explaining how the lack of clarity in the language of Article VI will be detrimental to the future of modern space exploration). See also Almudena Azcárate Ortega, *Artemis Accords: A Step Toward International Cooperation or Further Competition?*, LAWFARE BLOG (Dec. 15, 2020), *archived at* <https://perma.cc/3YPZ-VNVP> (introducing the Artemis Accords, which are a set of agreements, signed in the fall of 2020, and aimed at providing peaceful activity and behavior in outer space among the eight founding member states). With the goal of returning humankind to the Moon, and eventually, to Mars, NASA created

legislative proposals, the interpretation and meaning of the phrases “authority” and “continuing supervision” have come to the forefront of national debate.<sup>59</sup> In an effort to provide clarity on the scope of Article VI, the International Institute of Space Law (“IISL”), an advisory non-governmental agency dedicated to the development of space law, issued statements regarding the interpretation of the ambiguous phrases.<sup>60</sup> These statements set forth the interpretation that all private actions in outer space are considered national activities, and, therefore, are subject to Articles II and VI of the Outer Space Treaty.<sup>61</sup> The statements issued by the IISL provide examples of the complex discussions in an age where space exploration has become increasingly adversarial to the language of the Outer Space Treaty, ultimately stimulating international debate and calls for legal reform.

*E. Political Agendas and The Rise of Commercial Space Activity in the United States*

Under the leadership of President John F. Kennedy, and up until the Apollo 11 Moon landing in 1969, space exploration was *the*

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the Artemis Accords in an effort to “collaborate with commercial partners, as well as with the international community, to achieve a sustainable lunar exploration by the end of this decade.” *Id.*

<sup>59</sup> See Egan, *supra* note 43 (illustrating the confusion surrounding the term “continuing supervision” and how it applies to current trends in modern space exploration).

<sup>60</sup> See Lewis, *supra* note 44, at 400 (describing the statements of IISL as released in a non-professional capacity). See also *About the IISL*, INTERNATIONAL INSTITUTE OF SPACE LAW (2020), archived at <https://perma.cc/BS7B-7ZND> (depicting the founding and purpose of IISL). Founded in 1960, the primary purpose and objectives of the institute include cooperation with “appropriate international organizations and national institutions in the field of space law” and the carrying out of tasks for fostering the development of space law. *Id.* Members of the institution are elected based on contribution to the field of space law and represent almost fifty countries. *Id.*

<sup>61</sup> See *Statement by the Board of Directors Of the International Institute of Space Law (IISL) On Claims to Property Rights Regarding the Moon and Other Celestial Bodies* (Nov. 16, 2019), archived at <https://perma.cc/98FN-Y7RR> [hereinafter *Statements by IISL*] (setting forth the interpretation that the prohibition in Article II against national appropriation includes “appropriation by non-governmental entities (i.e. private entities whether individuals or corporations) since that would be a national activity.”).

political agenda for the nation.<sup>62</sup> Spurred on by bureaucratic pressure, Kennedy prioritized federal funding of the National Aeronautics and Space Administration (“NASA”) program that would ultimately take the first men to the Moon.<sup>63</sup> However, as the national allure of spaceflight peaked with the Moon landing, so did NASA’s budget.<sup>64</sup> From the end of Kennedy’s presidency until today, space exploration has been a secondary priority, and NASA’s federal budget has seen a steady reduction.<sup>65</sup>

Prior to 1984, United States satellite and shuttle launches were legally restricted to the NASA shuttle program.<sup>66</sup> However, when The United States Congress passed the Commercial Space Launch Act of 1984, encouraging government agencies such as NASA to promote private space activity, the commercial sector saw

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<sup>62</sup> See *1969 Moon Landing*, HISTORY (July 21, 2019), archived at <https://perma.cc/YQ53-HX63> (depicting the details of the Apollo 11 mission – the first successful lunar landing mission sent by NASA). See also BUZZ ALDRIN, *MAGNIFICENT DESOLATION 10* (2009) (reaffirming the importance of the Moon landing for America and for the World). Amidst international turmoil, America wanted the first Moon landing to be a success to unite the world and send a message of peace for humankind. *Id.* “We didn’t have the know-how, the technology, or the rocketry, but we had the willpower.” *Id.* at 9–10.

<sup>63</sup> See *The Birth of NASA*, NASA (Mar. 28, 2008), archived at <https://perma.cc/46JA-8LCC> (recounting the birth of NASA when President Eisenhower signed the National Aeronautics and Space Act into law in the summer of 1958).

<sup>64</sup> See Daniel Van Boom, *Apollo took us to the moon in 1969. Why haven’t we gone back?*, CNET (July 17, 2019), archived at <https://perma.cc/5ZWL-TPHT> (depicting the decline in space exploration relevancy).

<sup>65</sup> See *id.* (describing the priority given to space exploration in the subsequent presidencies after Kennedy). See also Lina Shi, *THE IMPLICATIONS OF THE PRIVATIZATION OF SPACE EXPLORATION*, Wharton University of Pennsylvania (Dec. 12, 2016), archived at <https://perma.cc/T45U-PTDJ> (juxtaposing NASA’s budget at the beginning of the space age with the budget it has today). Since 1993, NASA’s budget has not totaled over 1% of the overall national federal budget in contrast with the 4.4% budget it saw in 1966. *Id.* To fill the gap left by discontinued federal space programs, private companies are now performing important functions on behalf of NASA through commissions. *Id.*

<sup>66</sup> See *Space Shuttle Era*, NASA (Nov. 17, 2019), archived at <https://perma.cc/Y9GM-XWGM> (recounting the history of the Space Shuttle Program). Commencing in 1981, NASA’s space shuttle fleet of first reusable spacecrafts, including Columbia, Challenger, Discovery, Atlantis, and Endeavor flew 135 missions. *Id.*

an opportunity for profitable involvement.<sup>67</sup> In an attempt to lower the costs of space activities, the government began selecting private companies to compete for launch contracts and soon, commercial launches outnumbered governmental launches.<sup>68</sup> In 2004, The United States Congress passed an amendment to the Commercial Space Launch Act effectively requiring NASA to legalize private space flight, ultimately leading to the current private sector space era.<sup>69</sup>

In the formative years of the space age, NASA took risks with their space flights in an effort to be the first nation to send a man to the Moon.<sup>70</sup> However, following the tragedies of two failed shuttle

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<sup>67</sup> See Yun Zhao, *Space Commercialization and the Development of Space Law*, PLANETARY SCIENCE (July 30, 2018), archived at <https://perma.cc/PZJ8-NEDE> (discussing the legal issues that have arisen, such as the licensing of satellites owned by private companies, due to commercial space activity). See also Listner, *supra* note 48 (highlighting companies such as SpaceX that contract with NASA to launch commercial cargo missions to the ISS); discussion *infra* Part III.

<sup>68</sup> See Bill Canis, *Commercial Space Industry Launches a New Phase*, Congressional Research Service, at 1 (Dec. 12, 2016) (describing the desire to drive down satellite launch costs by contracting with private actors). See also *Houston We Have a Podcast: Space Tourism and Commercialization*, NASA (Aug. 2, 2019), archived at <https://perma.cc/Y6AD-4DJW> (discussing NASA's self-serving collaboration with private commercial entities). If there is not more demand for the International Space Station, the last government-driven program, NASA is stuck funding the entire operating cost for the next space destination. *Id.* "We are doing this in our own best interest to help companies, leveraging the assets of the space station to help them see if there's a business model in space. Whether it be . . . for marketing, for cell line development, personalized medicine, [or] in space manufacturing. . ." *Id.* See also *European Space Policy Inst., Evolution of the Role of Space Agencies*, at 1 (2019) [hereinafter *Evolution of the Role of Space Agencies*] (stressing NASA's increased reliance on the private sector to fulfill specific purposes that the government could no longer afford).

