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REGULATION OF CORPORATE ACTIVITY IN THE SPACE SECTOR

Akshaya Kamalnath* and Hitoishi Sarkar**

This Article argues that commercialisation of space coupled with technological innovation calls for a regulatory approach beyond (and complementary to) the treaty regime offered by international law. The rapid technological advances in the financial sector and corresponding regulatory innovations make financial technology (fintech) regulation a likely candidate to draw lessons from for the nascent space sector. The Article draws from the fintech sector and proposes that some lessons about initial regulation via regulatory sandboxes and sandbox bridges are useful in the space sector. At the domestic level, the Article proposes regulatory sandboxes to enable innovation while ensuring the necessary safeguards; and at the multi-national level, it proposes cooperation between regulators in various spacefaring nations along the lines of sandbox bridges used in the fintech sector. Since different states have varying levels of space sector activity, this Article makes broad recommendations with pointers that identify aspects that are more suitable to certain types of jurisdictions than others.

* Senior Lecturer, The Australian National University, College of Law. I am thankful to Andrew Schwartz, Leonid Sirota, Andrew Godwin, Jack Nelson, and Cassandra Steer for comments on earlier drafts. I am also grateful to Carla Reyes, and other participants of the National Business Scholars Association Conference for helpful suggestions. Finally, I would like to thank the editors for excellent inputs on this Article. All views expressed here are that of the authors.

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I. INTRODUCTION

In this Article, we offer a proposal for a legal regime that is appropriate for the era of corporations entering the space sector. We suggest a temporary regulatory model based on voluntary cooperation between regulators in various spacefaring nations along the lines of regulatory sandboxes and sandbox bridges used in the financial technology (fintech) sector.¹ As a general rule, the optimal law for any new and fast-developing technology is one that can strike the balance between enabling innovation and ensuring adequate safeguards.² Regulation of fintech, which responded to a relatively recent technological innovation in the financial sector, has valuable lessons to offer to a similarly nascent space sector.

As the cost of space activity fell and the potential commercial applications grew, the space sector opened up to many new private corporations.³ These factors have given rise to what has now come to be called the “new space” sector or simply New Space.⁴ Recognizing that New Space activities have enormous applications (including providing connectivity to remote areas and earth observation imagery that can be used in multiple industries),⁵ mainstream investors have entered the

1. See Saule T. Omarova, *Dealing with Disruption: Emerging Approaches to Fintech Regulation*, 61 WASH U. J.L. & POL’Y 25 (2020). Although the term fintech does not have a formal definition, in practice, it refers to various digital technologies and business models that are disrupting the financial sector. *See id.* at 25.

2. *See generally* Rebecca Crootof & BJ Ard, *Structuring Tech Law*, 34 HARV. J.L. & TECH. 347 (2021).

3. *Why Big Business Is Making a Giant Leap into Space*, KNOWLEDGE@WHARTON (June 4, 2019), <https://knowledge.wharton.upenn.edu/article/commercial-space-economy/>.

4. Ken Davidian, *Definition of NewSpace*, 8 NEW SPACE 53-55 (2020), <https://www.liebertpub.com/doi/10.1089/space.2020.29027.kda>.

5. OECD, MEASURING THE ECONOMIC IMPACT OF THE SPACE SECTOR: KEY INDICATORS AND OPTIONS TO IMPROVE DATA 6 (2020), <https://www.oecd.org/innovation>

market. This is reflected in the continuing rise of the amount of private investment in the commercial space sector. Even in 2020, when business activity was affected by the Covid-19 pandemic, it was reported to be the largest year on record for investment into space companies.⁶ Experts are predicting a further increase in 2021.⁷ New Space also seems to be riding the special purpose acquisition company (SPAC) boom of 2020 and 2021.⁸ A SPAC is a publicly traded company that can be used by a private company to access the public market by means of a merger.⁹ This way, the cost of a formal initial public offering can be avoided.¹⁰ Six space companies (Rocket Lab, Spire, Black Sky, Astra, AST Space Mobile, and Momentus Space) have either announced plans to take the SPAC route to go public or have already done so.¹¹

/inno/measuring-economic-impact-space-sector.pdf. The range of potential space technologies include space travel, “spacecraft that deliver payloads to space for research, . . . high-resolution Earth imaging for environmental monitoring; satellites for communications and data sharing . . . and mining the solar system for [useful] metals.” John Cumbers, *The New Space Race: Meet The Investors Building A New Space Settlement Industry*, FORBES (Feb. 18, 2020, 6:38 PM), <https://www.forbes.com/sites/johncumbers/2020/02/18/the-new-space-race-meet-the-investors-building-a-new-space-settlement-industry/?sh=6abb3d606b58>. Cutting-edge satellite technology (i.e., nanosatellites or CubeSats) might be able to “put a distress beacon in every automobile, allow remote monitoring of wildlife in any environment on earth, and track your Amazon shipment—not just when it’s on a truck, but backward, all the way to the factory that produced it. And it could be done at a fraction of the cost of earlier satellite tracking systems.” See Christopher Mims, *The Tiny Satellites That Will Connect Cows, Cars and Shipping Containers to the Internet*, WALL ST. J. (Jan. 9, 2021, 12:00 AM), <https://www.wsj.com/articles/the-tiny-satellites-that-will-connect-cows-cars-and-shipping-containers-to-the-internet-11610168400>.

6. Michael Sheetz, *Investment in space companies bounced back in the third quarter from the COVID-19 lull, report says*, CNBC (Oct. 15, 2020, 1:05 PM), <https://www.cnbc.com/2020/10/15/space-investing-q3-2020-report-investment-bounces-back-from-covid-19.html>.

7. See Peggy Hollinger, *Investors Join Space Race With Record Funding*, FIN. TIMES (Apr. 29, 2021), <https://www.ft.com/content/bdbe37cf-8d23-467c-89a5-abeae23de73f>.

8. See Amrith Ramkumar, *2020 SPAC Boom Lifted Wall Street’s Biggest Banks*, WALL ST. J. (Jan. 5, 2021, 5:30 AM), <https://www.wsj.com/articles/2020-spac-boom-lifted-wall-streets-biggest-banks-11609842601>; Mathieu Luinaud & William Ricard, *The Promises and Pitfalls of SPACs for the Space Economy*, VIA SATELLITE (May 25, 2021), <http://interactive.satellitetoday.com/via/june-2021/the-promises-and-pitfalls-of-spacs-for-the-space-economy/>.

9. Ramey Layne & Brenda Lenahan, *Special Purpose Acquisition Companies: An Introduction*, HARV. L. SCH. F. ON CORP. GOVERNANCE (July 6, 2018), <https://corpov.law.harvard.edu/2018/07/06/special-purpose-acquisition-companies-an-introduction>.

10. *Id.*

11. Jeff Foust, *Can you still spell space without SPAC?*, SPACNEWS (Mar. 23, 2021), <https://spacnews.com/can-you-still-spell-space-without-spac>. However, this also means that the SECs increased scrutiny of SPACs is something for investors in this sector to watch. See Dave Michaels, *SEC Weighs New Investor Protections for SPACs*, WALL ST. J. (May 26, 2021, 4:01 PM), https://www.wsj.com/articles/sec-weighs-new-investor-protections-for-spacs-11622052408?mod=article_inline. Already, the SEC has accused the founder of

The growing space economy presents some concerns. In a 2021 conference, two of the key issues identified as significant for investors in New Space were spectrum rights and orbital debris.¹² The former refers to the increased interest in using low earth orbit (LEO) and medium earth orbit (MEO) satellites (as against the more traditionally used geostationary equatorial orbit (GEO) satellites) to provide connectivity.¹³ Relatedly, orbital debris, also known as space junk, refers to old spacecraft and satellites, which could cause collisions resulting in enormous damage.¹⁴ As more satellites are launched, particularly in the LEO where companies like SpaceX have launched mega-constellations, the risk of collision has increased manifold.¹⁵ Thus, it is high time that we rethink the legal regime applicable to space activities. Furthermore, the fast pace of innovation in this sector means that the law has to play catch up to not only encourage innovation, but also identify and address problems like orbital debris, allocation of spectrum rights, etc. There are also broader concerns, like the sustainability of space operations and possible militarisation of space. While this Article will address the sustainable use of space by corporations, space militarisation is beyond the scope of this Article¹⁶ and is only addressed incidentally.

Scholars have called for the development of an international legal framework to specifically address the new technological developments like space resource exploitation.¹⁷ In addition to the need for

Momentum Space of fraud, and its SPAC partner of negligence respectively, for not disclosing, and in the case of the SPAC partner, for not finding via due diligence, issues with the underlying technology and some other concerns. See Dave Michaels, *A Space Company's Wall Street Launch Misfires*, WALL ST. J. (July 25, 2021, 12:00 PM), https://www.wsj.com/articles/a-space-companys-wall-street-launch-misfires-11627228802?mod=hp_lead_pos5.

12. *5 Key Themes in the New Space Economy*, MORGAN STANLEY (Feb. 4, 2021), <https://www.morganstanley.com/ideas/space-economy-themes-2021>.

13. *Id.*

14. *Id.*

15. Clive Cookson, *'Huge risk' of space junk collisions as satellite launches intensify, experts warn*, FIN. TIMES (Apr. 20, 2021), <https://www.ft.com/content/7ded0def-1715-4d01-880b-939a89cc33d7>.

16. For a discussion on the militarisation of outer space, see Melissa de Zwart & Dale Stephens, *The Space (Innovation) Race: The Inevitable Relationship Between Military Technology and Innovation*, 20 MELB. J. INT'L L. 1 (2019).

17. Talking about the increasing participation of private players in the space sector, Brennan and Vecchi had said, in their 2011 book, that "the role of states and national space agencies is to adapt to this new social value of the efficiency of investment." See LOUIS BRENNAN & ALESSANDRA VECCHI, *THE BUSINESS OF SPACE: THE NEXT FRONTIER OF INTERNATIONAL COMPETITION* 19 (2011). Scholars have also called for rules in response to specific developments. See e.g., Fengna Xu, Jinyuan Su & Miqdad Mehdi, *A Re-Examination*

international consensus on the applicable rules and standards for newer developments, domestic space legislation also needs to be improved. Current legislation in most countries provides a licensing framework for launching space objects¹⁸ but does not address newer issues like space debris, commercial human spaceflight, the use of information collected by earth observation satellites, etc.

