GOVERNANCE OF SPACE RESOURCES ACTIVITIES: IN THE WAKE OF THE ARTEMIS ACCORDS*

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ABSTRACT

This Article consists of three body Sections. Section II deals with the detailed examination of the whole picture of the Artemis Accords of 2020 in light of the existing U.N. space-related treaties and resolutions. Section III analyzes the legal issues arising from space resources activities in depth. In Section III, we focus on the interpretation of the "non-appropriation" principle as provided in Article 2 of the Outer Space Treaty and the relevant provisions of the Moon Agreement with reference to each of their drafting histories. As a result, we emphasize therein that a whole range of legal issues triggered by the space resources activities cannot be reduced to the question of whether they are legal or illegal under existing international space law, but the problem of determining whether such activities can satisfy "substantial reasonableness of their consequence." In other words, it is the prevention from adverse ramifications of such activities that counts. In Section IV, we observe the ongoing discussions at the Legal Sub-Committee of the UNCOPUOS and examine the domestic laws of the United States, Luxembourg, the U.A.E., and Japan as well as academic recommendations, including the Hague Building Blocks, the Vancouver Recommendations, and inputs from civil society, in the context of space governance. Finally, we conclude that it depends on two things to produce a multinational framework of any form, irrespective of its legally binding force: first, the values and wisdoms of the stakeholders about outer space per se, and second, the political momentum playing out at the relevant forum whether the

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Artemis Accords as a bottom-up approach can take hold in the international community or the debate taking place at the UNCOPUOS.

I. Introduction

On October 13, 2020, the United States, the U.K., Australia, Canada, Japan, Italy, Luxembourg, and the U.A.E. signed the Artemis Accords,[1] which represents a political commitment to a set of principles, guidelines, and best practices in carrying out the civil exploration and use of outer space. The signatories have increased to 20 countries as of June 7, 2022, including Ukraine, Korea, New Zealand, Brazil, Poland, Mexico, Israel, Romania, Bahrain, Singapore, Columbia, and France.[2] The

1. *See* Rossana Deplano, The Artemis Accords: Evolution or Revolution in International Space Law?, Int'l & Comparative Law. Qtr. 799 (July 1, 2021), https://www.cambridge.org/core/journals/international-and-comparative-law-quarterly/article/artemis-accords-evolution-or-revolution-in-international-space-law/DC08E6D42F7D5A971067E6A1BA442DF1. *See* The Artemis Accords: Principles For Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes, *opened for signature* Oct. 13, 2020, https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf [hereinafter The Accords].

2. Ukraine signed the Accords on November 12, 2020. *Ukraine Becomes the 9th Country to Sign the Artemis Accords*, U.S. Embassy in Ukr. (Nov. 17, 2020), https://ua.usembassy.gov/ukraine-becomes-the-9th-country-to-sign-the-artemis-accords/; Korea signed on May 24, 2021. *See* Park Si-soo, *South Korea signs Artemis Accords; Brazil, New Zealand likely next*, SpaceNews (May 27, 2021), https://spacenews.com/south-korea-signs-artemis-accords/; New Zealand signed on May 31, 2021. See Jeff Fast, *New Zealand signs Artemis Accords*, SpaceNews (June 1, 2021), https://spacenews.com/new-zealand-signs-artemis-accords/. Brazil already signed the Joint Declaration of Intent with NASA at the virtual conference which was held on December 14, 2020, and reportedly intended to become the first signatory to the Accords in South America. As late as June 15, 2021, Brazil at last signed the Accords. Jeff Fast, *Brazil joins Artemis Accords*, SpaceNews (June 16, 2021), https://spacenews.com/brazil-joins-artemis-accords/; *Poland Signs Artemis Accords at IAC*, NASA (Oct. 26, 2021), https://www.nasa.gov/feature/poland-signs-artemis-accords-at-iac; *Mexico joins Artemis Accords*, SpaceNews (Dec. 10, 2021), https://spacenews.com/mexico-joins-artemis-accords/; *Israel Signs Artemis Accords*, NASA (Jan. 27, 2022), https://www.nasa.gov/feature/israel-signs-artemis-accords; *Romania Signs Artemis Accords*, NASA (Mar. 1, 2022), https://www.nasa.gov/feature/romania-signs-artemis-accords; *Bahrain Signs Artemis Accords*, NASA (Mar. 7, 2022), https://www.nasa.gov/press-release/bahrain-signs-artemis-accords; *Singapore Signs Artemis Accords*, NASA (Mar. 29, 2022), https://www.nasa.gov/feature/singapore-signs-artemis-accords; *NASA Welcomes Vice President of Columbia for Artemis Accords Signing*, NASA (May 10, 2020), https://www.nasa.gov/feature/nasa-welcomes-vice-president-of-colombia-for-artemis-accords-signing; *France Signs Artemis Accords as French Space Agency Marks Milestone*, NASA (June 7, 2022), https://www.nasa.gov/feature/france-signs-artemis-accords-as-french-space-agency-marks-milestone. Interestingly enough, the Isle of Man, a self-governing British Crown Dependency with population of less than 100,000, at 221 square miles, sitting between England, Ireland, Scotland and Wales, reportedly joined the Accords in July, 2021, but the Island is counted out because the U.K. government, on behalf of the Crown, is ultimately responsible for its international relations.

United States negotiated the Accords bilaterally with each of the other countries involved. This mode of negotiation is very similar to that of the Memorandums of Understanding with each Partner under the 1998 International Space Station (ISS) Cooperative Agreement (so-called "Inter Inter-Governmental Agreement Agreement": IGA).[3] One reason that the United States bypassed multilateral fora such as the United Nations Committee on Peaceful Use of Outer Space (COPUOS) is that such a forum was perceived as time-consuming to finalize an agreement. In other words, there was a perceived sense of urgency because of the expected landing of humans on the Moon by 2024. Another is that the parties felt that an agreement needed to engage commercial entities (i.e., private companies), as well as non-state participants such as the National Aeronautics and Space Administration (NASA) of the United States or the Japan Aerospace Exploration Agency (JAXA). Prior to signing the Accords, Japan's Ministry of Education, Culture, Sports, Science and Technology entered into the Joint Exploration Declaration of Intent for Lunar Cooperation (JEDI)[4] with NASA, which outlines mutual contributions

Isle of Man: Island, Crown Possession, British Isles, BRITANNICA, https://www.britannica.com/place/Isle-of-Man (last visited Dec. 23, 2022); Cabinet Office, *Constitution*, GOV.IM, https://www.gov.im/about-the-government/departments/cabinet-office/external-relations/constitution/ (last visited Dec. 23, 2022). "It is a proactive measure, reinforcing the growing space economy on the Island," the Manx government says. They seem to believe signing up to the Accords has the potential to bring investment, employment or other opportunities to the Island. *Isle of Man Joins Artemis Accords*, SPACEWATCH EUR. (July 29, 2021), https://spacewatch.global/2021/07/isle-of-man-joins-artemis-accords/.

3. *See generally* Agreement Among the Government of Canada, the Government of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States Concerning Cooperation on the Civil International Space Station, Jan. 29, 1998, T.I.A.S. No. 12,927.

4. *See generally* Joint Exploration Declaration of Intent for Lunar Cooperation between the Ministry of Education, Culture, Sports, Science, and Technology of Japan and the National Aeronautics and Space Administration of the United States of America, Japan-U.S., July 10, 2020 [hereinafter JEDI], https://www.mext.go.jp/content/20200714-mxt_uchukai02-000008680_1.pdf. The JEDI classifies Japanese contributions into two categories: one is cooperation on the ISS and the Gateway, the other is cooperation on lunar surface exploration. *Id.* The former is to supply components for the Gateway's Habitation and Logistics Outpost (HALO), such as power components, to provide equipment and components, including the Environmental Control and Life Support System, batteries, and thermal control pumps to the Gateway's International Habitation Module (I-Hab), and to demonstrate enhanced HTV-X resupply capability and docking technology in order to explore possibilities for cargo transportation services to the ISS and the Gateway. *Id.* § 1. The latter is to discuss installing NASA payloads on JAXA's Smart Lander with NASA, to refine concepts for Japanese pressurized crew rover capability and to develop an arrangement to define the specifics regarding opportunities for lunar surface mobility systems, surface operations, and Japanese crew on the lunar surface, together with NASA. *Id.* § 2. For the

to be made with respect to the Artemis Plan. Leveraging its experience with ISS, Canada also declared to provide the Canadarm3 robotic arm to be used for the Lunar Gateway ("Gateway") as a multi-purpose outpost orbiting the Moon.[5] The size of the Gateway is about one-sixth of ISS. Besides, the European Space Agency (ESA), non-signatory to the Accords, entered the Memorandum of Understanding on Corporation[6] only for the purpose of establishment of the Gateway with NASA, after the date of signature of the Accords.