<sup>69</sup> See Jeff Foust, *Congress launches commercial space legislation*, THE SPACE REVIEW (May 26, 2015), archived at <https://perma.cc/2TZK-5CYG> (describing the 2004 amendment). The "learning period" of the Act was extended effectively restricting the FAA from enacting regulation that would restrict commercial space flight. *Id.* See also H.R. 3752, 108th Cong. (2004) (providing for the expedited issuance of permits to private actors).

<sup>70</sup> See Mark A. Wessels, *Why couldn't NASA do this?*, THE SPACE REVIEW (Feb. 12, 2018), archived at <https://perma.cc/4NAP-JSZZ> (describing the 1960s as an era when each new NASA flight went faster and further than the one previous). See also *Houston We Have a Podcast: 21st Century Space Travel*, NASA (Oct. 4, 2019), archived at <https://perma.cc/LUL6-2UT3> (highlighting the importance of putting humans in space and how government funding reflected this ambition in the early days of the space era).

missions, both launched under NASA's Space Shuttle Program, NASA's primary goal became risk aversion.<sup>71</sup> In addition to the safety concerns surrounding the Space Shuttle Program, government funding fluctuated over the program's lifetime, leaving NASA in a financially precarious position.<sup>72</sup> In 2011, thirty years after its inception, the Space Shuttle program was retired, opening the doors to private sector involvement in human spaceflight.<sup>73</sup>

### III. Facts

Following the Commercial Space Launch Act of 1984, and its later amendment in 2004, government space agencies, such as NASA, relied on privately-owned companies for cheaper alternatives to space launches.<sup>74</sup> The turn of the 21<sup>st</sup> century ushered in a new era of collaboration between NASA and private companies, spurring

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<sup>71</sup> See *Remembering Space Shuttle Challenger*, NASA HIST. (Jan. 28, 2019), archived at <https://perma.cc/JG88-SRE8> (describing the loss of the 1986 Space Shuttle Challenger as a result of a booster engine failure); see also *Space Shuttle Columbia*, HIST. (Aug. 21, 2018), archived at <https://perma.cc/3MAP-BPGR> (outlining the Space Shuttle Columbia disaster in 2003 as a result of damage to the shuttle's wing caused by a piece of foam that broke off during reentry to the atmosphere).

<sup>72</sup> See Mike Wall, *NASA's Shuttle Program Cost \$209 Billion – Was it Worth It?*, SPACE (July 5, 2011), archived at <https://perma.cc/UXW4-Q5WT> (highlighting the budget cuts over the past four decades as a result of lack of political will to continue to go to the moon after the initial goal was met); see also Wessels, *supra* note 70 (describing the goal of the Space Shuttle program to solve the expense issue of getting to space with reusable shuttles). “Technical, economic, and political reality did not allow for this. Compromises were made. The amount of work that each shuttle needed for another launch was grossly underestimated.” Wessels, *supra* note 70.

<sup>73</sup> See *Evolution of the Role of Space Agencies*, *supra* note 68 (outlining the origins of the new space age). The retirement of the Space Shuttle program and the budget constraints due to the global financial crisis in the mid 2000s ultimately led to “increased reliance on the private/commercial sector to fulfil some of the agency's purposes and goals. . .” *Id.* The factors that led to this new trend of private space activity were (1): “the retirement of the Space Shuttle programme and the pressing need to recover independent U.S. manned access to space, and to the ISS in particular,” and (2) the financial crisis in the early 2000s that led to “substantial budgetary constraints for public bodies, including space agencies . . .” *Id.*

<sup>74</sup> See Canis, *supra* note 68, at 1 (highlighting the growth of the commercial space sector as a product of a deliberate shift in federal policy).

contractual agreements with private agencies.<sup>75</sup> The emergence of billionaire-backed companies eager to join the outer space arena, coupled with a governmental desire to drive down prices and create a competitive market for outer space activities, ultimately led to the ideal collaboration.<sup>76</sup> As private companies became more prominent in outer space activities, both the financial burden and the risk potential shifted away from government-directed scrutiny, ultimately giving way to a new profit-driven model of space exploration.<sup>77</sup>

At the inception of the space era, and for several decades following, satellite and rocket launches remained within the government domain.<sup>78</sup> However, the effort to reduce costs of space

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<sup>75</sup> See *Beyond Earth Expanding human presence into the solar system*, NASA (Aug. 18, 2006), archived at <https://perma.cc/LLL7-K2QW> (explaining NASA's investment in private sector space flight in an effort to create a "competitive market for supply flights to the International Space Station"). See also James Cawley, *NASA, SpaceX Complete Final Major Flight Test of Crew Spacecraft*, NASA (Jan. 19, 2020), archived at <https://perma.cc/VC6T-FQRN> (noting the development of a new space industry with collaboration between government entities and private actors). Commercial human travel to the International Space Station and beyond will foster research and discovery of the cosmos. *Id.* Collaboration also has the "benefit of facilitating and promoting for America a vibrant economy in low-Earth orbit." *Id.*

<sup>76</sup> See Canis, *supra* note 68 (explaining how government policy has "sought to spur innovation and drive down costs by expanding the roles satellite manufacturers and commercial launch providers."). See also Ortega, *supra* note 58 (highlighting the United States' objective in gaining a competitive advantage in the international community). The United States plays to its own strengths by promoting "collaboration not only with other states but also with private actors that will have an increasingly important role to play in this new age of space exploration." *Id.*

<sup>77</sup> See *Evolution of the Role of Space Agencies*, *supra* note 68 (describing the recent trend of commercial space activities with a shift of risk and responsibility); Delgado-Perez, *supra* note 37 (illustrating the U.N.'s reactions to the recent era of commercial utilization of outer space). Only in the last decade, has the U.N. Committee on the Peaceful Uses of Outer Space been forced to deal with commercial activity in outer space. Delgado-Perez, *supra* note 37. In a recent report released by the Committee, members expressed concern that the "era of the commercial utilization of outer space's resources is intrinsically linked to the escalation of international competition over resources, which could threaten international peace and security." *Id.*

<sup>78</sup> See Canis, *supra* note 68, at 1 (highlighting the clear shift from government funded launches to private entity launches). Prior to the enactment of the Commercial Space Launch Act of 1984, orbital launches were only contracted to NASA or to the Department of Defense, and most of the orbiting satellites were government owned. *Id.* However, with the enactment of the 1984 Act, which provided in relevant part, "[T]he United States should encourage private sector launches," there was a clear shift toward private funding and involvement. *Id.*

exploration, coupled with increased technological advancements over the past two decades, have significantly motivated private actors to join the arena.<sup>79</sup> The last two decades have seen the development of the commercial space era with the formation of prominent private companies, motivated by profits, and eager to explore outer space.<sup>80</sup> In 2002, entrepreneur Elon Musk formed Space Exploration Technologies (“SpaceX”) in an effort to revolutionize space technology.<sup>81</sup> The enormously successful company has mastered the reusable rocket, leading to reduced launch prices and a partnership

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<sup>79</sup> See *Why Big Business Is Making a Giant Leap into Space*, WHARTON UNIV. OF PA. (June 4, 2019), archived at <https://perma.cc/RB67-LMHA> (highlighting the reduced costs of commercial applications due to using commercial technology and standard architectures); see also Finnigan, *supra* note 3 (describing how technological advancements have led to plans to crew missions to Mars); see also Dave Baiocchi & William Welser, *The Democratization of Space New Actors Need New Rules*, FOREIGN AFFAIRS (May/June 2015), archived at <https://perma.cc/V6N9-NMJK> (depicting the ease of building a basic satellite with modern technology). The availability of “small, energy-efficient computers, innovative manufacturing processes, and new business models for launching rockets” has made it easier than ever before to launch a space mission. Baiocchi & Welser, *supra*.