Further, the process of obtaining necessary licenses for space activity may itself act as a barrier for smaller companies to enter the sector. As Professor Lyon Brad King observes, bigger aerospace companies of the past took around ten years to build a satellite and thus could afford to wait for permits.¹⁹ However, smaller start-ups that are building satellites in the space of a few months would not have enough capital to wait for the lengthy permit process.²⁰ Besides, the relevant authority issuing these permits might not understand the new innovation. For instance, the Federal Communications Commission (FCC), which is the relevant authority to issue permits for satellite launches in the United States, denied start-up Swarm Technologies a permit for launching small satellites, called SpaceBEEs, on the basis that they were too small to be tracked.²¹ Swarm Technologies decided to launch the SpaceBEEs anyway, and later explained that they had hoped the FCC would give them approval after their launch because the FCC had allegedly done so for other companies in previous instances.²² It is also interesting to note that, contrary to the FCC decision, Swarm Technologies said that the SpaceBEEs were easily trackable by the Space Surveillance Network, as well as by LeoLabs, a California-based company.²³ Eventually, Swarm Technologies settled the matter by agreeing to a \$900,000 penalty, an extended period of FCC oversight, and a requirement of pre-launch notices to the FCC.²⁴ This story is important for two reasons.

of Fundamental Principles of International Space Law at the Dawn of Space Mining, 44 J. SPACE L. 1 (2020).

18. See e.g., *Space (Launches and Returns) Act 2018* (Cth) (Austl.).

19. Lyon Brad King, *Space tech has outpaced space law, and we're at risk of killing innovation*, TECHCRUNCH (July 11, 2018, 12:35 PM), <https://techcrunch.com/2018/07/11/space-tech-has-outpaced-space-law-and-were-at-risk-of-killing-innovation>.

20. *Id.*

21. Letter from Anthony Serafini, Chief, Fed. Commc'ns Comm'n Experimental Licensing Branch, to Sara Spangelo, Chief Executive Officer, Swarm Technologies, Inc. (Dec. 12, 2017), <https://apps.fcc.gov/els/GetAtt.html?id=203152&x>.

22. Marina Koren, *Launching Rogue Satellites Into Space Was a 'Mistake,'* THE ATLANTIC (Sept. 7, 2018, 7:36 PM), <https://www.theatlantic.com/technology/archive/2018/09/spacebees-swarm-unauthorized-satellite-launch/569395/>.

23. *Id.*

24. Press Release, Fed. Commc'ns Comm'n, FCC Reaches \$900,000 Settlement with Swarm for Unauthorized Satellite Launch (Dec. 20, 2018), <https://docs.fcc.gov/public/attachments/DOC-355578A1.pdf>.

First, it may be the case that the FCC might have been better served by engaging with Swarm Technologies to inform itself about whether the satellites could be tracked. Second, the FCC seems to have taken eight months to decide on not granting the permit (April 2017 to December 2017).²⁵ Such a long timeline is burdensome for small start-ups. Perhaps as a result of this experience, the FCC introduced a more flexible and cheaper application process for licensing small satellites in 2020.²⁶ While the more flexible licensing system for small satellites is promising, we argue that a period of regulatory learning and experimentation through regulatory sandboxes may be helpful for both regulators and New Space companies. On an international level, we argue that a regulatory approach beyond (and complementary to) the treaty regime offered by international law is necessary to provide a framework. The rapid technological advances in the financial sector and corresponding regulatory innovations make fintech regulation a likely candidate to draw lessons from for the nascent New Space sector.

The remainder of this Article will proceed as follows. Part I critically reviews existing international law treaties and multi-national agreements, including the more recent Artemis Accords, in order to assess their suitability to regulate New Space. Part II discusses regulatory sandboxes and sandbox bridges used in the fintech sector by drawing on pertinent lessons for New Space regulation. Part III makes the case for regulating the New Space sector through sandboxes and sandbox bridges and Part IV assesses possible safety concerns of such an approach. Part V is the conclusion.

II. INTERNATIONAL TREATIES AND AGREEMENTS REGARDING NEW SPACE

There are five main treaties relevant to space activities.²⁷ Some of these are less important than others because of the limited number of signatories. There is also a multi-lateral agreement, the Artemis Accords, which was initiated by the United States, and some bilateral agreements between space agencies that are pertinent to this discussion.²⁸ While the bilateral and multilateral agreements are more recent and try to address New Space activities, the international treaties

25. *Id.* The application was made in April 2017 and the FCC denied the permit in December 2017.

26. Press Release, Fed. Comm'ns Comm'n, FCC Streamlines Application Process for Small Satellites (Aug. 1, 2019), <https://docs.fcc.gov/public/attachments/DOC-358834A1.pdf>.

27. *See infra* 1.1.

28. *See infra* 1.2.

date back to the Cold War era.²⁹ Despite how dated the international treaties are, it is worth studying them because of the large number of spacefaring nations that have signed some of these treaties. To a large extent, the broad ideas and principles enshrined in those treaties are upheld in the new space sector as will be discussed in Part II of this Article. However, some other principles are contested in the context of new space as this Part I discusses.

1. International treaties

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 1967 (Outer Space Treaty) is the main instrument regulating activities in space.³⁰ Significantly, all major spacefaring nations at the time including the United States, Russia, China, the United Kingdom, Germany, France, etc., signed the treaty.³¹

Even though it was signed in the Cold War era when there was no private sector involvement in outer space, Article VI of the Outer Space Treaty seems relevant to the present moment inasmuch as it says that a State³² bears national responsibility for all of its activities in space, whether carried out by governmental agencies or non-governmental entities.³³ Thus it falls upon states to supervise activities of the non-governmental entity in order to comply with international law.³⁴ Consequently, many states have introduced national legislation to regulate the New Space sector.³⁵ Around two dozen states have introduced such laws and this includes both the big space powers of the cold war era and newer entrants into the space sector.³⁶ All of these national laws provide for licensing systems amongst other things.³⁷

29. See *infra* 1.1.

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

31. See *Status of International Agreements relating to Activities in Outer Space*, UNITED NATIONS OFF. FOR OUTER SPACE AFF., <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html> (last visited Jan. 6, 2021).

32. See *id.*

33. See Outer Space Treaty, *supra* note 30, art. VI, 18 U.S.T. at 2415, 610 U.N.T.S. at 209.

34. See James J. Trimble, *International Law of Outer Space and Its Effect on Commercial Space Activity*, 11 PEPP. L. REV. 521, 537-43 (1984).

35. See Frans G. von der Dunk, *Billion-dollar Questions? Legal Aspects of Commercial Space Activities*, 23 UNIFORM L. REV. 418 (2018) [hereinafter Dunk, *Billion-dollar Question*].

36. See *id.*

37. See FABIO TRONCHETTI, *The Legal Framework Regulating International Outer Space Activities*, in FUNDAMENTALS OF SPACE LAW AND POLICY 3-24 (2013); Dunk, *Billion-dollar Question*, *supra* note 35, at 424.

Article II of the Outer Space Treaty is also relevant to some of the activities in the New Space sector since it forbids the national appropriation of outer space resources.³⁸ Although this principle is well-accepted (with some even calling it a ground norm),³⁹ there is debate about its meaning and scope.⁴⁰ There is an argument that Article II only prohibits national appropriation and not private appropriation but the contrary argument also exists.⁴¹ There are also debates about whether the prohibition on appropriation also prohibits activities like space mining which some countries like the United States and Luxembourg explicitly allow.⁴² Some argue that since the Outer Space Treaty anticipates “‘exploration and use’ of outer space and celestial bodies” by non-governmental actors, this must include the use of space resources.⁴³

Although these debates make it obvious that the Outer Space Treaty is a creature of a different era, there have been controversies about how the Outer Space Treaty should be interpreted even before the New Space era. While we could assume that current disagreements over the interpretation of the terms of this Treaty stem from different levels of capability across States, the scholarly debate suggests that there are genuine treaty interpretation issues as well. Further, the Committee on the Peaceful Uses of Outer Space (COPUOS) is now working on building an international framework on space resource activities.⁴⁴ This shows that there really is a need to establish an international consensus on this issue afresh, and that clauses of the Outer Space Treaty alone might not suffice. Even before CUPUOS started working on this issue,

38. Outer Space Treaty, *supra* note 30, art. II, 18 U.S.T. at 2413, 610 U.N.T.S. at 208.

39. See generally Zachos A. Paliouras, *The Non-Appropriation Principle: The Grundnorm of International Space Law*, 27 LEIDEN J. INT'L L. 37-54 (2014).

40. Melissa J. Durkee, *Interstitial Space Law*, 97 WASH U. L. REV. 423, 455 (2019).

41. *Id.*

42. *Id.* at 457; U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, §§ 401-403, 129 Stat. 704, 720-22 (2015) (codified as amended at 51 U.S.C. 10101 (2018)); *Law of July 20th 2017 on the Exploration and Use of Space Resources*, LUX. SPACE AGENCY, https://space-agency.public.lu/en/agency/legal-framework/law_space_resources_english_translation.html (last updated Nov. 18, 2019).

43. Durkee, *supra* note 40, at 457.

44. The mandate of The Working Group of the COPUOS is, amongst other things, to “[d]evelop a set of initial recommended principles for such activities taking into account the need to ensure that they are carried out in accordance with international law and in a safe, sustainable, rational and peaceful manner, for the consideration of and consensus agreement by the Committee, followed by possible adoption by the United Nations General Assembly as a dedicated resolution or other action.” See Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixty-Fourth Session, U.N. Doc. A/AC.105/2021/CRP.11/Rev.1 (2021), https://www.unoosa.org/res/oosadoc/data/documents/2021/aac_1052021crp/aac_1052021crp_11rev_1_0_html/AC105_2021_CRP11Rev01E.pdf

there had been private efforts in this direction. In November 2019, the Hague International Space Resources Governance Working Group had adopted the “Building Blocks for the Development of an International Framework on Space Resource Activities,” which said that the issue should be addressed incrementally and “at the appropriate time on the basis of contemporary technology and practices.”⁴⁵

Similar disagreements between States can be foreseen when more permanent settlements are established on the Moon or on Mars.⁴⁶ Scholars have been writing about this issue for a while now. For example, Hertzfeld and von der Dunk have suggested that ownership of permanent structures on celestial bodies will vest in the company or state that builds and places the structure on the celestial body with resources from Earth.⁴⁷ On the other hand, they say it is not clear whom the ownership rights will vest in if the structure is built on the celestial body from “locally available resources.”⁴⁸ Looking further ahead, Gabrynowicz argues that when there are human settlements on celestial bodies, individuals in those settlements “will take the law they know from the place they came” and then adapt it to the local needs and practical concerns.⁴⁹ But what happens when humans from different countries disagree on the applicable laws? These issues might again need to be ironed out through cooperation and consensus-building when the practical need for such laws become imminent.

The second treaty, the Rescue of Astronauts and Return of Space Objects, 1968 (Rescue and Return Agreement)⁵⁰ is an elaboration of Articles V and VIII of the Outer Space Treaty.⁵¹ The purpose of the

45. See THE HAGUE INTERNATIONAL SPACE RESOURCES GOVERNANCE WORKING GROUP, BUILDING BLOCKS FOR THE DEVELOPMENT OF AN INTERNATIONAL FRAMEWORK ON SPACE RESOURCE ACTIVITIES (2019), <https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht—en-ruimterecht/space-resources/bb-thissrwg—cover.pdf>.

46. See Kyle Evanoff, *The Outer Space Treaty’s Midlife Funk*, COUNCIL ON FOREIGN REL. (Oct. 10, 2017, 2:08 PM), <https://www.cfr.org/blog/outer-space-treatys-midlife-funk>.