The signatories to the Accords, as described in the preamble, "[usher] in a new era of exploration, more than 50 years after the historic Apollo 11 Moon landing and more than 20 years after the

avoidance of doubt, the details are to be clarified going forward through future implementing arrangements between NASA and the government of Japan to be governed by the ISS-IGA as for the former and will be disclosed through similar arrangements as for the latter as well. *Id.* § 3.

5. Furthermore, NASA and the Canadian Space Agency (CSA) finally agreed to fly Canadian astronauts on board the Gateway. Jeff Foust, *Canadian Astronaut to Fly on First Crewed Artemis Mission*, SPACENEWS (Dec. 16, 2020), https://spacenews.com/canadian-astronaut-to-fly-on-first-crewed-artemis-mission/.

6. Memorandum of Understanding Between the National Aeronautics and Space Administration of the United States of America and the European Space Agency Concerning Cooperation on the Civil Lunar Gateway, Oct. 22, 2020, T.I.A.S. No. 20,1027. According to the MOU, ESA as a whole will contribute to providing an enhanced lunar communication system, an additional habitation element, a refueling capability to the Gateway and "two more European service modules for future Orion spacecraft." Jim Bridenstine, *NASA, ESA Sign MOU to Work Together on Artemis Lunar Program*, PARABOLIC ARC (Oct. 27, 2020), http://parabolicarc.com/2020/10/27/nasa-esa-sign-mou-to-work-together-on-artemis-lunar-program/. In return for such cooperation, "ESA will receive three flight opportunities for European astronauts to travel to and work on the Gateway." *Gateway MoU and Artemis Accords – FAQs*, ESA, https://www.esa.int/Science_Exploration/Human_and_Robotic_Exploration/Gateway_MoU_and_Artemis_Accords_FAQs (last visited Nov. 22, 2022). Nevertheless, the reason that ESA backs away from its participation in the Accords is reportedly that it prefers the Moon Agreement, wants the U.N.-centered official negotiations and hopes to wait and see how other countries view the Accords moving forward. *See generally* Kai-Uwe Schrogl, *We Must Not Overrate the Artemis Accords*, SPACEWATCH EUR. (Nov. 3, 2020), https://spacewatch.global/2020/11/spacewatchgl-interviews-kai-uwe-schrogl-we-must-not-overrate-the-artemis-accords/; Christopher J. Newman, *#SPACEWATCHGL Opinion: The Artemis Accords and Lunar Exploration – Revolution and Evolution*, SPACEWATCH EUR. (Oct. 13, 2020), https://spacewatch.global/2020/10/spacewatchgl-opinion-the-artemis-accords-and-lunar-exploration-revolution-and-evolution/; Jeff Foust, *NASA-ESA agreement a milestone in efforts to develop Artemis international partnerships*, SpaceNews (Oct. 30, 2020). It should be noted in passing that ESA's present member states are Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, The Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom (a total of 22 countries). "Further to the 22 Member States, also Canada, Latvia, Lithuania, Slovakia, and Slovenia based on their agreements with ESA, qualify to fully participate in the programmes of the ESA Education Office." *ESA Member States, Canada, Latvia, Lithuania, Slovakia and Slovenia*, ESA, https://www.esa.int/Education/ESA_Member_States_Canada_Latvia_Lithuania_and_Slovenia (last visited Oct. 31, 2022).

establishment of a continuous human presence aboard the International Space Station." The Artemis Plan intends to land the first woman and next man on the surface of the Moon, 250,000 miles away from the Earth, by 2024 and enable the sustainable human exploration of the solar system including Mars, 140,000,000 miles away from the Earth, harnessing the civil partners' participation.[7] The goal itself of constructing a lunar base and flying humans to the Mars was included as part of the long-term vision of the U.S. National Space Council[8] in the early 1990s, but it did not become full-fledged as a specific NASA mission before former President Donald Trump, in his space policy directive-1 of December 11, 2017, called for the United States to return to the Moon and prepare for a Mars mission through partnerships with the space industry.[9]

The Accords officially endorse the extraction of space resources for the first time, an issue which has remained controversial at the COPUOS level. The Moon Agreement[10] adopted by consensus at the COPUOS in 1979, however, designates the Moon and its resources as common heritage of mankind (CHM). Although very few countries ratified or acceded to the Moon Agreement, Australia, and more recently Mexico, joined both the Artemis Accords and the Moon Agreement. They may have to clarify how the two instruments may co-exist. Tronchetti and Liu in their article point out several inconsistencies between the provisions of both instruments, which may create tensions between Australia and the other parties to the Agreement and may place the country into uncomfortable spots in international

7. *See* Artemis Plan: Nasa's Lunar Exploration Program Overview 9, NASA (2020), https://www.nasa.gov/sites/default/files/atoms/files/artemis_plan-20200921.pdf.

8. The Council is an interagency body within the White House created in 1989 to coordinate space policy across the federal government. The vice president chairs the Council. This body was once disbanded in 1993, but reestablished in 2017. *See* National Aeronautics and Space Administration Authorization Act of 1989, Pub. L. No. 100-685, § 501, 102 Stat. 4083, 4102 (codified as amended at 51 U.S.C. § 20111 note The National Space Council); Exec. Order No. 14056, 86 Fed. Reg. 68871 (Dec. 1, 2021) (amending § 501 of National Aeronautics and Space Administration Authorization Act after the Council was reestablished in 2017).

9. Presidential Document Memorandum No. 2017-27160, 82 Fed. Reg. 59501 (Dec. 11, 2017). The Artemis Plan will be carried out in a three-phased manner. The first phase is to test unscrewed flights to and from the Moon and the Earth by using the world's largest rocket (Space Launch System: SLS) and the Orion spacecraft (Artemis I mission). The second phase is to test crewed flights (Artemis II mission). And the third phase is to land humans on the Moon in 2024 as scheduled (Artemis III mission). For further details, see Artemis Plan: Nasa's Lunar Exploration Program Overview , *supra* note 7, at 14–25.

10. Article 11 of the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, U.N. G.A. Res.A/34/68 (Dec. 5, 1979), 1363 U.N.T.S. 3 [hereinafter The Moon Agreement]. The member states to the Agreement are only 18 as of January 2021.

forums.[11] Therefore, they conclude that "it would be advisable for Australia to clarify its position and address the issues arising from Australia's simultaneous" participation in both instruments and thereby to prevent unnecessary disagreements with third countries.[12]

The Accords are open to countries other than original signatories, but spacefaring nations such as Russia and China have not expressed an interest in joining the Accords at this point in time. For example, the Russian Space Agency (Roscosmos) criticized the lunar Gateway as "too U.S.-centric," but said that if the principles of international cooperation such as collective decision-making are adopted like the ISS agreement, then Roscosmos could "also consider its participation."[13] While in a bleak tone China's media liken the Accords to the British Enclosure Movement of the Middle Age,[14] a China Foreign Ministry spokesperson commented on the Accords, expressing the view that they are in favor of discussions with respect to the legal regime of exploration of space resources, which will take place at the United Nations forum.[15] The critical comment from China seems to be caused by its different approach to the international regulation of space resources

11. Fabio Tronchetti & Hao Liu, *Australia's Signing of the Artemis Accords: A Positive Development or a Controversial Choice?*, 75 AUSTL. J. INT'L AFF. 243, 246–48 (2021).

12. *Id.* at 249.