<sup>80</sup> See George Sowers, *Op-ed | Commercializing Space: Before a commercial LEO market can flourish, the ISS must be retired*, SPACENEWS (Mar. 19, 2019), archived at <https://perma.cc/WA8G-27H6> (describing the rise of commercial space activity with the development of private companies); see also Babcock, *supra* note 49 (listing profit potential as the primary motivator among private actors eager to explore outer space). See also *How Do We Rule The Universe?*, *supra* note 41 (predicting the future of space mining fueled by private companies). There is a lot of money to be gained from mining the moon and other celestial bodies, and private companies are racing to take advantage of the opportunities. *Id.*

<sup>81</sup> See Grady, *supra* note 1 (describing the founder of SpaceX as a “charismatic entrepreneur, engineer, inventor, and investor.”); see also *About SpaceX*, SPACE X (Nov. 17, 2019), archived at <https://perma.cc/6NGZ-9JJF> (highlighting the ambitions of SpaceX to enable humans to live on other planets). See also Katie Benner & Kenneth Chang, *SpaceX Is Now One of the World’s Most Valuable Privately Held Companies*, N.Y. TIMES (July 27, 2017), archived at <https://perma.cc/TN3Z-7MRK> (pronouncing SpaceX as one of the most valuable privately held companies in the world, valued at \$21 billion). SpaceX is best known for owner Elon Musk’s ambitious goal of colonizing Mars. *Id.* See also ASHLEE VANCE, *ELON MUSK: TESLA, SPACE X, AND THE QUEST FOR A FANTASTIC FUTURE* 217 (2015) (depicting SpaceX as the “free radical trying to upend everything about this industry.”).



with NASA.<sup>82</sup> In 2000, Amazon founder and billionaire Jeff Bezos founded Blue Origin, a company whose primary goal is to provide commercially available human spaceflight.<sup>83</sup> In 2004, Richard Branson, an entrepreneur in retail and technology, created Virgin Galactic, a company designed to be the world's first commercial spaceline.<sup>84</sup> The year 2010 saw the emergence of Moon Express, a privately-held company formed by a group of space entrepreneurs.<sup>85</sup> With a mission of returning to the Moon for private and commercial interests, Moon Express is the first U.S. company to receive

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<sup>82</sup> See Wessels, *supra* note 70 (contrasting the price of a SpaceX payload at \$1,000 per pound with the price of a payload funded by NASA at several times that amount). See also Grady, *supra* note 1 (highlighting the success of SpaceX which provided direct competition to Boeing and Lockheed Martin, the contract holders of choice for rockets launched by NASA). "Having developed the Falcon 9 launch vehicle and dragon spacecraft, it became the first commercial company to dock a spacecraft at the ISS in 2012." *Id.* See also Lewis, *supra* note 44, at 409 (describing the responsibilities of SpaceX after the retirement of the space shuttle). Through contract with NASA, SpaceX is now in charge of deliveries to the International Space Station. *Id.* See also VANCE, *supra* note 81, at 217–18 (proffering the idea that SpaceX hopes to control the majority of the world's commercial launches given its cost advantages to governmental endeavors).

<sup>83</sup> See Grady, *supra* note 1 (describing the goals of Blue Origin as targeting the space tourism industry); see also *Our Mission*, BLUE ORIGIN (Nov. 17, 2019), archived at <https://perma.cc/59LZ-6WFH> (outlining the mission of "going to space to benefit earth."). See also Tim Fernholz, *Jeff Bezos says Blue Origin will go to the Moon to save the Earth*, QUARTZ (May 9, 2019), archived at <https://perma.cc/G4A5-UE5U> (highlighting the desire to create infrastructures on the Moon to preserve resources on Earth). If the human race moves into the solar system, "there could be nearly unlimited energy from solar power." *Id.* Blue Origin has already created a reusable rocket used to shuttle scientific experiments to space, and which will optimistically eventually shuttle people to the Moon. *Id.*

<sup>84</sup> See Grady, *supra* note 1 (describing how the technology differs from SpaceX and Blue Origin in that the launch into space occurs from a jet airplane, and not from the ground). See also *PURPOSE Why We Go*, VIRGIN GALACTIC (Nov. 17, 2019), archived at <https://perma.cc/LN3U-P3RP> (defining the purpose of the company). Many of the challenges in sustaining life on earth can be answered by making better use of outer space. *Id.* See also Lewis, *supra* note 44 (noting how Virgin Galactic is getting closer to making outer space a tourist destination).

<sup>85</sup> See W.J. Hennigan, *MoonEx aims to scour moon for rare materials*, L.A. TIMES (Apr. 8, 2011), archived at <https://perma.cc/C92A-7T5W> (depicting the history of Moon Express' formation). The new private venture was an idea formed by prominent entrepreneurs in Silicon Valley hoping to explore the Moon to extract resources that could benefit humanity as a whole. *Id.*

government approval to send a spacecraft beyond Earth's orbit.<sup>86</sup> These billionaire-backed private companies, including SpaceX, Virgin Galactic, Moon Express, and Blue Origin, are eager to utilize outer space as a profitable destination by offering space tourism to regular citizens.<sup>87</sup> Furthermore, these companies hope to preserve energy used on Earth by mining resources in outer space to create a sustainable future for humankind.<sup>88</sup> Ultimately, the entry of the private sector into space exploration has reduced launch costs, spurred innovation, and ultimately changed the trajectory of space exploration.<sup>89</sup>

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<sup>86</sup> See *Our Mission*, MOON EXPRESS (Feb. 24, 2020), archived at <https://perma.cc/5D7L-UEUQ> (outlining the mission of Moon Express and highlighting government approval).

This was the first time in history that any government signatory to the Outer Space Treaty exercised its rights and obligations to formally authorize and supervise a commercial entity to fly a mission beyond Earth orbit. This historic ruling is a breakthrough U.S. policy decision supporting our commercial lunar exploration and discovery and heralding a new era of expanding space enterprise.

*Id.* See also Loren Grush, *To mine the Moon, private company Moon Express plans to build a fleet of robotic landers*, VERGE (July 12, 2017), archived at <https://perma.cc/RS4S-55D2> (detailing the company's desires to mine the Moon for water and minerals which can ultimately be sold for profit).

<sup>87</sup> See Fernholz, *supra* note 83 (highlighting Jeff Bezos' desire to create a sustainable habitat in outer space). See also Freeland, *supra* note 47, at 2–3 (emphasizing the rapid growth in the relatively new commercial space tourism industry). “[T]here is no doubt that the prospect of commercial space tourism has captured widespread imagination.” *Id.* at 3.