47. Henry R. Hertzfeld & Frans G. von der Dunk, *Bringing Space Law into the Commercial World: Property Rights Without Sovereignty*, 6 CHI. J. INT’L L. 81, 83 (2005) (“[O]wnership of permanent structures that might be constructed on celestial bodies, including the moon, will vest in the company or state building the structure, at least to the extent it is placed ‘on a celestial body.’”).

48. *Id.* (“With regard to any structure essentially made from locally available resources, there are no clear rules, and it may be valuable to establish clarity on this subject.”).

49. Joanne Irene Gabrynowicz, *Some Legal Considerations Regarding the Future of Space Governance*, 48 GA. J. INT’L. & COMP. L. 739, 746 (2020).

50. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue and Return Agreement].

51. Article V of the Outer Space Treaty provides as follows:

Rescue and Return Agreement was to create an obligation for signatories to assist and help astronauts experiencing situations of danger or distress and to set out the conditions under which such help should be given.⁵² Although this seems to be the least discussed of the international treaties pertaining to outer space (it has even been called a sleeping beauty for this reason),⁵³ the Rescue and Return Agreement is likely to be an important instrument in the era of space travel which we seem to have just entered. At the time of writing this Article Blue Origin, Virgin Galactic, and SpaceX have all conducted their first space flights with paying customers on board.⁵⁴ The SpaceX flight crew did not even include a professional astronaut on board.⁵⁵

A major issue with the Rescue and Return Agreement is that although it deals with assistance to astronauts for earth-related events, like emergency landings, it does not address the issue of providing assistance to astronauts in space.⁵⁶ This limitation reflects the level of

States Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas. When astronauts make such a landing, they shall be safely and promptly returned to the State of registry of their space vehicle.

In carrying on activities in outer space and on celestial bodies, the astronauts of one State Party shall render all possible assistance to the astronauts of other States Parties.

States Parties to the Treaty shall immediately inform the other States Parties to the Treaty or the Secretary-General of the United Nations of any phenomena they discover in outer space, including the Moon and other celestial bodies, which could constitute a danger to the life or health of astronauts.

Outer Space Treaty, *supra* note 30, art. V, 18 U.S.T. at 2414, 610 U.N.T.S. at 208-09.

52. The preamble of the Rescue and Return Agreement notes,

[T]he great importance of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, which calls for the rendering of all possible assistance to astronauts in the event of accident, distress or emergency landing, the prompt and safe return of astronauts, and the return of objects launched into outer space

Rescue and Return Agreement, *supra* note 50, pmbl., 19 U.S.T. at 7572, 672 U.N.T.S. at 120-21 (footnote omitted).

53. Frans G. von der Dunk, *A Sleeping Beauty Awakens: The 1968 Rescue Agreement After Forty Years*, 34 J. SPACE L. 411, 412 (2008) [hereinafter Dunk, *A Sleeping Beauty Awakens*].

54. *SpaceX success: Trailblazing tourist trip to orbit ends with splashdown*, N.Z. HERALD (Sept. 18, 2021, 4:58 PM), <https://www.nzherald.co.nz/world/spacex-success-trailblazing-tourist-trip-to-orbit-ends-with-splashdown/RFERLBHWRUPTSYPFK6ZFPKCVUQ/>.

55. *Id.*

56. Mark J. Sundahl, *The Duty to Rescue Space Tourists and Return Private Spacecraft*, 35 J. SPACE L. 163, 167 (2009) (“Ideally, space law would impose a duty to rescue whenever anyone aboard a spacecraft experiences distress, whether on the ground, in space, or on a celestial body. However, . . . under existing space law . . . the space treaties were drafted in a

technological advancement at the time the Rescue and Return Agreement was entered into. With the advancement of space technology and space tourism getting started, issues like the obligation to rescue and return astronauts or spacecraft will become important.

Even as far as rescue and return on earth is concerned, the duty to engage in search and rescue operations imposed on States can be beneficial for the space tourism industry. Sundahl argues that the duty “will contribute to the safety of such company’s operations and could help the company maintain solvency in the event of an accident.”⁵⁷ There will also be questions about who is covered by the Rescue and Return Agreement. The Rescue and Return Agreement only mentions “personnel” in the text and “astronauts” in the preamble.⁵⁸ Even if these two terms do not include tourists, it now makes logical sense to include space tourists within the ambit of the Rescue and Return Agreement considering that space flight is now a reality. As von der Dunk argues, safety is a critical concern of the public, which will inevitably become space passengers as the cost of space flight decreases.⁵⁹ Thus, it will be in the interests of states and corporations to agree to a broader interpretation of the Rescue and Return Agreement.

Significantly, Sundahl contends that the Rescue and Return Agreement does not exclude commercial enterprises from its ambit.⁶⁰ In fact, the term “personnel,” which is typically used in a commercial context, is used in the Rescue and Return Agreement.⁶¹ Based on this, perhaps it is possible to argue that states would be required to rescue non-governmental personnel and return private spacecraft. Of the seven

manner that creates uncertainty about whether the duty to rescue under the treaties reaches this ideal.”).

57. MARK J. SUNDAHL, BUSINESS, LEGAL, AND POLICY ISSUES IN RELATION TO INCREASED PRIVATE SPACE ACTIVITY 8 (2019), https://engagedscholarship.csuohio.edu/cgi/viewcontent.cgi?article=1980&context=fac_articles.

58. Dunk, *A Sleeping Beauty Awakens*, *supra* note 53, at 421-22.

59. *Id.* at 431-34.

60. Sundahl, *supra* note 57, at 178-82.

61. *Id.* at 178-79. The text of Article 1 of the Rescue and Return Agreement is as follows: Each Contracting Party which receives information or discovers that the personnel of a spacecraft have suffered accident or are experiencing conditions of distress or have made an emergency or unintended landing in territory under its jurisdiction or on the high seas or in any other place not under the jurisdiction of any State shall immediately:

(a) Notify the launching authority or, if it cannot identify and immediately communicate with the launching authority, immediately make a public announcement by all appropriate means of communication at its disposal;

(b) Notify the Secretary-General of the United Nations, who should disseminate the information without delay by all appropriate means of communication at his disposal.

Rescue and Return Agreement, *supra* note 50, art. 1, 19 U.S.T. at 7573, 672 U.N.T.S. at 121.

instances where the Rescue and Return Agreement has been put to practical use, two instances involve private spacecraft being returned.⁶² Based on this, Sundahl argues that we already have evidence of states extending the duty to return to privately-owned spacecraft.⁶³ In the New Space era, this would mean that states should also impose this duty on space corporations as a part of their license requirements. It would also be in the interest of corporations to have these duties in place so as to be able to assure potential customers of safety mechanisms.

Ultimately, even reading space tourists into the term “personnel” in the Treaty, and imposing obligations on private companies to provide assistance to those in need of it will not be enough. The Rescue and Return Treaty should also be sufficiently re-written to clearly state that there is an obligation to provide assistance in space, rather than just after landing on Earth.

The third treaty governing space activities is the Convention on International Liability for Damage Caused by Space Objects, 1972 (Liability Convention).⁶⁴ This Convention provides an international liability framework for damages imposed and stipulates that the States are equally liable for both public as well as private activities that are undertaken on its soil.⁶⁵ However, there are some issues that remain unclear. For example, the Convention defines “launching State” as “[a] State which launches or procures the launching of a space object” or “[a] State from whose territory or facility the space object is launched”; however, there is no definition of when the launch is deemed to start.⁶⁶ Another issue is that the Liability Convention imposes strict liability on the “launching state” for all damage caused by its space object on earth or to any aircraft in flight.⁶⁷ On the other hand, it imposes liability on the launching State when a space object causes damage to the space object of another State when the object is in the air or space only when the launching state is at fault.⁶⁸ Thus, domestic laws have to ensure that

62. Sundahl, *supra* note 57, at 179 (“Specifically, the governments of Argentina and South Africa, in 2000 and 2004, respectively, notified the Secretary-General of the discovery and planned return to the United States of space objects that had been found in their respective territories.”).

63. *Id.* at 180.

64. Convention on the International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

65. Sharda Balaji, *Space: Liabilities in India and other countries*, NOVOJURIS LEGAL (Oct. 22, 2019), <https://www.novojuris.com/thought-leadership/space-liabilities-in-india-and-other-countries.html>.

66. See Liability Convention, *supra* note 64, art. I, 24 U.S.T. at 2392, 961 U.N.T.S. at 189.

67. Liability Convention, *supra* note 64, art. II, 24 U.S.T. at 2392, 961 U.N.T.S. at 189.

68. *Id.* art. III, 24 U.S.T. at 2392, 961 U.N.T.S. at 190.

States' obligations under this Convention are met even where private actors have entered the space sector. Most domestic laws have introduced some form of insurance requirements as part of the licensing regime to address this.⁶⁹ Finally, although it establishes a Claims Commission, its decisions are binding only if the parties to the dispute have agreed to be bound by it.⁷⁰ If not, the award will only be recommendatory.⁷¹

The fourth treaty is the Convention on Registration of Objects Launched into Outer Space (Registration Convention) which also has its roots in the 1967 Outer Space Treaty and requires all spacecraft to be registered.⁷² One issue that has arisen with the Registration Convention is that the Convention leaves it to state parties to determine which one of them shall register the space object in the event that there are multiple launching states.⁷³ This has resulted in multiple jointly-launched space objects not being registered on the United Nations Register of Objects Launched into Outer Space.⁷⁴ For instance, in 2002, the satellites NSS-6 and NSS-7, which were built by a U.S. corporation for a Dutch corporation, were launched by a French corporation from French territory.⁷⁵ However, despite being operational for over a decade, the satellites could not be registered in the United Nations Register of Objects Launched into Outer Space as all three states argued against being the launching state for these satellites.⁷⁶ Another concern is that the Registration Convention does not recognize the transfer of ownership of space objects.⁷⁷ As a result, when a space object is sold to a state which is not the original launching state, the new state which gains ownership of the space object doesn't incur any liability by virtue of its acquisition.⁷⁸ This is because the Liability Convention only recognizes liabilities and damages with regard to the original launching

69. Sandeepa Bhat B., *Space Liability Insurance: Concerns and Way Forward*, 6 ATHENS J.L. 37, 40-41 (2020).

70. *Id.* art. XIX, 24 U.S.T. at 2400, 961 U.N.T.S. at 193.

71. *Id.*

72. Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

73. *Id.* art. II, 28 U.S.T. at 698, 1023 U.N.T.S. at 17.

74. Jack Wright Nelson, *Lost in Space? Gaps in the International Space Object Registration Regime*, EJIL: Talk! (Nov. 19, 2018), <https://www.ejiltalk.org/lost-in-space-gaps-in-the-international-space-object-registration-regime/>.

75. *Id.*

76. *Id.*

77. Zhao Yun, *Revisiting the 1975 Registration Convention: Time for Revision?*, 11 AUSTL INT'L L.J. 106, 110-11 (2004).

78. *Id.*

state.⁷⁹ These issues are likely to become more important with increased cross-border commercial activity in this sector.