13. Jeff Foust, *Russia Skeptical About Participating in Lunar Gateways*, SPACENEWS (Oct. 12, 2020), https://spacenews.com/russia-skeptical-about-participating-in-lunar-gateway/. Roscosmos, however, reportedly later entered into a memorandum of understanding on "cooperative construction of an international lunar research station" with China. Andrew Jones, *China, Russia Enter MOU on International Lunar Research Station*, *SpaceNews* (Mar. 9, 2021), https://spacenews.com/china-russia-enter-mou-on-international-lunar-research-station/. Unfortunately, its details are not yet released as of this writing. On June 16, CNSA and Roscosmos presented the new roadmap to the project which outlines three separate development phases expected to be carried out by both agencies with potential international public and commercial partners in the next two decades. Both space agencies invited international partners to participate. European countries will discuss their ambitions in lunar exploration and approach to international cooperation at the next ESA Ministerial Council in 2022. *Policy & Programmes*, 17 EUR. SPACE POL'Y INST. INSIGHTS 2, 4 (2021).

14. Elliot Ji et al., *What Does China Think About NASA's Artemis Accords?*, THE DIPLOMAT (Sept. 17, 2020), https://thediplomat.com/2020/09/what-does-china-think-about-nasas-artemis-accords/.

15. *See* Zhao Lijian, Foreign Ministry Spokesperson, China, Press Conference (Oct. 15, 2020), https://www.fmprc.gov.cn/mfa_eng/xwfw_665399/s2510_665401/2511_665403/202010/t20201015_693418.html. In the same vein, "All in all, it's no doubt that the Accords seek a multilateral recognition of international rules and principles beyond the framework of UN [sic], through reaching some bilateral agreements . . . . [I]t's still a high risk to make countries more divided in legal opinions rather seek [sic] a united space law," Associate Professor Guoyu Wang, deputy director of Institute Space Law at Beijing Institute of Technology (China), says. Guoyu Wang, *NASA's Artemis Accords: The Path to a United Space Law or a Divided One?*, THE SPACE REV. (Aug. 24, 2020), https://www.thespacereview.com/article/4009/1.

activities. In any event, there is little chance that China will participate in the Accords, given the fact that space cooperation is presently banned by U.S. legislation (the "Wolf Amendment").[16] Some U.S. international lawyers, however, opine that the U.S. government should look for a way forward to cooperate with China, in light of China's fast growth in space capacity and technology as evidenced by its success in landing on the Moon and returning its samples to the Earth (e.g., the Moon mission of Chang'e 5 in 2020). According to this opinion, to do so, the U.S. government should turn around to direct a U.N.-centered regulatory approach, instead of isolating China; prevent countries from engaging in a "race to the bottom" in order to gain a competitive advantage, absent international standards; and tackle a common agenda together with China.[17]

France and Germany as member states of ESA joined in the architecture of the Gateway as part of the Artemis Plan, but France did not sign the Accords until quite recently, and Germany is still a non-signatory.[18]

16. The Wolf Amendment was first introduced to the U.S. Congress to add an amendment to an appropriations bill in 2011 by former Rep. Frank Wolf (R-VA), for the purpose of prohibiting cooperation in space programs with China. The principal concerns lie in the links that the Chinese space program maintains closely with the Chinese People's Liberation Army. The amendment has perpetuated and continues to be included in the annual appropriations bill. *See* Mathilde Minet, *Understanding the Wolf Agreement*, SPACE LEGAL ISSUES (Oct. 25, 2020), https://www.spacelegalissues.com/understanding-the-wolf-agreement/ [perma.cc/B8U9-HFEW]; Makena Young, *Bad Idea: The Wolf Amendment (Limiting Collaboration with China in Space)*, DEFENSE360° (Dec. 4, 2019), https://defense360.csis.org/bad-idea-the-wolf-amendment-limiting-collaboration-with-china-in-space/; Jeff Foust, *Eight Countries Sign Artemis Accords*, SPACENEWS (Oct. 13, 2020), https://spacenews.com/eight-countries-sign-artemis-accords/. The amendment, however, does not totally ban the collaboration with China, but has a few exceptions. According to section 530(c) of the House appropriations bill for FY2019 to 2020, the prohibitions may be lifted where NASA, OSTP or NSC, after consultation with the FBI, have certified that space programs with China "(1) pose no risk of resulting in the transfer of technology, data, or other information with national security or economic security implications to China or a Chinese-owned company; and (2) will not involve knowing interactions with officials who have been determined by the United States to have direct involvement with violations of human rights." Consolidated Appropriations Act of 2019, Pub. L. 116-6, 113 Stat. 13 (codified as amended in scattered titles and sections of U.S.C.). Practically, in 2019, NASA cooperated with CNSA in monitoring a lander and land rover with respect to the Chinese Chang'e 4 mission under the Wolf Amendment. *See* Young, *supra* note 16.

17. Anne-Marie Slaughter & Emily Lawrence, *The US and China Must Cooperate in Space*, THE STRATEGIST (Feb. 1, 2021), https://www.aspistrategist.org.au/the-us-and-china-must-cooperate-in-space/.

18. ESA is neither an internal organ of the E.U. nor subject to the E.U. law and includes non-member states of the E.U. such as Norway, Switzerland and the U.K. But ESA's space programs receive funds also from the E.U., let alone from ESA member states. The E.U. space diplomacy has adopted a long-standing policy of "strategic autonomy." The E.U. Space Diplomacy is only as strong as unity between E.U. member states. In this respect, there are notable divisions between

The reason that these countries were skeptical or hesitant about their participation in the Accords is presumed to be that they tended to prefer the Moon Agreement and hoped to see a properly negotiated treaty governing lunar exploration.[19] France and India have yet to ratify the Moon Agreement, but are signatories to it. Pursuant to Article 18(a) of the Vienna Convention on the Law of Treaties (VCLT),[20] a signatory to a treaty is obliged to refrain from acts that would defeat the object and purpose of a treaty until it shall have made its intention clear not to become a party to the treaty. This obligation, however, no longer applies to signatories to the Moon Agreement, since the obligation under Article 18 of the VCLT is interim by nature pending the entry into force of a relevant treaty as stipulated in the heading of Article 18, and the Moon Agreement took effect in 1984. The present rationale behind non-participation in the Artemis Accords by these three spacefaring countries seems to be not so much a legal one as one related to their space diplomatic strategy. The French government and its National Center for Space Studies (CNES), along with Germany (and its German Aerospace Center (DLR)), have played the leading role in decision-making of ESA. ESA, in the preparation of the space resources strategy, assumes that there is no international consensus regarding the legality of space resources utilization and exploitation under international law, nor are there international legal norms on the legal status of space resources or their governance.[21] Julien Mariez, chief of legal service, CNES, more clearly commented on the Artemis Accords, saying that "the formalization of common principles around an American center of gravity nevertheless constitutes a certain questioning of U.N. multilateralism, the U.N. space committee being so far the only forum for the development of international norms applicable to space activities."[22] His opinion was just personal, but somewhat echoed the then-

member states on how to utilize and view space. Such divisions leave the Union exposed to "divide and rule" strategies by third states. Daniel Fiott, *The European Space Sector as an Enabler of EU Strategic Autonomy*, at 35, Policy Department (Dec. 7, 2020), https://www.europarl.europa.eu/RegData/etudes/IDAN/2020/653620/EXPO_IDA(2020)653620_EN.pdf.

19. Christopher Newman, *Artemis Accords: Why Many Countries are Refusing to Sign Moon Exploration Agreement*, THE CONVERSATION (Oct. 20, 2020), https://theconversation.com/artemis-accords-why-many-countries-are-refusing-to-sign-moon-exploration-agreement-148134.

20. Vienna Convention on the Law of Treaties, Jan. 27, 1980, 1155 U.N.T.S. 331.

21. ESA SPACE RESOURCES STRATEGY, ESA18 (2019), https://sci.esa.int/documents/34161/35992/1567260390250-ESA_Space_Resources_Strategy.pdf.

22. Julien Mariez, *À Qui Appartiennent Mars, la Lune et Leurs Ressources Naturelles?* [*Who Owns Mars, the Moon and Their Natural Resources?*], THE CONVERSATION (July 16, 2020), https://theconversation.com/a-qui-appartiennent-mars-la-lune-et-leurs-ressources-naturelles-141406.

position of CNES. CNES, however, turned around and signed the Accords on June 7, 2022.