<sup>88</sup> See Fernholz, *supra* note 83 (stressing the motivating factors among private companies to preserve resources on Earth by utilizing outer space). See also Jacob Gershman, *The Moon Is a Huge Potential Resource. But Who Owns It?*, WALL ST. J. (July 14, 2019), archived at <https://perma.cc/EST8-JK3F> (noting plans to mine lunar resources). There is significant debate over whether such ventures are even permitted in the current legal landscape. *Id.*

<sup>89</sup> See Grady, *supra* note 1 (highlighting the benefits of involvement by high-tech companies that contribute to the growth of the economy). See also Robert Frost, *The Pros and Cons of Privatizing Space Exploration*, FORBES (Apr. 4, 2017), archived at <https://perma.cc/99MG-RG47> (highlighting the many benefits of private company involvement in space exploration and exploitation). The government's role in space exploration is to expand on our understanding of the universe and to foster scientific discoveries. *Id.* The commercial space industry provides cheaper alternatives to government-funded exploration. *Id.* By subsidizing the research and development of these activities, the government

These companies have positioned themselves at the forefront of space exploration in the private sector thanks to rapid technological advancements over the past several decades.<sup>90</sup> Improvements in computing, including customizable hardware and new software development tools, have made assembly of satellites easier than ever before.<sup>91</sup> Furthermore, advanced manufacturing techniques, such as 3-D printing and laser sintering, have drastically reduced costs associated with space missions.<sup>92</sup> While private companies forge ahead amidst these technological advancements, the legal framework remains largely the same as it was 60 years ago, and questions surrounding its applicability are at the forefront of discussion.<sup>93</sup> Since the dawn of the space era, there has been

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provides crucial funding needed by private entities to develop technology to affordably cater to the public. *Id.*

<sup>90</sup> See *Why Big Business Is Making a Giant Leap into Space*, *supra* note 79 (describing how access to space would be easy and accessible with technological advancements). See also Laura Montgomery, *President's Plan Gives US Companies Space to Innovate*, REALCLEAR POL'Y (Apr. 16, 2018), archived at <https://perma.cc/4BSF-DTTG> [hereinafter *President's Plan Gives US Companies Space to Innovate*] (depicting asteroid mining companies with ambitious plans such as Deep Space Industries and Bigelow Aerospace). "The commercial space sector is seeing a renaissance of new activity." *Id.*

<sup>91</sup> See Baiocchi & Welser, *supra* note 79 (emphasizing the iPhone as a clear example of the advancements in computational power). "The modern smartphone is the product of three-plus decades of advances in circuit design and fabrication techniques, and today's processors pack 1,000 times as many transistors as their predecessors did 20 years ago." *Id.* See also VANCE, *supra* note 81, at 226 (highlighting the unique approach SpaceX takes in manufacturing almost all of its rockets, electronics, engines, and other parts). Aerospace companies typically contract out design and building capabilities, but SpaceX "tends to buy as little as possible to save money and because it sees depending on suppliers—especially foreign ones—as a weakness." *Id.*

<sup>92</sup> See Baiocchi & Welser, *supra* note 79 (describing how modern techniques reduce costs because they don't require a modern factory with specialized molds and robots). See also Elizabeth Palermo, *What is Selective Laser Sintering?*, LIVESCIENCE (Aug. 13, 2013), archived at <https://perma.cc/V7CE-F7VR> (summarizing the process of selective laser sintering). Small particles of plastic or glass are fused by the heat of a high-powered laser to create a 3D object. *Id.*

<sup>93</sup> See Krause, *supra* note 2 (describing how "space is becoming big business, and commercial interests are putting new pressures on the law of outer space."); see also Finnigan, *supra* note 3 (highlighting the "progressing technological wave" and how commercial space activities are capitalizing upon it). See also Jeffrey Marlow, *Rogue Actors and the Coming Space Law Crisis*, DISCOVER (Jan. 25, 2017), archived at <https://perma.cc/CQ24-Z6QF> (contemplating a potential international

significant debate over the intended meaning of the Outer Space Treaty's language and scope.<sup>94</sup> While some believe that the treaty's ambiguous language directly supports manipulation of its meaning, others maintain adherence to its original purpose as outlining the prerogative of all participating nations for equal enjoyment and use of outer space.<sup>95</sup> This ambiguity has become increasingly problematic in recent decades as activity by commercial entities dominates the space industry.<sup>96</sup>

#### IV. Analysis

##### A. *Why the Governing Legal Framework Needs Updates in Light of the Expanding Private Space Industry*

Moments after setting foot on the Moon, Buzz Aldrin, one of the two astronauts aboard the Apollo 11 space mission, described the

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legal crisis with the emergence of private actors in space). Private companies could cause a legal crisis if they reject the current regulatory framework or act recklessly. *Id.* Economic considerations could also challenge the legal framework. *Id.* If private companies start mining resources for financial gain, it could “collapse resource markets and countries with strong financial dependence on natural resources could stage a legal revolt.” *Id.*

<sup>94</sup> See Caroline Haskins, *THE LEGAL BATTLE TO COLONIZE MARS: International rules to protect outer space may not be enough to stop the United States*, FUTURE (Mar. 15, 2018), archived at <https://perma.cc/635F-4D3X> (highlighting the Outer Space Treaty's ambiguity in its applicability to the private sector).

<sup>95</sup> See *id.* (illustrating how the ambiguity of the Outer Space Treaty may allow for a liberal interpretation of the legality of space colonization). See also Alan Wasser & Douglas Jobes, *Space Settlements, Property Rights, and International Law: Could a Lunar Settlement Claim the Lunar Real Estate It Needs to Survive*, 73 J. AIR L. & COM. 37, 59 (2008) (highlighting the agreement among experts that the Outer Space Treaty is full of ambiguities). Some experts believe the drafters were deliberately ambiguous regarding private property rights, ultimately fostering a broad interpretation of the Treaty's application to private actors. *Id.* See also Pershing, *supra* note 42, at 170 (calling for clarification of the Outer Space Treaty given disagreement on its meaning). It is possible that, “without a clearer articulation of what the international community agrees is the meaning and scope” of Article II, State parties to the treaty will reinterpret the non-appropriation principle as they wish to further the commercial interests of their private actors. *Id.*

<sup>96</sup> See Zhao, *supra* note 67 (highlighting the increase in space commercialization with satellite use and space tourism); see also Wheeling, *supra* note 1 (describing how the activities of private actors do not fit within the legal framework set forth in the Outer Space Treaty).

site as “magnificent desolation.”<sup>97</sup> He would later go on to author a book of the same title wherein he would emphasize the importance of private space travel to further space exploration.<sup>98</sup> While Aldrin’s statement about desolation was true at the inception of the space age, over the past several decades, the United States has been careening toward a reality where government involvement in space exploration is decreasing relative to the private sector.<sup>99</sup> The United States is at a crucial point where we must revisit the existing legal framework regulating outer space activity.<sup>100</sup> The governing treaties were written and adopted at the birth of the space age, when private space

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<sup>97</sup> See ALDRIN, *supra* note 62, at 34 (portraying the details of the Apollo 11 moon landing in the moments before setting foot on the moon). See also Steve Gorman, *Buzz Aldrin, second man on moon, recalls ‘magnificent desolation’*, REUTERS (July 16, 2019), archived at <https://perma.cc/6863-LV9C> (recounting highlights from the Apollo 11 moon landing). “Aldrin recounts feeling sure-footed in the one-sixth gravity of the lunar surface while gazing at the ‘magnificent desolation’ all around him.” *Id.* See also *1969 Moon Landing*, *supra* note 62 (describing details from the Apollo 11 Moon landing). “Aldrin joined [Armstrong] on the moon’s surface 19 minutes later, and together they took photographs of the terrain, planted a U.S. flag, ran a few simple scientific tests and spoke with President Richard Nixon . . .” *Id.*

<sup>98</sup> See ALDRIN, *supra* note 62, at 307 (postulating the inevitability of private space exploration to further the scientific purpose of the space program).

I believe that space travel will one day become as common as airline travel is today. I’m convinced, however, that the true future of space travel does not lie with government agencies – NASA is still obsessed with the idea that the primary purpose of the space program is science – but real progress will come from private companies competing to provide the ultimate adventure ride, and NASA will receive trickle-down benefits.