The fifth treaty is the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1979 (Moon Agreement).⁸⁰ The Moon Agreement deals with issues relating to exploration, use, and exploitation of the moon and other celestial bodies within the solar system.⁸¹ It clarifies that the moon and other celestial bodies should only be used for peaceful purposes.⁸² For the purpose of this discussion, a crucial provision of the Moon Agreement is Article 4 section 1 and states as follows:

The exploration and use of the moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development. Due regard shall be paid to the interests of present and future generations as well as to the need to promote higher standards of living and conditions of economic and social progress and development in accordance with the Charter of the United Nations.⁸³

Because of its wording, this clause casts doubt on whether corporations or states may exploit resources of the moon and other celestial bodies for commercial purposes. However, Article 11 of the Moon Agreement says that the moon and other celestial bodies or any part of it shall not “become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person.”⁸⁴ This could be interpreted as a prohibition on any property rights being assigned to corporations or states with respect to resources procured from the moon or other celestial bodies. Thus, some interpret this to mean that a moratorium is to be placed on the commercial exploitation of resources until the international regime is established.⁸⁵ This interpretation might be supported by the fact that Article 6 of the Moon Treaty allows scientific investigation of the Moon and other celestial bodies, but nowhere in the Treaty is commercial exploitation specifically approved.⁸⁶ However, commercial exploitation of space resources has explicitly been allowed

79. *Id.*

80. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1363 U.N.T.S. 3 [hereinafter Moon Agreement].

81. See Moon Agreement, *supra* note 80, art. 1-2, at 22-23.

82. *Id.* art. 3, at 23.

83. *Id.* art. 4, § 1.

84. *Id.* art. 11, § 3, at 25.

85. Trimble, *supra* note 34, at 549.

86. *Id.* at 549-50.

by some countries, thus challenging the relevance of the Moon Agreement.

Another clause within the Moon Agreement, Article 4 section 2, is worth highlighting here because of its relevance to the discussion in the next section and Part II of this Article. It states that parties to the Moon Agreement “shall be guided by the principle of co-operation and mutual assistance in all their activities concerning the exploration and use of the moon.”⁸⁷ It further goes on to say that “[i]nternational co-operation in pursuance of this Agreement should be as wide as possible and may take place on a multilateral basis, on a bilateral basis or through international intergovernmental organizations.”⁸⁸ While this clause presumably intends to nudge parties towards international cooperation via the United Nations, it is worth noting that multilateral and bilateral agreements are not ruled out. This suggests that agreements like the Artemis Accords, discussed below, might not be outside the contemplation of the Moon Agreement. Further, this clause, along with the fact that the Moon Agreement did not get many signatories, could be pointing to a new era in international space law. Gabrynowicz argues that international law is now trending towards non-binding agreements rather than formal treaties.⁸⁹ To make the point, one of the examples she cites is the space debris mitigation guidelines and terms of reference established by the Inter-Agency Space Debris Coordination Committee (IADC).⁹⁰ The IADC consists of thirteen space agencies and describes itself as a “forum for the worldwide coordination of activities related to the issues of man-made and natural debris in space.”⁹¹ The Artemis Accords, discussed in the section below, might be viewed as part of this trend towards multilateral cooperation between space agencies.

Before proceeding to the next section, it is worth noting that some resolutions of the United Nations General Assembly deal with activities in outer space. However, since the effect of these resolutions on states under customary international law is unclear, they will be discussed very briefly here.⁹² Despite dealing with various specific issues, the common

87. Moon Agreement, *supra* note 80, art. 4, § 2, at 23.

88. *Id.*

89. Gabrynowicz, *supra* note 49, at 747.

90. See INTER-AGENCY SPACE DEBRIS COORDINATION COMM., SUPPORT TO THE IADC SPACE DEBRIS MITIGATION GUIDELINES (2021), https://www.iadc-home.org/documents_public/view/id/173#u.

91. *What's IADC*, INTER-AGENCY SPACE DEBRIS COORDINATION COMMITTEE, https://www.iadc-home.org/what_iadc (last visited Mar. 11, 2022).

92. Ricky J. Lee, *Reconciling International Space Law with the Commercial Realities of the Twenty-first Century*, 4 SING. J. INT'L & COMP. L. 194, 204 (2000).

theme running through these resolutions is the promotion of international and regional cooperation in various space-related activities.

First, the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, 1962, promotes international cooperation in the peaceful uses of outer space by promoting exchange of information, international programs, international sounding rocket facilities, education, and training related to outer space.⁹³ It also encourages member states to continue cooperative arrangement and mutual assistance.⁹⁴

In the eighties, direct television broadcasting and remote-sensing were the subject of United Nations resolutions. The Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, 1982, aim to align the activities in the field of international direct television broadcasting by satellites in a way that is compatible with the sovereign rights of the States.⁹⁵ The Principles Relating to Remote Sensing of the Earth from Outer Space, 1982, again aim to emphasize cooperation in remote-sensing activities (i.e., “sensing of the Earth’s surface from space by making use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the purpose of improving natural resources management, land use and the protection of the environment”).⁹⁶ In particular, Principle VI encourages regional agreements.⁹⁷

Moving to the nineties, the Principles Relevant to the Use of Nuclear Power Sources In Outer Space, 1992, aim to minimize the quantity of radioactive material in space and the risks involved by restricting the use of nuclear power sources in outer space to those space missions which cannot be operated by non-nuclear energy sources in a reasonable way.⁹⁸ Again encouraging cooperation, it is emphasized that states that have monitoring and tracking capabilities should provide

93. G.A. Res. 1962 (XVIII), Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space (Dec. 13, 1963).

94. *Id.* at § 6.

95. G.A. Res. 37/92, Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting (Dec. 10, 1982).

96. G.A. Res. 41/65, annex, Principles Relating to Remote Sensing of the Earth from Outer Space, principle I (Dec. 3, 1986).

97. *Id.* principle VI (“In order to maximize the availability of benefits from remote sensing activities, States are encouraged, through agreements or other arrangements to provide for the establishment and operation of data collecting and storage stations and processing and interpretation facilities, in particular within the framework of regional agreements or arrangements wherever feasible.”).

98. G.A. Res. 47/68, Principles Relevant to the Use of Nuclear Power Sources in Outer Space (Dec. 14, 1992).

assistance to states expecting re-entry of space objects with nuclear power sources.⁹⁹ Finally, the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, 1996, encourages cooperation in space science and technology by fostering the relevant facilities in the interested and developing states through the exchange of expertise and technology.¹⁰⁰

2. *The Artemis accords and other bilateral agreements*

The United States space agency, National Aeronautics and Space Administration (NASA), announced a set of bilateral agreements called the Artemis Accords in 2020, which has taken the space law conversation by storm.¹⁰¹ The Accords address many of the gaps in the treaties discussed earlier in this Article, thus providing a more modern framework.

The Accords trace their origin to NASA's Artemis program, and apply to activities of signatories that "take place on the Moon, Mars, comets, and asteroids, including their surfaces and subsurfaces, as well as in orbit of the Moon or Mars, in the Lagrangian points for the Earth-Moon system, and in transit between these celestial bodies and locations."¹⁰² The recitals to the Artemis Accords makes it clear that corporate actors are also envisaged in space activity. Specifically, it says that the goal is sustainable space activity by collaborating with "international and commercial partners."¹⁰³ Section 5, which deals with interoperability, also emphasizes that "commercial utilization" of resources is contemplated.¹⁰⁴

The sections in the Accords contain principles that can be categorized into two main heads. The first category includes those pertaining to functional issues that facilitate cooperation. These issues include peaceful exploration, transparency, interoperability of space exploration infrastructure (for example, space suits of different astronauts being able to communicate with each other), providing

99. *Id.* principle 7.

100. G.A. Res. 51/122, annex, 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 (Dec. 13, 1996).

101. NASA, THE ARTEMIS ACCORDS: PRINCIPLE FOR COOPERATION IN THE CIVIL EXPLORATION AND USE OF THE MOON, MARS, COMETS, AND ASTEROIDS FOR PEACEFUL PURPOSES (2020), <https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf>.

102. *Id.* § 1, at 2.

103. *Id.* at 1.

104. *Id.* § 5, at 3.

emergency assistance to personnel in outer space, cooperation regarding registration of space objects, and open sharing of scientific data.¹⁰⁵ The second category can be thought of as including sustainability issues. These include preserving outer space heritage, extraction and utilization of space resources “in a manner that complies with the Outer Space Treaty and in support of safe and sustainable space activities,” deconfliction of space activities, and mitigation of orbital debris.¹⁰⁶ Under both categories, the Artemis Accords provide broad principles rather than very specific rules. It is also important to note here that the publicly available version of the Artemis Accords is just a summary and that the full text is still being negotiated by signatories.¹⁰⁷

One section of the Artemis Accords that has perhaps not received the attention it deserves is Section 6, which deals with emergency assistance.¹⁰⁸ It is as follows: “The Signatories commit to taking all reasonable efforts to render necessary assistance to personnel in outer space who are in distress, and acknowledge their obligations under the Rescue and Return Agreement.”

Clearly, this section aims to reiterate and update the Rescue and Return Agreement by committing to providing assistance in outer space, which as the discussion above shows, was not clearly stated in the Rescue and Return Agreement. Also, to be noted is the use of the broader term “personnel” rather than “astronauts,” which would mean that space tourists could be covered.¹⁰⁹ The fact that commercial activity is contemplated by the Accords should again suggest that space tourists would be included in the definition of personnel.

One could say that the section on space mining is perhaps the most controversial of all its sections. The Artemis Accords allow the mining of space resources, thus taking a decisive step on the contested issue.¹¹⁰ The only stipulation provided is that historic locations such as the Apollo landing sites are to be protected.¹¹¹ However, the Artemis Accords aim to situate itself within the Outer Space Treaty. It states that the signatories “intend to use their experience under the Accords to

105. *Id.* §§ 3–8, at 3–4.

106. *Id.* §§ 9–12, at 4–7.

107. Space Court Foundation, *Artemis Accords and the Future of Space Governance (Special Guest: Mike Gold) | SCFVideo3*, YOUTUBE (Aug. 26, 2020), <https://www.youtube.com/watch?v=Hn16cP3ACRc&t=1260s>.

108. NASA, *supra* note 101, § 6, at 3.

109. *Id.*

110. Joey Roulette, *Exclusive: Trump administration drafting ‘Artemis Accords’ pact for moon mining – sources*, REUTERS (May 5, 2020, 1:04 PM), <https://www.reuters.com/article/us-space-exploration-moon-mining-exclusi/exclusive-trump-administration-drafting-artermis-accords-pact-for-moon-mining-sources idUSKBN22H2SB>.