Germany, another major space player in both the ESA and EU, more explicitly asserts in its statement of 2019 at the 58th session of COPUOS-Legal Subcommittee (LSC) that as space resource utilization becomes feasible, only a multilateral legal framework can provide the necessary legal certainty and secure investments and that consequently, Germany supports the proposal for a Working Group for the Development of an International Regime for the Utilization and Exploitation of Space Resources.[23] India, for its part, basically has an affinity for the Moon Agreement. As early as 1974, when the COPUOS deliberated the daft Moon Agreement, India proposed that "[p]roperty in such samples shall vest in the United Nations,"[24] and reaffirmed that outer space is the CHM.[25] That does not mean that India sticks to all parts of the Agreement, but it values the spirit of the CHM principle. The Indian perspectives about the space resources mining are divergent. While some maintain the CHM principle or rather pursue a collective approach particularly at the COPUOS,[26] others, from the viewpoint of technological benefits and a potentially lucrative business, support the Indian participation in the Accords or suggest that India should withdraw from the Moon Agreement.[27] It is fair to say, however,

23. Gerhard Küntzle, Ambassador & Permanent Representative of Germany, Statement at the Opening of the 58th Session of the COPUOS Legal Subcommittee (Apr. 1, 2019), https://wien-io.diplo.de/iow-en/news/statement-rua3/2204900 [https://perma.cc/55KT-7MAK].

24. Draft Treaty Relating to the Moon, India-Nigeria, U.N. Doc. A/AC.105/C.2/L.97 (May 13, 1974).

25. RAJESWARI PILLAI RAJAGOPALAN ET AL., INDIA IN THE FINAL FRONTIER: STRATEGY, POLICY AND INDUSTRY (2020), https://www.orfonline.org/research/india-in-the-final-frontier-strategy-policy-and-industry-60834/.

26. V.S. Mani, *Mining of the Celestial Bodies and Need for International Regulations*, *in* SESSION 5: THE ACCEPTABILITY OF THE MOON AGREEMENT AND ROAD AHEAD? 305, 307–08 (McGill Univ., 2015), https://www.mcgill.ca/iasl/files/iasl/Moon-Proceedings-Part_5_2006.pdf (stating the failure of the Moon Treaty to attract ratifications was due to a number of non-legal reasons that inveigh - the minds of states while deciding to postpone ratification of a Treaty); SENJUTI MALLICK & RAJESWARI PILLAI RAJAGOPALAN, IF SPACE IS "THE PROVINCE OF MANKIND," WHO OWNS ITS RESOURCES? (2019), https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/ (stating it is imperative for nations to actively combine their efforts to ensure that this activity transpires in the most globally acceptable manner and not in one which stirs anarchism).

27. M. Ramish, *Why India Should Exit the Moon Agreement*, BUSINESSLINE (May 20, 2020), https://www.thehindubusinessline.com/news/science/why-india-should-exit-the-moon-agreement/article31634373.ece; Chaitanya Giri, *Artemis Accords Propel India's Space Ambitions*, GATEWAY HOUSE (May 12, 2020), https://www.gatewayhouse.in/indias-artemis-moon/ (stating that

that Indian space policy is not postured at present to enable India to take leadership regarding space-based resources.[28]

The United States, Luxembourg, the U.A.E., and Japan have already passed national legislation to prepare for the commercial exploitation of natural resources on the Moon and other celestial bodies in the coming years.[29] In 2016, the COPUOS also agreed to place on its agenda (i.e., agenda 14) the item "general exchange of views on potential legal models for activities in exploration, exploitation and utilization of space resources"[30] and still now continue the deliberations on the agenda. In addition, in January 2020, the Hague International Space Resources Governance Working Group, which was composed of 32 stakeholders from governments, the industry, and research institutes, published the final report entitled "Building Blocks for the Development of an International Framework on Space Resource Activities" ("Hague Building Blocks"),[31] co-sponsored by Leiden University Institute of Air and Space Law in the Netherlands and the consortium of other universities, research institutes and law firms, domestic or overseas. And in the same year, a workshop took place at the Peter Wall Institute for Advanced Studies at the University of British Columbia in Vancouver, Canada. Two dozen experts from governments, the industry and universities gathered at the workshop and declared the Vancouver Recommendations on Space Mining ("Vancouver Recommendations").[32]

Thus far, the legal issues arising from space resources activities have been discussed by a slew of authors, commentators, and negotiators and at various forums. How far have we come along in solving some of

based on its adherence to strategic autonomy of non-alignment policy, India need not conceptually side with any space grouping but should make pragmatic collaborations).

28. Peter Garretson & Namrata Goswami, *Is India Looking Towards Space-Based Resources?*, THE SPACE REV. (Oct. 2, 2017), https://thespacereview.com/article/3338/1.

29. U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat 704; *Loi A674 du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace* [*Law A674 of July 20, 2017 on the Exploration and Use of Space Resources*] (Fr.), *translated in* , 7093 J. OFFICIEL DU GRAND-DUCHÉ DE LUXEMBOURG, July 28, 2017, [hereinafter The Space Resources Act]; Federal Law No. 12 on the Regulation of the Space Sector Act of 2019(U.A.E.) [hereinafter U.A.E. Federal Law]; Japanese Act No. 83 on the Promotion of Business Activities for the Exploration and Development of Space Resources of 2021, https://www8.cao.go.jp/space/english/resource/application.html.

30. Comm. on the Peaceful Uses of Outer Space,, U.N. Doc. A/71/20, ¶ 212 (June 28, 2016).

31. BUILDING BLOCKS FOR THE DEVELOPMENT OF AN INTERNATIONAL FRAMEWORK FOR THE GOVERNANCE OF SPACE RESOURCE ACTIVITIES: A COMMENTARY (Olavo O. Bittencourt Neto et al., eds., 2020), [hereinafter Building Blocks].

32. OUTER SPACE INST., UNIV. OF B.C., VANCOUVER RECOMMENDATIONS ON SPACE MINING 2 (2020) [hereinafter Vancouver Recommendations].

these issues? Where are we heading, are we moving forward, and how should we tackle the new challenges? To answer these questions, this Article will first provide an overview of the 10 principles of the Artemis Accords and take stock of their implications in light of the relevant U. N. space-related treaties and resolutions. Then, we will analyze the legal issues arising from space resources activities in depth, in particular focusing on the interpretation of "non- appropriation" principle as provided in Article 2 of the 1967 Outer Space Treaty ("OST"), the relevant provisions of the Moon Agreement, and the issue of moratorium. Thirdly, following the examination of national legislation on this subject, we will observe the on-going discussions at the COPUOS-LSC and take stock of academic recommendations, including the Hague Building Blocks and the Vancouver Recommendations, as well as the inputs from civil society organizations. Finally, we will put the governance of the space resources activities into perspective, in view of the development of international space law.

II. The Artemis Principles

A. *Relationship with Existing U.N. Space-Related Treaties, Purpose and Scope*

The Artemis Accords, which sidestepped the negotiations at the COPUOS, affirm in their preamble the importance of compliance with the OST,[33] the Rescue and Return Agreement,[34] the Liability Convention,[35] the Registration Convention,[36] and the benefits of coordination via multilateral forums, such as the COPUOS, to further efforts toward a global consensus on critical issues regarding space exploration and use.[37] It also desires to "implement the provisions of the OST and other relevant international instruments" and thereby establish a political understanding regarding mutually beneficial practices,[38] and specifies that many principles described therein provide for "operational implementation" of important obligations contained in

33. 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 OST].

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

35. Convention on International Liability for Damage Caused by Space Objects, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187.

36. Convention on the Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15.

37. The Accords, *supra* note 1, Preamble ¶ 9.

38. The Accords, *supra* note 1, Preamble ¶ 10.

the OST and other instruments.[39] It follows that the Accords neither largely deviate from existing international space law nor intend to exclude the present and future efforts at multinational forums such as the COPUOS. It should be noted, however, that it also contains new norms ("legal novelty")[40] such as preservation of outer space heritage or deconfliction of activities that cannot be found in existing international space law.

The purpose of the Accords is not only to establish a common vision via a practical set of principles, guidelines, and best practices to enhance the governance of the civil exploration and use of outer space with the intention of advancing the Artemis Program, but also to increase the safety of operations, reduce uncertainty, and promote the sustainable and beneficial use of space for all humankind.[41] The wording "sustainable and beneficial use of space for all humankind," irrespective of the drafter's intent, may well literally mean space must be used in the way that all humankind, whether past, present, or future generation, is the ultimate beneficiary, including through environmental protection. This phrase is of significance in examining the legal issues of space resources activities.