*Id.*

<sup>99</sup> See Krause, *supra* note 2 (indicating the shift from national space agency activity to private sector involvement). “Nearly 50 years after the U.S. beat the USSR to land the first humans on the moon, a new space race is underway.” *Id.* Billionaire-backed companies are racing to be the first to launch commercial rockets to take tourists to space. *Id.* See also *Why Big Business Is Making a Giant Leap into Space*, *supra* note 79 (highlighting the new space race categorized by private sector involvement). “It used to be a space race between countries, and now it’s a space race between billionaires.” *Id.*

<sup>100</sup> See Babcock, *supra* note 49 (describing the need for revisiting the current legal framework while refraining from complete replacement). Much of the tension surrounding the use of outer space is due to differing interpretations of the Outer Space Treaty, therefore requiring revisions to accommodate the shifting landscape. *Id.*

exploration had not yet been contemplated.<sup>101</sup> Advancing technology, and the proliferation of private actors seeking to make their mark in outer space, have come into increasing conflict with the current legal framework.<sup>102</sup> The following discussion will illustrate the incongruity between the governing treaties and private practices today.

1. Outer Space Treaty Language Lacks Clarity Related to the Private Space Industry and Territorial Claims

Under Article II of the Outer Space Treaty, national appropriation by claims of sovereignty, by occupation or use, or by any other means, is prohibited.<sup>103</sup> At face value, this language indicates a strict adherence to an international alliance.<sup>104</sup> However, there is significant debate over the scope of applicability to private activities, particularly in light of several contemporary legislative efforts.<sup>105</sup> While the lofty initiatives contemplated by private actors are promising for the future of our planet, and for the future of

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<sup>101</sup> See Wessel, *supra* note 12, at 290–91 (emphasizing the start of the space era with the satellite launched by the USSR). See also Freeland, *supra* note 47, at 6 (contemplating the drastically different landscape at the birth of the space race). At the time of the Treaty's finalization, commercial space tourism had not yet been anticipated. *Id.*

<sup>102</sup> See Krause, *supra* note 2 (depicting the clear shift from government-driven activity to the private space industry). See also *Des Los Santos Mora v. New York*, 524 F.3d 183, 194 (2d Cir. 2008) (upholding the notion that interpretation of a treaty begins with the actual text of the treaty and the context in which the words were drafted).

<sup>103</sup> See *The Outer Space Treaty*, *supra* note 2, at art. II (highlighting the relevant language in the article); see also Simberg, *supra* note 42 (utilizing the language in Article II of the Outer Space Treaty to suggest property claims would be prohibited under the Treaty).

<sup>104</sup> See generally *The Outer Space Treaty*, *supra* note 2 (providing clear language regarding the prohibition against national appropriation of outer space by any means, including use or occupation); see also Van Boom, *supra* note 64 (highlighting the decline in space exploration relevancy).

<sup>105</sup> See Wheeling, *supra* note 1 (discussing debates over the Outer Space Treaty's applicability to private actor involvement); see also Egan, *supra* note 43 (proffering legislation in light of recent trends in outer space activity that directly conflict with the Outer Space Treaty).

exploration and discovery of outer space, they are not supported by the current legal framework.<sup>106</sup>

Scholars have argued that Article II of the Outer Space Treaty is not applicable to the private space industry due to the word “national.”<sup>107</sup> However, Article VI of the Outer Space Treaty provides clarification on the scope of the word, and clearly supports its application to commercial activity.<sup>108</sup> While some contend that the Treaty’s use of the phrase “national activities” precludes conduct by private companies, it is erroneous to assume that the private space industry does not act on behalf, and for the benefit, of the United

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<sup>106</sup> See Egan, *supra* note 43 (discussing the current trends in space exploration and the lack of support by Article VI of the Outer Space Treaty). See also Freeland, *supra* note 47, at 6 (stressing the stark differences between the era when the treaties were adopted, and the outer space activities occurring today). The treaties were formed and adopted:

... in the Cold War era, when only a relatively small number of countries had space faring capability. At the time they were finalised, it had certainly not been anticipated that humankind would engage in widespread commercial space tourism” and therefore, the treaties do not “deal with such activities in any specific detail.

*Id.* See also VANCE, *supra* note 81, at 215 (providing that SpaceX quickly developed into one of the most reliable and consistent actors in the space industry).

<sup>107</sup> See *Statements by IISL*, *supra* note 61 (proffering an interpretation of The Outer Space Treaty and its applicability to the private space industry). See also Wasser & Jobes, *supra* note 95, at 43–45 (quoting experts who agree that the Outer Space Treaty does not ban private activity). Law Professor Glenn Reynolds argued that the Outer Space Treaty only forbids “national” sovereignty, and not private property rights. *Id.* at 44. While some interpret Article II broadly to prohibit all forms of appropriation, scholars such as attorney Wayne White argue that a narrow interpretation, prohibiting only national appropriation, is correct. *Id.* at 45.

<sup>108</sup> See The Outer Space Treaty, *supra* note 2, at art. VI (stating in part State parties to the Treaty shall bear international liability for national activities of non-governmental actors in space). See also *Statements by IISL*, *supra* note 61 (depicting the broad interpretation of the Outer Space Treaty by arguing activities by private actors are national activities); *contra* Lewis, *supra* note 44, at 399–400 (arguing that Article VI only applies to private actors when operating as an agent of the State party to the Treaty).

Article VI only requires that non-governmental actors carry out their actions in conformity with the provisions of the Outer Space Treaty when they are engaged in ‘national activities’. . . the fact that a non-state actor operates in outer space itself can hardly turn the private actor into an agent of the State.

Lewis, *supra* note 44.

States as a whole.<sup>109</sup> The very nature of the activities contemplated by the leading companies in the private space industry, and often subsidized by the federal government, exhibits a commitment to benefiting the nation, and all those who inhabit it.<sup>110</sup> Therefore, relevant conduct carried out by private companies in outer space can be considered national activity.<sup>111</sup> Consequently, appropriation of outer space by private actors through claims of sovereignty, use, or occupation, or by any other means, is prohibited under Article II of the Outer Space Treaty.<sup>112</sup> Furthermore, beyond the specific language in the Treaty, there is a strong argument for interpreting the Treaty language based on the canon of construction *expressio unius*

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<sup>109</sup> See *PURPOSE Why We Go*, *supra* note 84 (framing the mission of Virgin Galactic). See also *About SpaceX*, *supra* note 81 (depicting the goal of enabling humans to live on other planets); *Our Mission*, *supra* note 83 (emphasizing the goal of going to space to benefit Earth).

<sup>110</sup> See Fernholz, *supra* note 83 (stressing Blue Origin's goal of spaceflight to save the planet). Jeff Bezos has repeatedly speculated that the Earth is in danger of running out of energy. *Id.* See also Grady, *supra* note 1 (describing the goals of the leading private companies to drive down costs of space exploration, making it accessible to the general public).

<sup>111</sup> See generally The Outer Space Treaty, *supra* note 2 (correlating non-governmental actors with "national" activity). See also *Houston We Have a Podcast: Space Tourism and Commercialization*, *supra* note 68 (emphasizing the economic benefit to the nation granted by private activity in outer space).

The American tax payers have put billions of dollars into developing and operating and doing research on space station. The creation of the National Lab was to start providing some return to the U.S. economy in the form of commercial research on space station. That was important. But for the long haul, we're going to enable the, using the resources that we have rights to, we, NASA have right to on station, we're going to enable a broader participation by the U.S. economy [and] U.S. commercial sector. .