111. NASA, *supra* note 101, § 9, at 4.

contribute to multilateral efforts to further develop international practices and rules applicable to the extraction and utilization of space resources, including through ongoing efforts at the [Committee on the Peaceful Uses of Outer Space (COPUOS)].”¹¹² A similar intention is articulated in the context of sections dealing with preserving space heritage, and deconfliction of space activities.¹¹³

Despite this, the Accords have come under criticism from international law scholars. It has been argued that the Accords are a means of working around the prohibition on the appropriation of space resources set out in the Outer Space Treaty.¹¹⁴ Others believe that the Accords represent a radical departure from space governance as the United States has used bilateral agreements to establish norms of behaviour in this regard.¹¹⁵ All earlier attempts to govern space have been through “painstakingly negotiated international treaties.”¹¹⁶ Likewise, several states have expressed reservations over the negotiation of these Accords outside the ambit of international institutions such as the U.N. Committee on the Peaceful Uses of Outer Space.¹¹⁷ For instance, spacefaring nations such as Russia and China have opposed these accords with Russia, terming the Accords as too “U.S.-centric” for it to participate.¹¹⁸

However, the fact remains that countries like Australia, Canada, Italy, Japan, Luxembourg, United Arab Emirates, United Kingdom, Ukraine, New Zealand, and the Republic of Korea have signed the Artemis Accords along with the United States.¹¹⁹ Furthermore, critics who emphasize that the Accords were not the product of U.N.-facilitated international negotiations need to recognize that space exploration had

112. *Id.* § 10(4), at 5.

113. *Id.* §§ 9(2), 11(6), at 4-5.

114. John Hickman, *Opinion - The Unimpressive Nature of the Artemis Accords*, E-INT’L REL. (Oct. 19, 2020), <https://www.e-ir.info/2020/10/19/opinion-the-unimpressive-nature-of-the-artemis-accords/>.

115. See Jack Wright Nelson, *The Artemis Accords and the Future of International Space Law*, 24 ASIL INSIGHTS, Dec. 10, 2020, at 1, https://www.asil.org/sites/default/files/ASIL_Insights_2020_V24_I31.pdf.

116. Christopher Newman, *Artemis Accords: why many countries are refusing to sign Moon exploration agreement*, THE CONVERSATION (Oct. 19, 2020, 7:45 AM), <https://theconversation.com/artemis-accords-why-many-countries-are-refusing-to-sign-moon-exploration-agreement-148134>.

117. *Id.*

118. Jeff Foust, *Russia skeptical about participating in lunar Gateway*, SPACENEWS (Oct. 12, 2020), <https://spacenews.com/russia-skeptical-about-participating-in-lunar-gateway/>.

119. Sean Potter & Cheryl Warner, *NASA, International Partners Advance Cooperation with First Signings of Artemis Accords*, NASA (Oct. 13, 2020), <https://www.nasa.gov/press-release/nasa-international-partners-advance-cooperation-with-first-signings-of-artemis-accords>.

already progressed beyond what the international treaty regime envisaged when the Artemis Accords were introduced. As pointed out earlier, specific changes in some treaties are now required to address new technological developments and business endeavors. Further, the Moon Agreement, which was a product of negotiations via international institutions, did not get the support of the major spacefaring nations.¹²⁰ The Moon Agreement itself sets out that international cooperation in pursuance of it, “should be as wide as possible and may take place on a multilateral basis, on a bilateral basis or through international intergovernmental organizations.”¹²¹ The Artemis Accords are a multilateral effort that, even if initiated by the United States, addresses gaps in the Moon Agreement. In fact, as a senior analyst at the Australian Strategic Policy Institute argues, since signatories of the Artemis Accords have declared that they will not claim territory on the moon or other celestial bodies for themselves, it pressures states that are not signatory to the Accords to also play by the same rules.¹²²

At a space agency level, the European Space Administration (ESA) signed a “Gateway Memorandum of Understanding (MoU)” with the United States which “will see ESA Member States contribute a number of essential elements to the first human outpost in lunar orbit, known as the Gateway.”¹²³ The Gateway is part of the Artemis program.¹²⁴ However, the ESA has clarified that operations beyond the Gateway, like those taking place on the surface of the moon, are not part of the MoU.¹²⁵

Even outside of the Artemis Accords, there have been MoUs and agreements between space agencies. For instance, the Australian Space Agency has signed a statement of intent with the Italian Space Agency in early 2020 to “consider a joint Australia-Italy activity on the

120. Michael Listner, *The Moon Treaty: failed international law or waiting in the shadows?*, SPACE REV. (Oct. 24, 2011), <https://www.thespacereview.com/article/1954/1> (“[T]he three major spacefaring nations (“the Big Three”) are non-parties to the Moon Treaty, which has led to the opinion that the Moon Treaty is a failure as a treaty and international law.”).

121. Moon Agreement, *supra* note 80, art. 4, § 2, at 23.

122. Malcolm Davies, *Commitment to Artemis Accords affirms Australia’s rising star in space*, AUSTL. STRATEGIC POL’Y INST.: THE STRATEGIST (Jan. 12, 2021), <https://www.aspistrategist.org.au/commitment-to-artemis-accords-affirms-australias-rising-star-in-space>.

123. *Positive signs for Europe as ESA goes forward to the Moon*, EUR. SPACE AGENCY (Oct. 27, 2020), https://www.esa.int/Science_Exploration/Human_and_Robotic_Exploration/Positive_signs_for_Europe_as_ESA_goes_forward_to_the_Moon.

124. *Id.*

125. *Gateway MoU and Artemis Accords – FAQs*, EUR. SPACE AGENCY, https://www.esa.int/Science_Exploration/Human_and_Robotic_Exploration/Gateway_MoU_and_Artemis_Accords_FAQs (last visited Apr. 12, 2022).

International Space Station.”¹²⁶ The joint activity could include the development of payloads, and the execution of scientific or technological investigations. Australian Space Agency has signed similar letters of intent with space agencies (or relevant governing bodies) in New Zealand, Germany, the United States, and Europe.¹²⁷ More interestingly, MoUs have been entered into by the Australian Space Agency with its counterparts in Canada, U.K., and U.A.E.¹²⁸ The MoUs are more substantial than letters of intent to cooperate. For instance, the MoU between the Australian Space Agency and the UK Space Agency “provides a framework for collaborative activities and the exchange of information, technology and personnel” between the two countries.¹²⁹ One of the areas of cooperation includes the “[e]xchange of views on space policy, law and regulation.”¹³⁰ The MoU further specifies that it will “place no financial, legal or other type of commitment on either” of the two space agencies or their respective governments.¹³¹ Thus, the MoUs serve the function of allowing space agencies of different countries to collaborate not only on scientific aspects but also on law, regulation, and policymaking in the nascent field—albeit without placing any legal commitments on the parties involved. Australia is not alone in entering into such MoUs with different countries at the space agency level.

The Artemis Accords being signed by more spacefaring nations than the Moon Treaty, along with the proliferation of MoUs and letters of intent between space agencies in different countries, indicates, as Gabrynowicz has argued, that international law is now trending towards non-binding agreements rather than formal treaties.¹³² It also indicates that there is an appetite for business collaboration in the New Space sector. Such appetite can be harnessed to achieve both business collaborations across countries and safeguards, such as preventing the

126. *Australian Space Agency signs statement of intent with Italian Space Agency*, AUSTL. GOV'T DEP'T INDUSTRY, SCI., ENERGY & RESOURCES (Feb. 17, 2020), <https://www.industry.gov.au/news-media/australian-space-agency-signs-statement-of-intent-with-italian-space-agency>.

127. *See Australian Space Agency News*, AUSTL. GOV'T DEP'T INDUSTRY, SCI., ENERGY & RESOURCES, https://www.industry.gov.au/news/australian-space-agency-news?field_news_section_tid=2583 (last visited Feb. 6, 2021).

128. *Id.*

129. *Australian Space Agency signs with United Kingdom Space Agency*, AUSTL. GOV'T DEP'T INDUSTRY, SCI., ENERGY & RESOURCES (Oct. 2, 2018), <https://www.industry.gov.au/news-media/australian-space-agency-signs-with-united-kingdom-space-agency>.

130. *Id.*

131. *Id.*

132. Gabrynowicz, *supra* note 49, at 747.

accumulation of space debris. Such collaborations will be important in the absence of cooperation amongst nation-states through an international treaty regarding commercial space activity. Eventually, such collaborations may even lead to an international treaty incorporating the best practices that develop through these processes. The next section will discuss how such collaboration has worked in another new industry, fintech, in order to draw lessons where pertinent.

III. REGULATORY SANDBOXES - LESSONS FROM FINTECH

A regulatory sandbox is a temporary test area that allows for experimentation and innovation on the one hand and regulatory discovery on the other.¹³³ Within this phase, the regulations typically allow for exemptions from certain prohibitions, approval requirements, etc.¹³⁴ The knowledge problem, as Friedrich Hayek described it, is a situation where the planners (government or even regulatory bodies) may not have the required information about the activity.¹³⁵ This problem is especially acute in most new and fast-developing technology sectors. Regulatory sandboxes solve this problem by allowing a test phase where the regulator can learn from those engaged in the relevant sector and, during that time, ensure that innovation is not stymied by uninformed regulation.¹³⁶

While regulatory sandboxing has been used predominantly in the fintech industry, its use may also be relevant to any new and fast-developing sector where it is beneficial to allow innovation while regulators are still working out the most effective regulatory mechanisms.¹³⁷ For instance, the regulatory sandbox tool is now starting to be used in the legal services sector of Canada and the United States. In April 2021, the Law Society of Ontario (in Canada) approved a regulatory sandbox with a five-year term to “encourage the development of innovative technological legal services in the province.”¹³⁸ Approved

133. FED. MINISTRY FOR ECON. AFFAIRS & ENERGY, MAKING SPACE FOR INNOVATION: THE HANDBOOK OF REGULATORY SANDBOXES 7 (2019), https://www.bmwi.de/Redaktion/EN/Publikationen/Digitale-Welt/handbook-regulatory-sandboxes.pdf?__blob=publicationFile&v=2.

134. *Id.* at 39.

135. See F.A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519-30 (1945).

136. Christopher M. Bruner, *Distributed Ledgers, Artificial Intelligence, and the Purpose of the Corporation*, 79 CAMBRIDGE L.J. 431, 456 (2020).

137. *Id.* at 456. Bruner suggests that the concept of regulatory sandboxes might be used in the context of corporate governance-related innovations as has been done in the context of the fintech sector.

138. Dale Smith, *Law Society of Ontario approves regulatory sandbox for legal tech*, CBA/ABC NATIONAL (Apr. 22, 2021), <https://www.nationalmagazine.ca/en->

participants will be given a two-year window within the sandbox to serve consumers with innovative legal technologies, while also complying with “risk-based monitoring and reporting requirements.”¹³⁹ In the United States, Utah launched a regulatory sandbox for ‘non-traditional’ legal services in August 2020 for a two-year period.¹⁴⁰ Utah later extended the Utah sandbox by another five years because of its success.¹⁴¹ Following Utah’s sandbox, British Columbia in Canada also launched a regulatory sandbox for legal tech innovation in December 2020.¹⁴² This Part will mainly study the use of regulatory sandboxes in fintech.