The Artemis principles apply to civil space activities conducted by the civil space agencies of each signatory and cover the activities 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[42] for the Earth-Moon system, and in transit between these celestial bodies and locations.[43] Signatories will implement the principles set out in the Accords through their own activities by taking measures such as contractual mechanisms with entities acting on their behalf. The celestial bodies the Accords apply to are limited in scope to the Moon, Mars, comets and asteroids, unlike the OST which embraces the

39. The Accords, *supra* note 1, § 1, ¶ 1.

40. Christopher Johnson, *The Space Law Context of the Artemis Accords (Part 2)*, SPACEWATCHGL (May 27, 2020), https://spacewatch.global/2020/05/spacewatchgl-feature-the-space-law-context-of-the-artemis-accords-part-2/.

41. Johnson, *supra* note 40.

42. Simply put, they are the points at which a primary star (e.g., the Earth), a secondary star (e.g., the Moon and spacecraft are in gravitational equilibrium when they align. The point at which gravity of the Earth plus that of the Moon and centrifugal force of spacecraft are in equilibrium is called L_2 and located at the backside of the Moon. There exists the Halo Orbit near the point. This Orbit is comparatively stable and enables spacecraft to keep position with less propulsion fuel and communicate to the Earth almost continuously. In case of Chinese Chang' 4 mission L_2 was used. NASA, *What is a Lagrangian point?, NASA Solar System Exploration (Mar. 27, 2018),* https://solarsystem.nasa.gov/resources/754/what-is-a-lagrange-point/.

43. The Accords, *supra* note 1, § 1, ¶ 2.

comprehensive phraseology "the Moon and other celestial bodies."[44] There is no definition of celestial bodies in the OST, but it is evident that the concept of "celestial bodies" refers to natural objects of a tangible and visible nature, to pieces of more or less solid substance traversing outer space from the contexts in which the term is used,[45] and comets and asteroids are naturally included in celestial bodies. It is reported that NASA originally focused on the Moon and Mars, but finally met the request from Japan to include asteroids and comets, based on JAXA's asteroids missions like the Hayabusa 2.[46]

B. *Implementation, Peaceful Purposes, and Transparency*

Cooperative activities based on the Accords may be implemented through appropriate instruments, such as MOUs, implementing agreements under existing intergovernmental agreements, inter-agency arrangements, or other instruments.[47] For example, according to the JEDI referred to above, with regard to future arrangements of legally binding force, cooperation on the ISS and Gateway will be enacted by future implementing arrangements under the MOU between NASA and Government of Japan ("U.S.-Japan Gateway MOU"),[48] which is to be governed by the ISS-IGY, and cooperation on lunar surface exploration will be set out in future arrangements.[49] The Accords also stipulate that such future arrangements (i) should describe the nature, scope and object of the cooperative activities and (ii) are expected to contain other provisions, including those related to liability, intellectual property, and the transfer of goods and technical data.[50] In particular, with

44. OST, *supra* note 33, art. 1.

45. Frans G. von der Dunk, *Defining Subject Matter under Space Law: Near Earth Objects versus Space Objects*, 51 PROC. INT'L INST. SPACE L. 293, 295 (2008).

46. *Artemis Accords: The American ways to the Moon*, KNAPPILY (Dec. 22, 2020), https://knappily.com/technology/artemis-accords-the-american-way-to-the-moon-539.

47. The Accords, *supra* note 1, § 2.1.

48. The Japan-U.S. Gateway MOU consists of 24 articles which stipulate cooperation on the civil lunar gateway in detail. This document was signed on December 20, 2020 by the Government of Japan and on December 31 of that year by NASA. The latter is the effective date. Space station evolution was already contemplated under the ISS-IGA and its MOUs with partners (respectively Article 14). This MOU is enabled by Article 14.6 (Space Station Evolution) of the GOJ-NASA ISS MOU to implement the Gateway as an addition and sharing of evolutionary capability to the International Space Station (the Japan-U.S. Gateway MOU, Article 2.1). Memorandum of Understanding Between Government of Japan and the National Aeronautics And Space Administration of the United States of America Concerning Cooperation on the Civil Lunar Gateway, Japan-U.S. (entered into force Dec. 31, 2020) [hereinafter Japan-U.S. Gateway MOU].

49. JEDI, *supra* note 4, §§2(C), 3.

50. The Accords, *supra* note 1, §§ 2.1(a)–(b).

respect to (ii) above, the relevant provisions contained in the ISS-IGA would be precedents.[51] In addition, the Accords as such, by being incorporated by reference in these instruments, will become legally binding. Furthermore, the Accords provide that each signatory commits to taking appropriate steps to ensure that entities acting on its behalf comply with the principles of these Accords.[52] This provision would also apply when a signatory contracts with a private company of the third country in connection with the Artemis program.

These signatories to the Artemis Accords affirm, among other things, that they will conduct all space activities peacefully and in accordance with relevant international law.[53] International cooperation on Artemis is intended not only to bolster space exploration but also to enhance

51. In fact, the Japan-U.S. Gateway MOU mirrors the cross-waiver of liability between the partners and their related entities under the ISS-IGA (Article 2.2). With regard to transfer of goods and technical data, the Gateway MOU practically adopts the substantial parts of the relevant provisions of the ISS-IGA in a more simplified form, except as otherwise specifically provided. Namely, the MOU adds that upon completion of the activities, recipients, including those to which the technical data or goods are subsequently transferred shall return or otherwise dispose of all goods and marked proprietary or export-controlled technical data provided under this MOU, as directed by providers (Article 19.4). The transfer of technical data or goods more or less accompanies the conflicting exigencies of autonomy and cooperation in the development of space technology. Therefore, the wording of legal texts is very prudent in that it provides for the obligation to transfer to advance cooperation on one hand and restricts or carefully conditions the transfer on the other. This holds true for this MOU. As for the ISS-IGA, Yutaka Osada, *Kanzei, Shutsunyukoku oyobi Data matawa Buppin no Koukan* [*Immigration and Exchange of Data or Goods*], in Uchu-Kankyo wo torimaku Hoteki Mondai no Chousa Kenkyu Hokokusho dai San go [The Report on the Research and Examination of the Legal Issues Surrounding the Utilization of the Space Environment: Part 3], Mirai Kougaku Kenkyujo (Institute of Future Engineering) 80–83 (Mar. 1991. The provisions of intellectual property (Article 16) are different from those of the ISS-IGA in the following three respects. First, unlike the ISS-IGA, the legal fiction of territorial principle is not adopted with regard to invention or any copyright on the flight elements the partners provide. Instead, Gateway MOU is based on the principle of nationality. Second, not only the Party, but also its Contributing Entities (the term of which is newly adopted in the Gateway MOU and means a contractor or a subcontractor of a Party at any tier engaged in activities related to the performance of the MOU) are subject to the protection of intellectual property. Third, in the event of joint invention which is not anticipated under the MOU, the Parties shall, in good faith, consult and agree as to the allocations of rights, the responsibility, cost and actions to be taken to establish and maintain patents, and the terms and conditions of any license to be exchanged between the Parties or granted by one Party to the other. For the ISS-IGA, *cf.* Tadao Kuribayashi Ed. Kaisetu Uchuho Shiryoshu [Space Law Materials Annotated] 226–251 (Keio University Press, 1995).

52. The Accords, *supra* note 1, § 2.1(d).

53. The Accords, *supra* note 1, § 3.

peaceful relationships between nations.[54] The term "relevant international law" naturally includes the OST. The Accords as such, however, do not deal with the different interpretations of Article 4 of the OST[55] or the issue of the weaponization[56] of outer space, which has been discussed at the U.N. Conference on Disarmament since 1980s. In the first place, the Accords focus on cooperation in the civil exploration and use of outer space to be undertaken by civil space agencies and private companies. Thus, the issue of the military use of outer space is excluded from the scope of the Accords. Nonetheless, it is noteworthy that the U.S.-Japan Gateway MOU provides for a unique clause on the subject. Namely, this MOU also stresses that its purpose is on the basis of "genuine partnership" for peaceful purposes.[57] Furthermore, each Party providing an element shall review whether a contemplated use of that element is for peaceful purposes, and in the event of doubts the Parties will agree to consult.[58]

The signatories are committed to transparency in their national space policies and plans in their national rules and regulations, and also plan to share scientific information resulting from their activities with the public and the international scientific community on a good-faith basis, and consistent with Article 11 of the OST.[59] This principle of transparency, in a wider context, helps to create mutual understanding and trust through information sharing, to reduce misperceptions and

54. NASA, International Partners Advance Cooperation with First Signings of Artemis Accords, NASA (Jan. 5, 2021), https://www.nasa.gov/press-release/nasa-international-partners-advance-cooperation-with-first-signings-of-artemis-accords.