*Id.*

<sup>112</sup> See generally The Outer Space Treaty, *supra* note 2 (emphasizing the prohibition against appropriation by claims of sovereignty). See also Pershing, *supra* note 42, at 156 (demonstrating the appropriate interpretation of the non-appropriation principle by highlighting historical practices of customary international law). Before the Outer Space Treaty was ratified, customary international law prohibited any appropriation of outer space. *Id.* Two years prior to the Treaty's adoption it was noted in writing that "the only means by which any part of space might be appropriated would be through the United Nations acting on behalf of the world community as a whole." *Id.*



*est exclusio alterius*.<sup>113</sup> At the time of the Treaty's birth, the drafters had no foresight to predict the technological advancements and privatization of space exploration present today.<sup>114</sup> Therefore, because Article II specifically prohibits appropriation by actors present at the time of the Treaty's birth, if the drafters wished to specifically *exclude* private companies from the Treaty's scope, they would have expressly noted that in the text.<sup>115</sup>

## 2. Modern Legislation Contradicts Requirements in The Outer Space Treaty

Critics of a broad interpretation of the Outer Space Treaty argue that, even if language in the Treaty restricts commercial activity, the United States has adopted legislation that allows for appropriation by private actors.<sup>116</sup> Specifically, they point to the

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<sup>113</sup> See Taylor, *supra* note 56, at 670 (setting forth the definition as “a canon of construction holding that to express or include one thing implies the exclusion of the other, or of the alternative.”).

<sup>114</sup> See *id.* at 656 (highlighting the lack of foresight amongst the Treaty drafters). See also *The Universe, A Zone of Lawlessness*, *supra* note 36 (expounding the notion that the Outer Space Treaty's founders did not predict a private industry of space exploration). “The architecture of space law was never thought to address the issue of commercial exploitation of resources.” *Id.*

<sup>115</sup> See *The Universe, A Zone of Lawlessness*, *supra* note 36 (noting the lack of specific exclusions in the Outer Space Treaty related to private companies). See also Pershing, *supra* note 42, at 154–55 (indicating that the non-appropriation principle was originally construed broadly under customary international law given: (1) the realities of space exploration at the time of the Treaty's drafting, (2) the concrete language in the Treaty, and (3) works by legal scholars at the time). Parties to the Treaty at the time of its drafting, while primarily concerned with nuclear weapon use, were also incentivized to allow for intelligence collection via satellite by keeping outer space free and open to all space-faring nations. *Id.* at 155. Therefore, the Outer Space Treaty was “drafted and ratified in large part to prevent *any* appropriation—a goal that would have been seriously undermined had the signatories at the time not understood the Treaty to apply broadly.” *Id.* Furthermore, the technological limitations at the time of the Treaty's birth offer evidence that the drafters did not intentionally exclude private actors from the Treaty, but rather, the drafters assumed that States would be the only actors in space. *Id.* Prior to the finalization of the Treaty, Arthur Goldberg, the Permanent Representative of the United States, authored a letter to the Chairman of COPUOS wherein he emphasized that celestial bodies should not be subject to *any* claim of sovereignty. *Id.*

<sup>116</sup> See generally Spurring Private Aerospace Competitiveness and Entrepreneurship Act of 2015, H.R. 2262, 114th Cong. (2015) (setting forth the

2015 SPACE Act as an example of this freedom, whereby a company working under a United States license is granted the ability to mine resources from celestial bodies.<sup>117</sup> However, when read in conjunction with the Outer Space Treaty, it is clear that the SPACE Act violates the Treaty itself.<sup>118</sup> Specifically, because private companies are regulated by the appropriate State party to the Outer Space Treaty, it is reasonable to conclude that State parties to the Treaty are barred from extending to private actors any rights not granted to the State party by the Treaty.<sup>119</sup> Any such allowance would directly contradict the language of the Outer Space Treaty that prohibits *national* appropriation of a celestial body.<sup>120</sup>

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specifics addressed in the bill); *see also* Stockton, *supra* note 56 (discussing elements of the SPACE Act). *See also* Ortega, *supra* note 58 (detailing the non-binding principles that seek to guide states involved in the exploration of outer space).

<sup>117</sup> *See generally* Stockton, *supra* note 56 (highlighting the real “vote of confidence from Congress that commercial space matters, and we can shape and grow the industry without the burdens of the federal government.”). The bill gave the industry another eight years with limited regulatory oversight. *Id.* *See also* H.R. 2262, 114th Cong. (2015) (stating, in part, “any U.S. citizen ‘shall be entitled to any asteroid resource or space resource obtained,’ including the ability to own or sell that resource.”).

<sup>118</sup> *See generally* The Outer Space Treaty, *supra* note 2, at art. II & art. VI (emphasizing key language in direct contradiction to the SPACE Act). *See also* Gershman, *supra* note 88 (listing nations that have questioned the legality of the SPACE Act). In a formal policy statement in 2016, Russia asserted the signing of the Act as showing a “total disrespect for international law.” *Id.* Greece and Belgium have also questioned the United States’ actions, and it is predicted that resistance could also come from other nations, including India, Brazil, France, and Turkey. *Id.*

<sup>119</sup> *See* Taylor, *supra* note 56, at 657 (favoring a broad interpretation of the Outer Space Treaty and its applicability to private activity). Private individuals cannot hold property rights in a celestial body without recognition from a State party. *Id.* “If a state recognizes a property right held by an individual over a celestial body or resource, such recognition would constitute a form of national appropriation because it is essentially ‘a *de facto* exclusion of other states and their nationals’ to that body or resource. *Id.*

<sup>120</sup> *See* HERMIDA, *supra* note 10, at 59–60 (positing a clear obligation to prioritize adherence to international treaties over a domestic piece of legislation).

When a State agrees to abide by an obligation under an international treaty, any right which that State may have, including a sovereignty related right, that contravenes the assumed international obligations is limited and even superseded by that

### 3. The United States Constitution and the Argument for Private Actor Autonomy

Commercial space advocates in the United States argue that authority over private activities, carried out in furtherance of commercial space exploration, is not a power delegated to the federal government under the United States Constitution, and therefore, is a power reserved to the states and to the people, including those in the private space industry.<sup>121</sup> While theoretically true on the basis of Article VI of the Constitution, an examination of the Outer Space Treaty, in relation to Article VI of the Constitution, reveals the fault in this logic.<sup>122</sup> Commercial space advocates reason that private actors reserve the right, under the 10<sup>th</sup> Amendment, to exercise freedom of activity in outer space without interference from the federal government or overarching Treaty language.<sup>123</sup> This argument would be invalid under Article VI of the Constitution.<sup>124</sup>

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obligation. This doctrine, known as interdependence of rights and obligations, imposes a clear limit to States in the implementation of domestic space law or any other national space measure. In effect, regardless of the internal constitutional, legislative or judicial prescriptions when a State undertakes an obligation at the international level the State may not adopt a national measure in contradiction with the international obligation, for that would be in itself a violation of International Law.

*Id.*

<sup>121</sup> See Listner, *supra* note 48 (discussing the view held by those who believe private activities are permitted under the laws of the Constitution); Montgomery, *supra* note 46, at 12 (suggesting that the US Constitution shall dictate and override any conflicting Treaty).

<sup>122</sup> See Listner, *supra* note 48 (depicting the effect of the Constitution on the Treaty's interpretation as applied to private actors). Private space activity is subject to the federal government's power granted to it by Article VI of the Outer Space Treaty instead of being a private right reserved for private individuals under the 10<sup>th</sup> amendment. *Id.* See also HERMIDA, *supra* note 10, at 70 (stressing the State party compliance requirements outlined in Article VI including authorization and continuing supervision the activities of non-governmental actors).