Regulatory sandboxes in the fintech sector have allowed innovative fintech businesses to ‘test’ their business concepts without having to comply with certain financial regulations by exempting them from licensing and regulatory requirements on a conditional basis.¹⁴³ As they were first used in 2016, sandboxes are a relatively recent development in financial regulation.¹⁴⁴ However, they now represent a major element of new regulatory approaches involving fintech.¹⁴⁵

As a precondition to enter and participate in the sandbox, regulators usually require companies to satisfy some tests. Professor Dirk Zetzsche and his co-authors identify three such pre-conditions based on practices in various jurisdictions.¹⁴⁶ The first is that the firm should support the financial services industry.¹⁴⁷ The second and third are that the firm should provide genuine innovation (i.e., new solutions to existing or new problems) and benefit customers.¹⁴⁸ Zetzsche et al. argue that the benefit of the first test is debatable since it requires the regulator to assess an

ca/articles/legal-market/regulatory/2021/law-society-of-ontario-approves-regulatory-sandbox.

139. *Id.*

140. Sam Skolnik & Melissa Heelan Stanzione, *Utah Court OKs Pathbreaking Pilot on New Legal Service Models*, BLOOMBERG LAW (Aug. 14, 2020, 11:55 AM), <https://news.bloomberglaw.com/us-law-week/utah-court-oks-pathbreaking-pilot-on-new-legal-service-models>.

141. *Id.*; Rhys Dipshan, *Utah Adds 5 Years to Regulatory Sandbox Program Fostering Legal Services Innovation*, LAW.COM (May 4, 2021, 1:43 PM), <https://www.law.com/legaltechnews/2021/05/04/utah-adds-five-years-to-regulatory-sandbox-program-fostering-legal-services-innovation/?slreturn=20210516005954>.

142. Smith, *supra* note 138.

143. See Lev Bromberg, Andrew Godwin & Ian Ramsay, *Fintech Sandboxes: Achieving a Balance Between Regulation and Innovation*, 28 J. BANKING & FIN. L. & PRAC. 314 (2017).

144. See *id.*

145. See Hilary J. Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579, 596 (2019).

146. Dirk A. Zetzsche et al., *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation*, 23 FORDHAM J. CORP. & FIN. L. 31, 69-70 (2017).

147. *Id.*

148. *Id.*

innovation, which is outside their skillset.¹⁴⁹ Recognizing the limitation, some regulators do not use these tests and simply focus on a risk analysis, which seeks to look at the impact of the firm on market stability and market transparency, or at whether the firm has adequate processes to protect customers and the broader financial system.¹⁵⁰ The idea is that knowledge gained through sandboxes will eventually feed into standardized regulatory requirements to ensure that the risks are managed appropriately. It might also help regulators determine the relevant technology that can then be used to regulate the new technologies. This has come to be known as regulatory technology or regtech. Ultimately, the extent to which sandboxes can promote innovation would mainly depend on whether there is in-depth knowledge exchange between innovator and regulator.¹⁵¹ From the perspective of companies entering the sandbox, benefits include certainty in terms of applicable rules; enhanced communication with regulators; and, as a consequence of this, quicker entry into the market.¹⁵² The regulatory sandboxes usually have a set term. Participants may also be removed from the sandbox if they fail to comply with the rules, engage in misconduct, or simply fail to achieve their stated purpose.¹⁵³

One important concern with regulatory sandboxes is the potential lack of transparency. It is important for regulators to disclose details of all concessions made within the sandbox, which would not only level the playing field for interested firms but also create legal certainty.¹⁵⁴ An effective sandbox would, at the very least, be expected to ease communications with the regulator and also make such necessary information readily available. Over and above this, communication channels between the regulator and prospective players in the sandbox should remain open.

Some countries have used innovation hubs (which also facilitate information exchange and communication with the regulator)¹⁵⁵ instead of regulatory sandboxes, and some others have used a hybrid model. The

149. *Id.*

150. *Id.* at 70-71.

151. *Id.* at 79.

152. Wolf-Georg Ringe & Christopher Ruof, *Regulating Fintech in the EU: The Case for a Guided Sandbox*, 11 EUR. J. RISK REG. 604, 611-612 (2020).

153. *Id.* at 610-11.

154. *Id.* at 619.

155. See RADOSTINA PARENTI ET AL., EUROPEAN PARLIAMENT, REGULATORY SANDBOXES AND INNOVATION HUBS FOR FINTECH 20 (2020), [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU\(2020\)652_752_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652752/IPOL_STU(2020)652_752_EN.pdf).

main distinction between the two is that an innovation hub does not allow businesses to interact with customers, while the sandbox allows for products to be tested in the market and thus also implies closer regulatory monitoring.¹⁵⁶ Some countries in the European Union (Sweden and Germany, for example) have set up innovation hubs, but seem hesitant or unwilling to set up regulatory sandboxes.¹⁵⁷ All the benefits of regulatory sandboxes outlined thus far are also applicable to innovation hubs, although regulatory sandboxes offer an additional benefit of signaling the regulator's openness to the industry.¹⁵⁸ As evidence of the signaling effect of a regulatory sandbox, particularly one that is well-run, Ringe and Ruof note that London has become a fintech hub as a result of the FCA's regulatory sandbox.¹⁵⁹ Ultimately, each jurisdiction will have different needs and whether it adopts an innovation hub or a regulator sandbox will depend on local factors. While innovation hubs may be better in jurisdictions where innovation needs to be fostered, regulatory sandboxes would work well where there is a significant number of innovation-focused firms and where the regulatory framework needs to catch up with the level of innovation in the industry.¹⁶⁰

The benefits of regulatory sandboxes are generally enhanced if sandboxes also operate across borders. Businesses can test the viability of their concepts in multiple jurisdictions via regulatory sandbox bridges or agreements between the market regulators across jurisdictions.¹⁶¹ This is beneficial to the companies involved because, rather than being required to comply with different laws, the regulatory bridge allows them to test their innovations in a uniform framework across the jurisdictions participating in the regulatory sandbox bridge.¹⁶² The sandbox bridges may also include a framework for information sharing with regard to regtech.¹⁶³ Examples of such regulatory sandbox bridges in fintech include a Memorandum of Understanding (MoU) between the UK's Financial Conduct Authority (FCA) and the Australian Securities and Investments Commission (ASIC) agreeing to support firms in

156. *See id.* at 19-20.

157. *Id.* at 22.

158. *See* Ross P. Buckley et al., *Building Fintech Ecosystems: Regulatory Sandboxes, Innovation Hubs and Beyond*, 61 WASH. U. J.L. & POL'Y 55, 70-76 (2020).

159. Ringe & Ruof, *supra* note 152, at 612.

160. *Id.* at 617.

161. *See* Lev Bromberg, Andrew Godwin & Ian Ramsay, *Cross-Border Cooperation in Financial Regulation: Crossing the Fintech Bridge*, 13 CAP. MARKETS L.J. 59 (2018).

162. *Id.* at 22-23.

163. *See* Lev Bromberg, Andrew Godwin & Ian Ramsay, *Sandboxes and Bridges – the Impact of Fintech on Regulatory Convergence and Coordination in Asia*, in RESEARCH HANDBOOK ON ASIAN FINANCIAL LAW 547, 549 (Douglas W. Arner, et. al. eds., 2020).

navigating the regulatory system in each market.¹⁶⁴ Firms that meet certain eligibility criteria can access the regulatory sandboxes in both countries.¹⁶⁵ The United States-Mexico-Canada Agreement (USMCA) has similar arrangements for firms doing business in these countries.¹⁶⁶

In addition to sandbox bridges between regulators of two states, the Global Financial Innovation Network (GFIN), a cross-border regulatory sandbox, was set up in 2018.¹⁶⁷ The GFIN was set up to enable regulators across participating jurisdictions to be able to collaborate and share information about emerging technologies, business models, and regtech, and to trial cross-border solutions.¹⁶⁸ In addition to this, they also aimed to provide accessible regulatory contact information for firms.¹⁶⁹ In 2020, the GFIN introduced a single-entry application form for firms seeking to operate in the participating jurisdictions, thus further easing barriers to entry.¹⁷⁰ The eligibility requirements for businesses seeking to apply are as follows:¹⁷¹

1. The product will provide identifiable benefits.
2. The product is established and is ready to be tested in a regulatory/supervisory sandbox in at least one jurisdiction.
3. If applicable, the innovative product has been discussed with the applicant's principal regulatory/supervisory authority.
4. The applicant should have reviewed the compendiums (containing information about regulations in all participating jurisdictions) and should confirm that the innovative product is covered there.

164. UK-Australia FinTech Bridge, U.K.-Austl., Mar. 22, 2018, <https://cdn.treasury.gov.au/uploads/sites/1/2018/03/UK-Australia-FinTech-Bridge.pdf>.

165. Ana Badour & Nicole Chiarelli, *Australia and UK Establish "Fintech Bridge": A Model for Canada?*, LEXOLOGY (July 16, 2018), <https://www.lexology.com/library/detail.aspx?g=8917b7fb-c653-4213-ba17-efff0606c503>.

166. Curtis M. Dombek & Emilio Cazares, *The United States-Mexico-Canada Agreement – Paving the Way For A Cross-Border Fintech Sandbox*, SHEPPARDMULLIN: LATIN AM. BLOG (June 8, 2020), <https://www.latinolawblog.com/2020/05/articles/commerce/usmca-cross-border-fintech-sandbox/>.

167. *Global sandbox accepts first eight firms*, FINEXTRA (Apr. 29, 2019), <https://www.finextra.com/newsarticle/33740/global-sandbox-accepts-first-eight-firms>; *Global Financial Innovation Network (GFIN)*, FIN. CONDUCT AUTHORITY (Jan. 31, 2019), <https://www.fca.org.uk/firms/innovation/global-financial-innovation-network>.

168. *Id.*

169. *Id.*

170. *Id.*

171. GLOB. FIN. INNOVATION NETWORK, GFIN CROSS-BORDER TESTING APPLICATION 5 (n.d.), <https://www.bma.bm/viewPDF/documents/2020-10-29-17-33-23-GFIN-Cross-Border-Testing-Application.PDF>.

5. The applicant should confirm that they understand the risks that their innovative product entails and that they have taken necessary steps to mitigate those risks.
6. The applicant should be responsive in addressing questions and concerns from GFIN members while participating in the cross-border testing.
7. The applicant should consent to the use of information they submit by the GFIN while discharging its functions.

These criteria indicate the goal of easing access to different markets within the sandbox alongside risk-management.

The European Union, which was initially less enthusiastic about regulatory sandboxes, proposed a regulatory sandbox for distributed ledger technology (DLT) and blockchain services in September 2020.¹⁷² Known as the DLT Pilot Regime, the regulatory sandbox allows applicants fulfilling the eligibility criteria to operate across the whole EU market.¹⁷³ Under this proposal, the European Securities and Markets Authority (ESMA) plays a central role, coordinating between the national authorities.¹⁷⁴ While academics have suggested that the model could be more dynamic,¹⁷⁵ the DLT Pilot is still an exciting development from the perspective of the EU experimenting with the regulatory sandbox model.