55. As is well known, the U.S. position to interpret the term of "peaceful" as meaning "non-aggressive" and the former U.S.S.R. position as meaning that of "non-military" are conflicting but in practice the interpretations of both countries are identical with non-aggression as to the issue of reconnaissance satellites. *But see* Stephen Gorove, *Arms Control Provisions in the Outer Space Treaty: A Scrutinizing Reappraisal*, 3 GA. J. INT'L & COMP. L. 114, 120 (1973) (suggesting that instead of the dichotomy of interpretations, it is more productive to focus on whether or not certain activities are permissible); Bin Cheng, *The Legal Status of Outer Space and Relevant Issues: Delimitation of Outer Space and Definition of Peaceful Use*, 11 J. SPACE L. 89, 103–05 (1983) (viewing the U.S. interpretation as wrong and potentially noxious).

56. For now, *see* the following articles. David A. Koplow, *The Fault Is Not in Our Stars: Avoiding an Arms Race in Outer Space*, 59 HARV. INT'L L.J. 331, 331–87 (2018); A Ferreira-Snyman, *Selected Legal Challenges Relating to the Military Use of Outer Space, with Specific Reference to Article IV of the Outer Space Treaty, PER/PELJ*, 18 POTCHEFSTROOM ELEC. L.J. 488, 488–521 (2015); Setusko Aoki, *Uchu-Heiki Haichi towo Mezasu Chu-Ro Kyoudou Teian no Kentou* [*Review of the Joint Proposal by China and Russia Aiming at the Prevention of Placement of Space Weapons and Others*], Kokusai-Jousei[International Situation] 361–76, (Feb. 2010).

57. Japan-U.S. Gateway MOU, *supra* note 48, art. 1.1.

58. *Id.* art. 8.1(e).

59. The Accords, *supra* note 1, § 4.

miscalculations, to prevent military confrontation, and to foster regional and global stability.[60] In this way it will play a crucial role in building confidence. The obligation to inform the U.N., the public, and the international scientific community is, however, qualified by the phrase "to the greatest extent feasible and practicable" under the relevant provision of the OST.[61] Therefore, this might give rise to the concern that the qualification allows a signatory providing information leeway to interpret the phrase so as to compromise the commitment to transparency. Even if that happens, the phrase "on a good-faith basis" may be an incentive to narrow the discretion of an information provider.[62]

C. *Interoperability, Emergency Assistance, Registration of Space Objects and Release of Scientific Data*

The term "interoperability," in a nutshell, refers to the plug-and-play capability that enables you to use separate systems or devices just by connecting them. Building on the ISS experiences, interoperability is perceived as essential for integrating the basic systems or infrastructures of each partner (e.g., rover landing, power, communication, or docking) and constructing the international configuration like the ISS, the Gateway, or the lunar base. Unfortunately, the ISS was not designed to be fully interoperable and there was an inherent limit to the degree of interoperability that can be achieved on board the station.[63] For this reason, the Accords commit to use reasonable efforts to utilize current interoperability standards for space-based infrastructure, to establish such standards when current standards do not exist or are inadequate, and to follow such standards.[64] Interoperability also helps to implement the Guidelines for the Long-term Sustainability of Outer Space ("LTS Guidelines").[65] For the LTS guidelines include the exchange of technology and equipment for space activities to promote and facilitate international cooperation (guideline C.1) and the development of

60. U.N. Secretary-General, Rep. of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, ¶ 20 U.N. Doc. A/68/189 (July 29, 2013).

61. OST, *supra* note 33, art. 11; *see also* Rescue and Return Agreement, *supra* note 34, art. 11.

62. The Accords, *supra* note 1, § 4, ¶ 2.

63. Antonino Salmeri, *One Size to Fit Them All: Interoperability, the Artemis Accords and the Future of Space Exploration*, #SPACEWATCHGL OPINION (Nov. 2020), https://spacewatch.global/2020/11/spacewatchgl-opinion-one-size-to-fit-them-all-interoperability-the-artemis-accords-and-the-future-of-space-exploration/.

64. The Accords, *supra* note 1, § 5.

65. The Accords, *supra* note 1, § 5.

technologies that maximize the use of renewable resources and the reusability or repurposing of space assets (guideline D.1.3).[66]

The Accords 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.[67] Between 1968 and 2018, 147 occurrences, including a number of notifications about the fragments of a single space object fallen on Earth, were reported to the United Nations Secretary General under the OST and the Rescue and Return Agreement (Article 5.1).[68] The cases notified to the U.N. are more than expected as seen above, but in not a few of all these cases, the launching state could not be identified. Besides, the cases where costs incurred by recovery have been paid by the launching state are very few and so far have not concerned the category of astronauts in distress.[69] The only case involving assistance rendered to an emergency that happened in outer space was the Apollo 13 incident. When the return of its three crew members to Earth was endangered due to an oxygen tank explosion, let alone the Moon landing, the former Soviet Union offered assistance to the United States.[70] One of the major faults is that the Rescue and Return Agreement focuses on the events of accident, distress, emergency, and unintended landing on Earth, but not on those occurring extra-terrestrially.[71] When we look further into the future, does the Rescue and Return Agreement continue to apply to all events occurring in outer

66. Rep. of the Comm. on the Peaceful Uses of Outer Space, U.N. Doc. A/74/20, annex II, at 66, 68–69 (July 3, 2019).

67. The Accords, *supra* note 1, § 6.

68. Rescue and Return Agreement, *supra* note 34, art. 5.1; *see also* U.N. Off. for Outer Space Aff., Recovery and Return of Objects Launched into Outer Space, UNOOSA, https://www.unoosa.org/oosa/en/treatyimplementation/arra-art-v/unlfd.html.

69. Frans G. von der Dunk, *A Sleeping Beauty Awakens: The 1968 Rescue Agreement after Forty Years*, 34 J. SPACE L. 411, 425–426 (2008) (stating that, "As to implementation in law, the Rescue Agreement has remained a sleeping beauty, which is not surprising given its subject matter.").

70. Niklas Hedman, *"Return to sender" Fifty years of the Rescue Agreement and the role of the United Nations*, UNOOSA 7 (Apr. 9, 2018), https://www.unoosa.org/documents/pdf/copuos/lsc/2018/symp-02.pdf. According to a newspaper article at the time, the Soviet government ordered all Soviet transmitters using frequencies close to those of Apollo 13 to maintain silence from the spacecraft's entry into the earth's atmosphere to its splashdown in the Pacific. Editorial, *Service Module Damage Called 'Unbelievable'*, READING EAGLE (Apr. 17, 1970), https://news.google.com/newspapers?nid=1955&dat=19700417&id=pR8rAAAAIBAJ&sjid=CqAFAAAAIBAJ&pg=5270,4050234&hl=en.

71. The words "any other place not under the jurisdiction of any State" described in Articles 4 and 5.1 might be interpreted as including outer space. G.A. Res. 2345 (XXII), arts. 4–5, annex (Dec. 19, 1967). In contrast the Moon Agreement explicitly provides for the distress and emergency on the moon and the notification to the launching state as well as U.N. Secretary General. *See* G.A. Res. 34/68, arts. 10.2, 12.3, 1310–13, annex (Dec. 5, 1979).

space and on a celestial body? Is it a one-size-fits-all agreement? What about its application to emerging space tourism?[72] In any event, it is the purpose of section 6 of the Accords that the Agreement will apply *mutatis mutandis* to extra-terrestrial emergencies.