<sup>123</sup> See U.S. CONST. amend. X (setting forth the language in the 10<sup>th</sup> amendment to the Constitution). "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people." *Id.*

<sup>124</sup> See Listner, *supra* note 48 (reiterating the legal effect of a ratified treaty as binding on private actors). See also U.S. CONST. art. VI, cl. 2 (highlighting Article

Specifically, given the legal effect of a ratified treaty, both the federal government and private citizens of the United States would be legally obligated to abide by the terms of the Outer Space Treaty.<sup>125</sup> However, following the Supreme Court decision in *Medellin v. Texas*, Article VI of the Outer Space Treaty is not legally binding because it is not a self-executing provision of the Treaty.<sup>126</sup> Therefore, private actors cannot be denied access to space on the basis of Article VI of the Outer Space Treaty until Congress enacts implementing legislation.<sup>127</sup> Despite the failure of Article VI of the

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VI of the Constitution by depicting the legal effect of a ratified treaty as analogous to the effects of a federal statute passed by Congress and signed by the President).

This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.

*Id.*

<sup>125</sup> See Listner, *supra* note 48 (establishing the effect of a ratified treaty as set forth in the Constitution). The provisions of a ratified treaty have the same legal effect on the United States as a federal statute “passed by Congress and signed into law by the President.” *Id.* See also Babcock, *supra* note 49 (proffering an alternative interpretation of Article VI to the Outer Space Treaty whereby private activities are permitted under appropriate State party supervision). “So it seems as if private actors can undertake operations in space and appropriate for all intents and purposes so long as a state takes responsibility for their actions.” *Id.* See history *supra* Part II Section C.

<sup>126</sup> See *Medellin v. Texas*, 552 U.S. 491, 505 (2008) (quoting *Foster v. Neilson*, 27 U.S. 253 (1829) in distinguishing between a self-executing and non-self-executing treaty). “[A] treaty is equivalent to an act of the legislature, and hence, self-executing, when it operates of itself without the aid of any legislative provision. When, in contrast [treaty] stipulations are not self-executing they can only be enforced pursuant to legislation to carry them into effect.” *Id.* See also *Reopening the American Frontier*, *supra* note 16, at 15 (upholding the findings in the *Medellin* court where the Justices determined what constitutes a self-executing treaty). Given that Article VI of the Outer Space Treaty falls into the category of a provision dependent on the good faith of the parties, failure of the United States to adopt any regulations would not violate the Treaty. *Id.*

<sup>127</sup> See Montgomery, *supra* note 46, at 13 (stressing the importance of allowing private actors access to outer space in accordance with the Article VI of the Outer Space Treaty).

The Constitution grants legislative powers to Congress. Congress also plays a role in foreign relations. As the Supreme Court has noted, reiterating a longstanding observation, the Constitution

Outer Space Treaty to constitute a self-executing provision, other articles in the Treaty, including Article II, *are* self-executing, and require adherence by private actors.<sup>128</sup> Specifically, given the nature of the activities contemplated by the private space industry, the word “national” in Article II not only applies to government agencies, but also to private actors.<sup>129</sup> Therefore, private entities are required by

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commits the conduct of foreign relations to both the executive and legislative branches of our government. The responsibility for turning a non-self-executing treaty’s obligations into domestic laws falls to Congress. Congress may also enact legislation that repeals a treaty provision.

*Id.* See also *Medellin*, 552 U.S. at 505 (arguing that while a treaty may symbolize an international commitment, it does not constitute binding law unless Congress enacts statutes to implement it, or it conveys an intention to “be ‘self-executing’ and is ratified on these terms.”). See also *President’s Plan Gives US Companies Space to Innovate*, *supra* note 90 (emphasizing how Article VI alone cannot deny a non-governmental entity access to outer space).

<sup>128</sup> See *Medellin*, 552 U.S. at 508 (relying on the presence of language of future effect to determine the existence of a non-self-executing treaty). Compare *The Outer Space Treaty*, *supra* note 2, at art. VI (highlighting specific treaty language related to state authorization of private activity), with *Medellin*, 552 U.S. at 508 (underscoring the concept of language of future effect). The language in Article VI of the Treaty that states, in part, “shall require authorization and continuing supervision by the appropriate State Party to the Treaty,” clearly exhibits language of future effect. *The Outer Space Treaty*, *supra* note 2, at art. VI. See *Montgomery*, *supra* note 46, at 4–5, 21 (proffering that the text of Article VI contains language of future effect because, in the future, private activity requires authorization by some part of government). See also MULLIGAN, *supra* note 51, at 17 (emphasizing the continuing international obligations of a State party despite the presence of a non-self-executing provision). “The self-execution doctrine concerns how a treaty provision is implemented in U.S. domestic law, but it does not affect the United States’ obligation to comply with the provision under international law.” *Id.* When a treaty is ratified by the United States, the nation “acquires obligations under international [law] regardless of self-execution . . .” *Id.* See also *Reopening the American Frontier*, *supra* note 16, at 88–89 (listing specific provisions of the Outer Space Treaty that are self-executing including Article II, Article IV, and Article IX). The Outer Space Treaty sets forth that (1) “Space and celestial bodies are not subject to claims of appropriation by means of use or occupation”; (2) nuclear weapons and weapons of mass destruction in outer space are prohibited; and harmful contamination and interference are prohibited. *Id.* at 89.

<sup>129</sup> See *The Outer Space Treaty*, *supra* note 2, at art. II (setting forth the language in Article II of the Outer Space Treaty). See also *About SpaceX*, *supra* note 81 (depicting the goals of SpaceX for human spaceflight to benefit the nation). See also *Our Mission*, *supra* note 83 (indicating the revolutionary goals of Blue Origin to benefit humankind). See also *PURPOSE Why We Go*, *supra* note 84 (highlighting the benefits to the nation that Virgin Galactic will offer).

law to abide by the non-appropriation requirement set forth in Article II of the Outer Space Treaty, along with the requirements in other self-executing provisions of the Treaty.<sup>130</sup> Furthermore, under Article VI of the Outer Space Treaty, State parties are required to monitor and enforce adherence by private actors to any such self-executing provisions.<sup>131</sup>

*B. Suggested Reform for the Outer Space Legal Framework*

Given the complex nature of amending an international Treaty, which affects more than just one nation, the conversation surrounding the private space industry has shifted.<sup>132</sup> Specifically, towards how private actors can continue to push the boundaries of space exploration and exploitation while maintaining conformity with the Outer Space Treaty.<sup>133</sup> This approach ultimately requires a

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<sup>130</sup> See *The Outer Space Treaty*, *supra* note 2, at art. II (focusing on the non-appropriation language in Article II of the Outer Space Treaty). See also *Des Los Santos Mora v. New York*, 524 F.3d 183, 201–02 (2d Cir. 2008) (citing precedent that “recognize a presumption against inferring individual rights from treaties.”). Even when treaty language specifically confers benefits on private nationals, any rights arising from those specific provisions belong to the states, meaning individual rights are only derivative through the states. *Id.* at 201.

<sup>131</sup> See *Reopening the American Frontier*, *supra* note 16, at 18 (emphasizing a State party’s requirement to ensure private actor adherence to Treaty provisions).

While Article VI requires each nation to ‘authorize’ and ‘continually supervise’ the activities of its citizens, the extent of such oversight only extends to compliance with the *self-executing* provisions of the Treaty provisions . . . Article VI says that countries must assure that activities are ‘carried out in conformity with the provisions set forth in the present Treaty.’