Despite the widespread appeal of regulatory sandbox bridges in the fintech sector, Professor Hillary Allen has cautioned that financial stability regulation should be the main concern of any regulatory regime in fintech, in order to prevent financial crises.¹⁷⁶ This is a valid concern and should be heeded and adapted by regulators in sectors like New Space while importing the regulatory sandbox idea from fintech. The concerns in New Space are different from those in fintech (as will be discussed later) but nevertheless just as important, if not more.

Further, Allen cautions that there could be a race to the bottom if some jurisdictions prioritize efficiency and competition over consumer protection and financial stability.¹⁷⁷ Companies would then engage in

172. See *Proposal for a Regulation of the European Parliament and of the Council on a Pilot Regime for Market Infrastructures Based on Distributed Ledger Technology*, COM (2020) 594 final (Sept. 24, 2020), <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020PC0594&from=EN>.

173. *Id.*

174. *Id.*

175. Wolf-Georg Ringe & Christopher Ruof, *The DLT Pilot Regime: An EU Sandbox, at Last!*, U. Oxford: OXFORD BUS. L. BLOG (Nov. 19, 2020), <https://www.law.ox.ac.uk/business-law-blog/blog/2020/11/dlt-pilot-regime-eu-sandbox-last>.

176. Hilary J. Allen, *Sandbox Boundaries*, 22 VAND. J. ENT. & TECH. L. 299, 308 (2020) [hereinafter Allen, *Sandbox Boundaries*].

177. *Id.* at 310.

regulatory arbitrage and prefer jurisdictions with fewer safeguards. This problem may, in theory, be assuaged through cross-border regulatory sandbox initiatives such as the GFIN which, as Allen says, can be understood as a coordination mechanism between nations to develop regulatory best practices that “maximize[] efficiency and promote[] competition, while minimizing harm to consumers and financial stability.”¹⁷⁸ Similar principles may be imported into the New Space sector as well. Even beyond domestic regulatory regimes, firms themselves have started to look for social legitimacy, and Professor Hilary Allen argues that this is particularly true for fintech companies where consumer trust is important.¹⁷⁹ This is also true in other sectors, including New Space, as will be discussed below.

IV. REGULATORY SANDBOXES FOR NEW SPACE

The fact that a treaty-based regime was insufficient had been recognized long before the Artemis Accords was introduced in 2020. For instance, Lee argued in 2000 that there was a need for “new and adapted rules of international space law” in the face of rapid technological progress.¹⁸⁰ Twenty years later, international law on this issue is still lacking. Many states have introduced domestic legislation to regulate corporate activity in space and others are in the process of introducing such legislation.¹⁸¹ However, not all space activities are covered by domestic legislation.

The fast pace of innovation in this sector has resulted in issues like space mining, space debris, etc. that need to be addressed.¹⁸² There are firms trying to innovate to solve some space sustainability issues, while others are finding ways to enhance connectivity or provide crucial data on climate change via space technologies. Effective regulation can

178. *Id.* at 313.

179. *Id.* at 314.

180. Lee, *supra* note 92, at 196.

181. US, UK, Australia, and New Zealand are some examples of countries which have introduced domestic space legislation. *National Space Law*, UNITED NATIONS OFF. FOR OUTER SPACE AFF., <https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/index.html> (last visited Apr. 12, 2022). India is currently in the process of introducing a domestic space legislation. See Martand Jha, *From allowing private players, to regulating satellite use, why India needs a space law*, FIRSTPOST (Oct. 3, 2021, 1:07 PM), <https://www.firstpost.com/india/from-making-provisions-for-private-players-to-regulating-satellite-use-why-india-needs-a-new-space-law-10020521.html>. For incentives of countries to introduce domestic space laws, see Irmgard Marboe & Karin Traunmuller, *Small Satellites and Small States: New Incentives for National Space Legislation*, 38 J. SPACE L. 289 (2012).

182. While the United States, Luxembourg, U.A.E., and Japan have legislated to explicitly allow space mining, the international consensus on this is unclear.

encourage such innovation.¹⁸³ Further, rapid technological development means that regulators have to address new innovations before policymakers can decide on appropriate legislation. States must be careful to ensure that laws do not stymie innovation in an area that holds much promise.

Most jurisdictions are aware of the promise of New Space and are seeking to foster innovation. For instance, the E.U.'s 2021 space strategy aims to foster space entrepreneurship with its entrepreneurship initiative (CASSINI) making a €1 billion investment in New Space.¹⁸⁴ Innovation hubs and regulatory sandboxes in New Space would help achieve such innovation, while also addressing risks, as was the case in the fintech sector. Although the idea of regulatory sandboxes has not been proposed by policymakers or academics in the space sector so far, Helena Correia Mendonça—a lawyer based in Portugal—has made out a case for it.¹⁸⁵ As she has rightly argued, a regulatory sandbox would be beneficial to nurture and regulate the New Space sector.¹⁸⁶ She has further explained that the legal framework for New Space activities being under-developed, coupled with the fact that technological advancements in the space sector have implications beyond space law, make the case for a regulatory sandbox even more compelling.¹⁸⁷ Such a sandbox would help assess “the best routes for new smart legal frameworks.”¹⁸⁸

While countries with smaller New Space activity can consider innovation hubs, countries like Luxembourg, which probably has the most thriving space industry in Europe,¹⁸⁹ would find regulatory sandboxes useful. Even countries with a fledgling New Space sector can opt for a regulatory sandbox, or a mixed model consisting of an innovation hub and a sandbox, in order to provide a positive signal to the industry. Typically, regulatory sandboxes are set up for a certain period

183. See e.g., Mercedes Ruehl, *Companies vie to develop ways to dispose of space junk*, FIN. TIMES (Apr. 10, 2019), <https://www.ft.com/content/fe4e89a0-5b51-11e9-939a-341f5ada9d40>.

184. Martin Banks, *Europe can become an innovative space technology hub, says Thierry Breton*, PARLIAMENT, POL., POL'Y & PEOPLE MAG. (Jan. 15, 2021), <https://www.theparliamentmagazine.eu/news/article/europe-can-become-a-innovative-space-technology-hub-says-thierry-breton>.

185. Helena Correia Mendonça, *Regulatory Sandboxes Spur Innovation in the Space Sector*, VIA SATELLITE (Oct. 16, 2020), <http://interactive.satellitetoday.com/regulatory-sandboxes-spur-innovation-in-the-space-sector/>.

186. *Id.*

187. *Id.*

188. *Id.*

189. Elie Dolgin, *The New Capital of the Private Space Industry*, SCI. AM. (May 15, 2017) <https://www.scientificamerican.com/custom-media/luxembourgs-innovation-is-out-of-this-world/the-new-capital-of-the-private-space-industry/>.

of time; it would be up to domestic regulators to decide the term of such sandboxes. It would also be up to each country's strategic priorities and strengths to identify the types of space activity that will be eligible to access the sandbox. Such sandboxes would help regulators design smart regulation that addresses the gaps in current laws. The terms of entry into the sandbox could also require companies to make efforts to operate sustainably and to identify risks that become evident along the way. This would create a feedback loop from the industry to those regulatory authorities.¹⁹⁰ Eventually, the knowledge gained by space regulators could be used in broader policy discussions about how other areas of law (data protection, confidentiality, insurance, dispute resolution, etc.) should apply to the use of space technologies.

To some extent, many countries have already started experimenting with space regimes/policies that do not qualify as formal sandboxes. For example, the New Zealand space regime learnt from and responded to the operations of Rocket Lab, the subsidiary of a U.S. company, in New Zealand by incorporating specific terms relating to the export of technology.¹⁹¹ Domestic legislation for the sector in many countries is set out in broad terms so as to be enabling.¹⁹² Secondary legislation and space agencies would then have to set out more specific rules as and when necessary.¹⁹³ Regulatory sandboxes could help formulate optimal rules, based on appropriate information and practical feedback from the industry.

Further, regulators (space agencies) often see one of their roles as that of assisting entrepreneurs. For instance, the European Space Agency's (ESA) new chief, Josef Aschbacher, has spoken of opening up ESA's expertise to start-ups in Europe.¹⁹⁴ The U.A.E. Space Agency has already launched an innovation hub that aims to allow start-ups to access relevant facilities and networks of investors.¹⁹⁵ The U.K. has recently launched a campaign that seeks to find solutions to "major space

190. Jeff Foust, *Space industry seeks continued progress on regulatory reform*, SPACE NEWS (Oct. 30, 2020), <https://spacenews.com/space-industry-seeks-continued-progress-on-regulatory-reform/>.

191. Joel Lisk & Melissa de Zwart, *Watch this Space: The Development of Commercial Space Law in Australia and New Zealand*, 47 FED. L. REV. 444, 447-48 (2019).

192. For a discussion of the UK legislation see Alexander Simmonds, *The Space Industry Act 2018: A Giant Leap?*, 24 COVENTRY L.J. 95, 99 (2020).

193. *Id.*

194. Peggy Hollinger & Clive Cookson, *Europe's new space chief is on a mission to reinvigorate the agency*, FIN. TIMES (Apr. 25, 2021), <https://www.ft.com/content/abf65e88-9d51-4bef-9769-1e9eeca2b7ee>.

195. *UAE Space Agency and Krypto Labs Launch UAE New Space Innovation Programme*, SPACEWATCH GLOBAL, <https://spacewatch.global/2020/01/uae-space-agency-and-krypto-labs-launch-uae-new-space-innovation-programme/> (last visited Mar. 18, 2022).

hurdles” and also provide seed funding for such ventures.¹⁹⁶ A regulatory sandbox aimed at such new ventures could also reduce barriers to entry.

Now that space regulators are realizing the value of promoting innovation in the New Space sector, they can learn from the regulatory sandboxes that were widely adopted in the fintech sector. It is also important for national (and regional, in the case of the ESA) space agencies to not only set up sandboxes, but to also build regulatory sandbox bridges with space agencies of other countries, again along the lines of what we have seen in the fintech sector. This will create incentives for cooperation and sustainable practices along the lines of what countries have agreed to in international space treaties. Like in fintech, one could imagine various space agencies entering into regulatory sandbox bridges to allow firms of one country to operate in the markets of the other country. Additionally, such bridges can facilitate agreement on other mutually beneficial issues that are currently unregulated, like the rescue and return of astronauts and spacecraft.¹⁹⁷ We could imagine the MoU setting up the sandbox bridge to include a term about space tourism companies needing to take reasonable measures to rescue personnel of other companies (registered in the signatory countries) in case of distress. Regulatory sandbox bridges may in fact serve to clarify and bring a more practical consensus to issues that remained unresolved in international treaties.