The concept of registration in space law represents the nexus between a state and a space object to determine governing law relating to the jurisdiction and control over the space object and its crew, which is analogous to that of nationality granted to aircraft and ships.[73] Registration is also the basic concept that obligates the "launching state"[74] as the state of registry to enter the space object in its domestic register and the U.N. register and also makes it liable for damage under the Liability Convention.[75] The space object that the Registration Convention contemplated was a unitary object launched into outer space.[76] The significant point to note for legal purposes is that it is more complicated to determine which state should register what parts of the international configuration constructed in outer space like the ISS or the Lunar Gateway. The Registration Convention only provides that the term "space object" includes component parts of a space object and as well as its launch vehicle and parts thereof and thus lacks the precise definition of the space object.[77] Article 2(a) of the Registration Convention is particularly relevant to the international configuration. It reads: "Where there are two or more launching States in respect of any such space object, they shall jointly determine which one of them shall register the object . . ." Accordingly, the Artemis Accords commit

72. von der Dunk, *supra* note 69, at 431–34; Tanvi Mani, *The Applicability of the Norms of Emergency Rescue of Astronauts to Space Tourists*, 7 KING'S STUDENT L. REV. 28, 34, 39 (2016) (concluding that the Rescue and Return Agreement cannot be made applicable to the rescue of space tourists and that several drawbacks of the Agreement provide the necessary impetus for the formulation of an alternative legal instrument).

73. *See* G.A. Res. 2222 (XXI), art. VIII, annex (Dec. 19, 1966). However, ownership of space objects is not affected by the registration.

74. The launching state means: (i) a state which launches or procures the launching of a space object; (ii) a state from whose territory or facility a space object is launched. Article 1(a) of the Registration Convention. This definition is the same as one used in Article 1(c) of the Liability Convention.

75. *See* G.A. Res. 3235 (XXIX), art. I(b), annex (Nov. 12, 1974); U.N.G.A. Res. 2777 (XXVI), art. II, annex (Nov. 29, 1971).

76. Yutaka Osada, *Uchu Buttai Touroku Jouyaku* [*The Registration Convention of Space Objects*], *in* Kaisetu Uchuho [Space Law Materials Annotated] (Tadao Kuribayashi ed. Keio University Press, 1995), at 35.

77. Galloway suggested that it would be necessary to define "component parts" of a space station, because hitherto this term has meant parts of a single spacecraft, whereas the space station is a cluster of objects. Eilene Galloway, *The Space Station: United States Proposal and Implementation*, 14 J. SPACE L. 14, 18, 24–25 (1986).

the signatories to determine which of them should register any relevant space object in accordance with the Registration Convention[78] and also the U.S.-Japan Gateway MOU stipulates that the Parties shall determine which Party shall register or, as applicable, request its Government to register the "flight elements" it provides.[79] In addition, in the event that a non-Party to the Registration Convention becomes involved in the cooperative activities, the signatories intend to cooperate to consult with that non-Party to determine the appropriate means of registration.[80] While the system of registering objects under the Registration Convention is mandatory, that of the U.N.G.A. Res. 1721(XVI B) (1961) is voluntary and does not require any specification of the information to be provided but is still used today.[81] And both instruments are complementary in that it is possible for a space object to be registered in accordance with the resolution, but for its change of status (i.e., re-entry into the Earth's atmosphere) to be provided in accordance with the Registration Convention. Therefore, it can be expected that the appropriate means of registration will be determined after the consultation between the signatory and such a non-Party. The state of registration, which is the launching state which has so registered, has problems concerning the application of the concept of the launching state in the event of the on-orbit change of ownership of a satellite and the inroad into the commercial space launch by private companies like the SeaLaunch venture.[82] But also, it has registration-specific problems of when and what to inform. With regard to these

78. The Accords, *supra* note 1, § 7.

79. Japan-U.S. Gateway MOU, *supra* note 48, art. 5.2.

80. The Accords, *supra* note 1, § 7.

81. H. Peter van Fenema, U.N. Off. for Outer Space Aff., Proc. of U. N./Int'l Institute of Air and Space L. Workshop on Capacity Building in Space L., The Registration Convention, at 31, U.N. Doc. ST/SPACE/14 (2003). This U.N. resolution, however, seems to have evolved into a norm of customary international law requiring all States that launch objects into orbit or beyond to promptly furnish information to the U.N. about their launchings for registration. Ram S. Jaku et al., *Critical Issues Related to Registration of Space Objects and Transparency of Space Activities*, 143 ACTA ASTRONAUTICA 406, 415 (2018).

82. As to the on-orbit transfer of ownership of a satellite. Fenema, *supra* note 81, at 33; Jaku et al., *supra* note 81, at 412–413. Problems concerning the application of the concept of the launching state came up with the establishment and the operation of the SeaLaunch space transportation venture. This item came on the agenda of the COPUOS Legal-subcommittee. For the efforts at the COPUOS and the UNOOSA on the subject, see Dr. Marietta Benkö & Dr. Kai-Uwe Schrogl, *The UN Committee on the Peaceful Uses of Outer Space Adoption of a Resolution on Application of the Concept of the "Launching State" and Other Recent Developments*, ZLW 54. Jg. 1/2005 58–69 (2005). *See also* Setsuko Aoki, *Shougyou Uchu Uchiage Keitai Tayouka ni tomonau "Uchiage-Koku" Gainen Saikou* [*The Concept of the Launching State Revisited Associated with the Diversification of the Modes of Commercial Space Launch*], 75 Hogaku Kenkyu [Keio J. of L., Pol. and Socio.] 69 (2002) (suggesting that this concept, in particular, "a state which procures the launching," needs to be

problems, state practice has been varied due to the lack of definition of space objects.[83] However, U.N.G.A. Resolution (62/101) of 2007,[84] which aims to uniform the practice of registration as much as possible, will also help to determine the "appropriate means of registration" as described in section 7 of the Artemis Accords.[85]

While the signatories to the Accords are committed to transparency regarding their national space policies and space exploration plans under section 4, they will retain the right to communicate and release information to the public regarding their own activities.[86] If such information relates to the other signatories' activities under the Accords, they will coordinate in advance with each other to protect any proprietary and/or export-controlled information.[87] They are committed to the open sharing of scientific data and plan to make the scientific results obtained from cooperative activities available to the public and the international scientific community, as appropriate, in a timely manner.[88] In this connection, on December 17, 2020, NASA signed the MOU with the UNOOSA pledging cooperation in areas of science and technology to support the peaceful uses of outer space.[89] Together, UNOOSA and

expanded in view of the Liability Convention and against the backdrop of commercial space launch).

83. Space objects entered in the U.N. register are classified into two categories: functional space objects (such as satellites, probes, spacecraft and space station components) and non-functional objects (such as spent rocket stages and deactivated satellites). France and the United States provide information on all non-functional space objects. China, India and ESA provide information on functional objects and non-functional objects that are produced during or just after lunch. Israel, Japan and Russia provide information on functional objects only. Reusable space objects (such as the United States Space Shuttle) are registered by mission. Practice of States and International Organizations in Registering Space Objects, Background Paper by the Secretariat,, U.N. Doc. A/AC.105/C.2/L.255, at 5–6 (2005). As to the Japanese procedure concerning registration, Naikakufu Uchu-Kaihatsu Senryaku Suishin Jimukyoku [the Cabinet Office Space Development Strategy Promotion Secretariat], Uchu Buttai Touroku ni kakawaru Todokede Manyuaru [The Filing Manual concerning the Registration of the Space Objects] (Rev, 1, 2013), https://www8.cao.go.jp/space/comittee/01-anzen/anzen-dai1/siryou6_1.pdf.

84. G.A. Res. A/62/101, ¶ 3 (Jan. 10, 2008). It is noteworthy that it recommends that states should encourage launch service providers under their jurisdiction to advise the owner and/or operator of the space object to address the appropriate States on the registration of that space object, given the fact private companies inroad into the commercial space launch and transportation service like the Space X. *Id.* ¶ 3(d).

85. *Id.* ¶ 2.

86. The Accords, *supra* note 1, § 8.1.

87. The Accords, *supra* note 1, § 8.1.

88. The Accords, *supra* note 1, § 8.2.

89. Press Release, United Nations Office for Outer Space Affairs, United Nations Office for Outer Space Affairs and NASA Sign Landmark Memorandum of Understanding to Advance Peaceful Uses of Outer Space, U.N. Press Release UNIS/OS/542 (Dec. 17, 2020).