*Id.* See also Grush, *supra* note 37 (focusing on nations’ responsibilities of private space activities). “[C]ountries have to oversee whatever the private sector does in space and can be held liable for the actions of commercial companies if they don’t adhere to the articles of the treaty.” *Id.*

<sup>132</sup> See Zhao, *supra* note 67 (highlighting the difficulty in negotiating an international treaty to which an increasing number of nations are becoming parties). See *Reopening the American Frontier*, *supra* note 16, at 6 (pondering the difficulty in amending an international treaty). “[I]f the United States officially broaches the subject of amending the Outer Space Treaty, it is likely that other countries would identify issues of their own they would like addressed, not all of which would be aligned with U.S. interests.” *Id.*

<sup>133</sup> See Stefoudi, *supra* note 3 (stipulating the initial negative reaction to private space mining, and the ultimate shift toward acceptance).

vague interpretation of Treaty language, and poses the risk of an international legal revolt.<sup>134</sup> Therefore, it is crucial that the parties to the Treaties revisit the governing framework now, to clarify the language before the New Space race goes much further.<sup>135</sup> It is inevitable that, in the years to come, other nations, and their private actors, will venture into space, motivated by potential profit and a desire to mine resources from celestial bodies.<sup>136</sup> The United States is poised in an optimal position to spearhead the initiative of updating and augmenting the Treaty, given our advanced stance in the private space industry.<sup>137</sup> Specifically, to avoid an unfair advantage held by private actors in countries that may have greater resources and more advanced technologies, the United States should take advantage of this unique opportunity to address the ambiguities now.<sup>138</sup> For private space companies to achieve their lofty goals, it is imperative

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<sup>134</sup> *Contra id.* (underlining the vague nature of the Outer Space Treaty). “It is exactly the generic character of the Treaty’s provisions that affords adjustments and interpretation to match any contemporary challenges.” *Id.*

<sup>135</sup> See *The Universe, A Zone of Lawlessness*, *supra* note 36 (stating “the architecture of space law was never thought to address the issue of commercial exploitation of resources.”).

<sup>136</sup> See Van Boom, *supra* note 64 (describing several international desires to go to space). China wants to put a man on the Moon before the year 2030, and “Russia has grand plans to start a Moon colony by 2040.” *Id.* See also *Evolution of the Role of Space Agencies*, *supra* note 68, at 2 (discussing the recent trend of increased commercial space activity that has spread to Europe). Although distinct in many ways from the approaches the United States has taken, Europe is exploring new ways to contract with the commercial space industry, ultimately shifting the development and design responsibilities to the private sector, while maintaining public funding for the program. *Id.* See also Gershman, *supra* note 88 (pointing to other nations whose outer space activities threaten their status as member States to the Outer Space Treaty). In addition to the United States, the United Arab Emirates and Luxembourg have enacted legislation permitting private resource extraction and mining. *Id.* Furthermore, China has big plans to utilize space for manufacturing and asteroid mining, posing risks for future private appropriation claims that contradict the Outer Space Treaty. *Id.*

<sup>137</sup> See *Why Big Business Is Making a Giant Leap into Space*, *supra* note 79 (stressing the benefits of reduced launch costs and avoidance of federal liability).

<sup>138</sup> See Wessel, *supra* note 12, at 321 (observing the advantage of clarifying treaty language through formal amendment or creation of new treaties); see also Marlow, *supra* note 93 (predicting the increase in private space activity and emphasizing the need for a revision of the legal framework as soon as possible). See also *Reopening the American Frontier*, *supra* note 16, at 88 (emphasizing the important role the United States plays in securing domestic interests). To ensure that Americans abide by the provisions of the Outer Space Treaty, Congress should enact a regulatory framework. *Id.*

that the international legal framework undergo amendment to specifically address private appropriation.<sup>139</sup> Particularly, State parties should revisit Article VI of the Outer Space Treaty, adding more concrete language related to non-governmental activity and State party “authorization.”<sup>140</sup> The addition of clear language allowing private activity with appropriate government permission, coupled with an addendum for each State party, listing relevant Congressional authority for private activity, would remove some of the ambiguity surrounding the Treaty’s interpretation.<sup>141</sup> In January of 2019, SpaceX CEO and lead engineer Elon Musk expressed his delight after a successful launch testing the safety system of the Crew Dragon spacecraft.<sup>142</sup> Musk hopes to use his contract with NASA as leverage for future flights to other celestial bodies.<sup>143</sup> This dream

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<sup>139</sup> See Taylor, *supra* note 56 (noting the importance of revising the existing legal framework to reflect current trends in outer space exploration). See also *How Do We Rule The Universe?*, *supra* note 41 (advocating for international consensus on private appropriation of extracted natural resources). While some countries, such as the United States, are drafting their own outer space acts granting private companies property rights to outer space, other countries, such as Russia, object. *Id.* Discussions about the future of appropriation and space law have begun, and legal experts are looking to the international governing treaties of the High Seas for inspiration. *Id.* Space Law Attorney Sarah Moons suggests creating international committees dedicated to deciding who can mine outer space resources, who gets a license to do so, and whether the resources would benefit all countries. *Id.*

<sup>140</sup> See Marlow, *supra* note 93 (proselytizing the potential for a legal revolt “if someone goes out and starts mining asteroids” contradictory to the language of the Outer Space Treaty). According to International Studies Professor James Gilley, space law needs an overhaul in light of new actors and objectives in outer space. *Id.*

<sup>141</sup> See Egan, *supra* note 43 (discussing the ambiguity in the Outer Space Treaty, specifically surrounding text in Article VI). See also *How Do We Rule The Universe?*, *supra* note 41 (stressing the importance of adopting a new set of binding laws that fit our 21<sup>st</sup> century ambitions, and that have been negotiated and agreed upon by all participating nations). History has shown us that international collaboration and agreement is possible when nations have similar objectives and dreams. *Id.*

<sup>142</sup> See Benner & Chang, *supra* note 81 (discussing the recent rocket launch by SpaceX). See also Cawley, *supra* note 75 (quoting SpaceX CEO and Chief Engineer Elon Musk as saying “this is a reflection of the dedication and hard work of the SpaceX and NASA teams to achieve this goal. Obviously, I’m super fired up. This is great.”).

<sup>143</sup> See Benner & Chang, *supra* note 81 (highlighting Elon Musk’s plans for future spaceflight).



could become reality in the decades to come, pending revision of the international legal framework.<sup>144</sup>

## V. Conclusion

Undeniably, the dramatic increase in private commercial space activity in the past several decades yields advancement opportunities for the future of space exploration and accessibility. However, as an area of law developed amidst political turmoil and international strife, the legal framework governing outer space is at risk of becoming obsolete due to technological advances and private affluence. The past several decades have seen a surge in private companies competing for a presence in outer space. As technology advances, and accessibility to cost-effective means of outer space exploration becomes more prevalent, the nation, and the world, progressively rely on private companies to further outer space interests. These ventures, while pivotal for space exploration progress, do not conform to parameters set forth in the Outer Space Treaty. Although intentionally vague in nature, the Treaty – specifically, Articles II and VI – does not currently support appropriation attempts by private actors. At a pivotal moment in time, when The United States is poised to propel the private sector into outer space for international benefit, it is crucial to revisit and revise the governing legal framework to ensure it can accommodate the growing industry.

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<sup>144</sup> See Grady, *supra* note 1 (emphasizing the importance of establishing protocols for the future of space exploration). Specifically, safety concerns surrounding spacecraft collision will need to be addressed to facilitate space travel “for citizens beyond those with deep pockets.” *Id.* See also Haskins, *supra* note 94 (stressing the conflicts between the Outer Space Treaty and Elon Musk’s plans to colonize Mars). The Treaty states that “nothing in space can become national territory, meaning that any base or settlement on Mars would have to be free to use by anyone else who can travel there. A person can’t just set up a colony, claim independence, and create rules that restrict access to it.” *Id.* See also Gershman, *supra* note 88 (proffering an idea floated by an independent group of scientists, legal thinkers, and space regulators who recommend that the U.N. adopt a framework which allows for private mining ventures).