The Artemis Accords provide a helpful set of principles that contemplate commercial activity within its paradigm of collaboration between states. However, they do not address specific issues relevant to regulating the New Space sector. As Mike Gold, a former NASA official, specifically emphasized in a recent talk, the Artemis Accords were government-to-government agreements and more specific rules will be required in each country to govern the private sector.¹⁹⁸ Thus, it will be the role of domestic legislation to device specific rules and update them when there are technological innovations. However, the law-making process in most countries is too slow to keep up with innovation in this field. Regulatory sandboxes are thus extremely appropriate at this time of high innovation in this sector.

196. *Finding next-gen space tech: DASA launches the Space to Innovate Campaign*, GOV.UK (June 16, 2021), <https://www.gov.uk/government/news/finding-next-gen-space-tech-dasa-launches-the-space-to-innovate-campaign>.

197. See *supra* Part 1.

198. Space Court Found., *Artemis Accords and the Future of Space Governance (Special Guest: Mike Gold) | SCFVideo3*, YOUTUBE (Aug. 27, 2020), <https://youtu.be/Hnl6cP3ACRc?t=1440>.

Further, not all spacefaring nations are signatories to the Artemis Accords.¹⁹⁹ NASA's agreement with ESA suggests that even countries that are not signatories to the Accords may find it useful to collaborate on specific issues.²⁰⁰ Similarly, agreements between various space agencies show that a model similar to sandbox bridges used in fintech might be starting to develop. This must be fostered in order to ensure that New Space may evolve in a manner that is useful and also sustainable. When the private players collaborate across jurisdictions, there will be benefits to both big industry players (like SpaceX, Blue Origin, etc.), since new markets would become more easily accessible, and smaller companies and start-ups in other jurisdictions that would be able to collaborate with these large players. Such collaborations across countries, particularly those that collaborate with both the United States on the one hand and Russia and China on the other, would create economic interdependencies and reduce the likelihood of tensions.

V. ARE REGULATORY SANDBOXES FOR NEW SPACE SAFE?

Taking lessons from the fintech space also means that concerns emerging out of that model should be heeded when adapting it to the space sector. With fintech, the issues revolve around balancing consumer protection and financial stability with enabling innovation and competition. In the space sector, there is a general concern about ensuring that all space activity is conducted sustainably.²⁰¹ It is therefore important for regulatory sandboxes to incorporate sustainability safeguards. Since the Artemis Accords already incorporate principles of sustainability, we can expect that regulators will continue to prioritize this in domestic and cross-border sandboxes. As Allen has noted, a cross-border sandbox, like the GFIN, will prevent a race to the bottom, since jurisdictions that deviate too much might not be included in such an initiative.²⁰²

Further, as Allen has said in the fintech context, companies, particularly in newer industries, require social legitimacy to succeed.²⁰³ Anecdotal evidence suggests that companies in the space sector are making voluntary efforts to ensure that their activities are sustainable. For instance, SpaceX has begun to voluntarily address the issue of orbital light pollution (caused when objects orbiting the earth reflect and scatter

199. See Foust, *supra* note 118.

200. See *Positive signs for Europe as ESA goes forward to the Moon*, *supra* note 123.

201. See *supra* note 182 and accompanying text.

202. See Allen, *Sandbox Boundaries*, *supra* note 176-179 and accompanying text.

203. See Allen, *supra* note 176.

sunlight, thus interfering with astronomers' observations)²⁰⁴ by giving satellites a less reflective coating.²⁰⁵

The mission statements articulated by some big corporate players in New Space also suggest that these companies are indeed seeking social legitimacy and support for what is still a new field. The mission statements of five companies—the big three from the United States along with a German and a UK company—are discussed below to assess their efforts to gain social legitimacy. SpaceX's mission statement is personally articulated by its founder as follows:²⁰⁶

You want to wake up in the morning and think the future is going to be great - and that's what being a spacefaring civilization is all about. It's about believing in the future and thinking that the future will be better than the past. And I can't think of anything more exciting than going out there and being among the stars.

Virgin Galactic's mission statement in 2020 read as follows:²⁰⁷

Our mission, to be the Spaceline for Earth, means we focus on using space for good while delivering an unparalleled customer experience.

We recognize that improving access to space is a fundamentally challenging ambition. We will achieve it only in a spirit of collaboration and with a recognition that we must continually learn and can always improve.

The mission statement on the website, in 2022, has been updated as follows: "We are the world's first commercial spaceline and our purpose is to connect people across the globe to the love, wonder, and awe created by space travel."²⁰⁸ The updated statement perhaps reflects the fact that Virgin Galactic has now already 'accessed space.'²⁰⁹

204. Mark Strauss, *Orbital Debris Creates a New Problem: Light Pollution*, AIR & SPACE MAG. (June 2021), <https://www.airspacemag.com/space/bright-lights-big-problem-180977824/>.

205. Clive Cookson, *Private sector navigates outer space ahead of international law*, FIN. TIMES (Jan. 13, 2020), <https://www.ft.com/content/73145372-1b74-11ea-81f0-0c253907d3e0>.

206. SPACE X, <https://www.spacex.com/mission/> (last visited Dec. 15, 2020).

207. *Virgin Galactic Mission, Vision & Values*, COMPARABLY, <https://www.comparably.com/companies/virgin-galactic/mission> (last visited Apr. 11, 2022).

208. VIRGIN GALACTIC, <https://www.virgingalactic.com/> (last visited Apr. 11, 2022).

209. Kim Lyons & Joey Roulette, *Virgin Galactic spaceplane VSS Unity completes successful flight*, THE VERGE (May 22, 2021, 5:51 PM), <https://www.theverge.com/2021/5/22/22448928/virgin-galactic-spaceplane-vss-unity-space-branson>.

Blue Origin's core mission statement is articulated succinctly in Latin as *graditum ferociter*, which is translated as "step by step, ferociously."²¹⁰ The more detailed mission statement is as follows:²¹¹

We are not in a race, and there will be many players in this human endeavor to go to space to benefit Earth. Blue's part in this journey is building a road to space with our reusable launch vehicles, so our children can build the future. We will go about this step by step because it is an illusion that skipping steps gets us there faster. Slow is smooth, and smooth is fast.

UK company, OneWeb, has the following message on its website:

OneWeb exists to raise the barriers to connectivity that are holding economies and communities back.

A digital divide persists, with three billion people around the world denied access to reliable terrestrial infrastructure. Going digital is a stepchange that divides many more, on the basis of affordability, speed, reliability, and digital literacy. Rural or hard to reach communities especially cannot access the broadband connectivity (min 25Mbps) that others rely on for interactive, simultaneous communications at work, at school, for health, or for home.

Even though this is not labelled as a mission statement, it is clearly on the same lines as the mission statements of the other companies discussed above.

Although a mission statement is not legally binding, it tells us about the company's business, future goals, and its approach to achieving those goals.²¹² Such mission statements, or "mission-purpose" statements as Professors David Kershaw and Edmund Schuster term them, offer companies a means to bond with their stakeholders, particularly customers.²¹³ Sometimes the statement can offer customers a "shared ethical and identity-forming" purpose.²¹⁴ This is particularly the case with new technologies, such as fintech or even social media companies like Facebook and Twitter at a time when those ideas were new. Companies in the New Space sector are not only offering customers the dream of new technology; they are also offering them a sense of

210. BLUE ORIGIN, <https://www.blueorigin.com/our-mission> (last visited Dec. 15, 2020).

211. *Id.*

212. Graham Kenny, *Your Company's Purpose Is Not Its Vision, Mission, or Values*, HARV. BUS. REV. (Sept. 3, 2014), <https://hbr.org/2014/09/your-companys-purpose-is-not-its-vision-mission-or-values>; *Mission and Vision Statements*, BAIN & CO. (Apr. 2, 2018), <https://www.bain.com/insights/management-tools-mission-and-vision-statements/>.

213. David Kershaw & Edmund Schuster, *The Purposive Transformation of Corporate Law 2* (European Corp. Governance Inst., Working Paper No. 616/2021, 2021), https://ecgi.global/sites/default/files/working_papers/documents/kershawschusterfinal.pdf.

214. *Id.* at 13.

adventure and possibility. This is obvious from all five mission statements discussed above but particularly so with SpaceX because its sole message is that it is going to do something special (make us a spacefaring civilization).²¹⁵ Virgin Galactic wants to make it clear that it wants to use space “for good”²¹⁶ and Blue Origin indirectly echoes this sentiment when it says its activities in space should “benefit earth” and that it will go about its goals in a “step by step” manner and will not skip steps.²¹⁷

It would seem that Allen’s observations about fintech companies seeking social legitimacy are also true in New Space. In fact, New Space companies may be going beyond bonding with customers. Their talk of responsible space and future generations in the mission statements seem to also be aimed at the broader policy discourse on the sustainable use of space. Thus, these companies are seeking out customers with the promise of an exciting journey on the one hand, while also noting that it will be for “the good” and to “benefit earth” on the other hand. In other words, they are promising Responsible Space, thus speaking to the criticism leveled against corporate activity in space and suggesting that the criticism is unwarranted.

Regulatory sandboxes and sandbox bridges would help regulators promote research that helps make outer space activity more sustainable while also allowing them to slowly incorporate minimum standards into bilateral agreements, MoUs, and consequently domestic regulations. The existence of multilateral agreements setting out broad principles, complemented by regulatory sandboxes and sandbox bridges, would further incentivize and guide companies in the New Space sector to anticipate regulations as per the principles set out and act responsibly. As Professor Armour explains, firms engaging in such anticipatory compliance (or “forward compliance” as he calls it) “will stand a far better chance of weathering any subsequent reputational storm, as the internal communications that emerge will show the firm grappling proactively with the problem rather than seeking to bury it.”²¹⁸

Finally, the collaboration between countries via sandbox bridges will also increase cross-border investments, which could provide incentives for countries to restrict themselves to peaceful uses of outer space. The current controversies relating to the Moon Agreement and the Artemis Accords suggest that an international treaty for the New

215. SpaceX, *supra* note 206.

216. Virgin Galactic, *supra* note 207.

217. Blue Origin, *supra* note 210.

218. John Armour, *The Case for ‘Forward Compliance’*, 34 BRITISH ACAD. REV., Autumn 2018, at 19.

Space sector is not likely in the near future. Even if a new international treaty is agreed upon, it would only set out very broad principles and it would then be left up to domestic laws to regulate the rapidly evolving sector. The model proposed in this Article, inspired by the regulation of the fintech sector, would be most suitable.

VI. CONCLUSION

This Article has argued that regulatory sandboxes, as used in fintech, would be suitable and safe for the current needs of New Space. Further, it has argued that regulatory sandbox bridges between different jurisdictions can help build international consensus on several issues, including sustainability standards. Such a model could eventually lead to a multi-state, and possibly even international, monitoring system that deploys regtech to monitor and enforce corporate space activity. The proposed model can be adapted to each jurisdiction's needs based on specific factors identified in the Article. Ultimately, the proposals outlined in this Article are not meant to supplant international law, but rather to complement and perhaps even help shape future international law efforts.