NASA will develop ways to leverage the Artemis program as part of UNOOSA's Access to Space 4 All Initiative.[90] The commitment to openly share scientific data is, however, not intended to apply to private sector operations unless such operations are being conducted on behalf of a signatory.[91]

D. *Preserving Outer Space Heritage and Space Resources*

The most intriguing, but controversial,[92] part of the Accords is that for the first time they in principle sanction the extraction and utilization of space resources. They emphasize that the space resources activities should be executed in a manner that complies with the OST and in support of safe and sustainable space activities.[93] They also affirm that the extraction of space resources does not *inherently* constitute national appropriation under Article II of the OST, and that contracts and other legal instruments relating to space resources should be consistent with that Treaty.[94] There is no way to know about the precise implication of the term "inherently" for lack of its drafting history. "Ultimately, the Accords represent a compromise. They do not expressly state that space resource extraction is legal. Rather, they simply state a negative: that such activity would not in and of itself amount to national appropriation," says Professor Jack W. Nelson.[95] Judging from the use of such a prudent term, his view is more than plausible. The Accords furthermore commit to inform the Secretary-General of the United Nations as well as the public and the international scientific community of the resources activities and intend to use their experience under the Accords to "contribute to multilateral efforts" to

90. *Id.*

91. The Accords, *supra* note 1, § 8.3.

92. *See, e.g.*, IV.B.1. in this Article.

93. The Accords, *supra* note 1, § 10.2.

94. The Accords, *supra* note 1, § 10.2.

95. Jack W. Nelson, *The Artemis Accords and the Future of International Space Law*, 24 ASIL INSIGHTS 1, 3 (2020). On the contrary, Jack Hickman, Professor of Political Science, ironically views the language as an international "workaround" to recognize and protect those exotic property rights while pretending that the assertion by the USA is not effectively the territorial annexation or resource appropriation clearly prohibited by the 1967 Outer Space Treaty, saying that this is the sort of language written by lawyers resigned to the reality that their work must fail the "duck test." John Hickman, *Opinion – The Unimpressive Nature of the Artemis Accords*, E-INTERNATIONAL REL. 1–2 (Oct. 19, 2020), https://www.e-ir.info/pdf/88219. Strictly speaking from a legal point of view, however, his view is too far-fetched. Even if the language is a workaround, it is too much to say it intends to pretend that the assertion by the USA is not effectively the territorial annexation.

further develop international practices and rules applicable to such activities, including "through the COPUOS."[96]

The Accords provide that the signatories intend to preserve outer space heritage, which they consider to comprise historically significant human or robotic landing sites, artifacts, spacecraft, and other evidence of activity on celestial bodies in accordance with mutually developed standards and practices.[97] It is self-evident that outer space heritage primarily covers the conservation in situ of those places (e.g., "Tranquility Base" on the Moon where the Apollo 11 achieved the first manned landing), artifacts, or spacecraft above, without being brought back to Earth. This is quite a novel concept for which there is no precedent in existing international space law. Outer space heritage apparently falls into the category of "cultural heritage" as defined by the 1972 World Heritage Convention,[98] but the Convention applies to the heritage situated on the territory of each state party. Outer space, including celestial bodies, is excluded from its scope of application.[99]

The Accords also contemplate the development of international practices and rules applicable to preserving outer space heritage.[100] In the development of these practices and rules, the NASA's Recommendations may well offer themselves for consideration as a frame of reference.[101] After the Apollo Lunar Landing Legacy Act was aborted,[102] U.S. Congress passed the One Small Step Act in 2022.[103] The One Small Step Act sets out in particular the universal value to humanity of the Apollo 11 lunar landing site.[104] Furthermore, it states

96. The Accords, *supra* note 1, §§ 10.3–10.4.

97. The Accords, *supra* note 1, § 9.1.

98. Convention Concerning the Protection of the World Cultural and Natural Heritage art. 1, *adopted* Nov. 16, 1972, 1037 U.N.T.S. 151.

99. *Id.* art. 5.

100. The Accords, *supra* note 1, § 9.2.

101. NASA, THE 2011 NASA'S RECOMMENDATIONS TO SPACE-FARING ENTITIES: HOW TO PROTECT AND PRESERVE THE HISTORIC AND SCIENTIFIC VALUE OF U.S. GOVERNMENT LUNAR ARTIFACTS (2011) [hereinafter NASA's Recommendations].

102. H.R. 2617, 113th Cong. (2013). The primary criticism against this bill was its definition of the Apollo Landing Site National Historical Park which would raise a concern about the possible conflict with the non-appropriation principle as provided by the OST because the definition would include "all areas of the Moon where astronauts and instruments . . . touched the lunar surface." *Id.* § 4(2). Another criticism came from the proposed designation of the Apollo 11 landing site as a World Heritage Site of the UNESCO (Section 8 of the bill). Kyle Ellis, *Preserving Apollo: H.R. 2617 and the Creation of the Apollo Lunar Landing Sites National Historic Park*, 26 FORDHAM ENVTL. L. REV. 517, 547–48 (2015).

103. The One Small Step to Protect Human Heritage in Space Act, REP. OF THE COMM., SCIE. & TRANSP. ON S. 1694, 116th Cong. (2020) [hereinafter One Small Step Act].

104. *Id.* § 2(a).

that it is the sense of Congress that as commercial enterprises and more countries acquire the ability to land on the Moon, it is necessary to encourage the development of best practices to respect the principle of due regard and to limit harmful interference to the Apollo landing site artifacts.[105] Following these statements, it provides that NASA shall add the NASA's Recommendations as a condition or requirement to contracts, grants, agreements, partnerships, or other arrangements pertaining to lunar activities carried out by, for, or in partnership with NASA.[106] The Recommendations, however, contain the concept of "Exclusion Zone,"[107] into which visiting spacecraft should not enter, so that the legal status of the Zone, if applicable, should be carefully examined in connection with that of the safety zone as discussed below.

E. *Deconfliction of Space Activities*

This principle occupies a comparatively large amount of space of all the sections of the Accords. The majority of this section is based on Article 9 of the OST and the relevant space-related resolution. In the first place, this section acknowledges and reconfirms the commitment to the OST, including those provisions relating to due regard and harmful interference.[108] And then, it provides for the following paragraphs about the conduct of space activities with due considerations to the LTS Guidelines,[109] with appropriate changes to reflect the nature of operations beyond low-Earth orbit;[110] the commitment to respect the principle of due regard and the request of consultations with a signatory or any other party to the OST authorizing the activity in case of

105. *Id.* § 2(b)(1).

106. *Id.* § 3(a)(1).

107. NASA's Recommendations, *supra* note 101, A1–9 at 9. This Zone specifically defines an area beginning at the lunar surface site of interest and extending to a 2.0 km radial distance e from the site where no overflight of a landed spacecraft may occur and a 0.5 km radial distance from the center of the impact site where no overflight of a landed spacecraft may occur. *Id.* A1–3 at 7.

108. The Accords, *supra* note 1, § 11.1.

109. The proliferation of space debris, the increasing complexity of space operations, the emergence of large constellations and the increased risks of collision and interference with the operation of space objects may affect the long-term sustainability of space activities. The LTS Guidelines expect states or international organizations to *voluntarily* take in guidelines through their own national or other applicable mechanisms to address these developments and risks and avoid harm to the space environment and the safety of space operations. Rep. of the Comm. on the Peaceful Uses of Outer Space, *supra* note 66, at 50, 52.

110. The Accords, *supra* note 1, § 11.2.

the threat or actual occurrence of harmful interference;[111] the commitment to seek to refrain from any intentional actions that may create harmful interference with each other's use of outer space[112]; the commitment to provide each other with necessary information regarding the location and nature of space-based activities under these Accords in the event of the threat of harmful interference with or a safety hazard to the space-based activities resulting from other signatories' activities.[113] More to the point, the Accords seek to roll out the experiences under the Accords in multilateral efforts to further develop international practices, criteria, and rules applicable to the definition and determination of safety zones and harmful interference.[114]

The provisions of safety zones are novel ones. Particularly during the Cold War era, the legality of various types of zones such as keep-out zones, warning areas, safety and security zones, and defense zones was intensely discussed to reduce the risk that unannounced and uncoordinated close approaches (i.e., Rendezvous Proximity Operations) may pose to satellites, but these zones and areas have never been put into practice.[115] For NASA, however, these types of zones are not quite unprecedented. The Keep Out Sphere (KOS) is defined as a sphere with a 200-meter radius, centered at the ISS center of mass to ensure a safe integration with ISS.[116] Unlike the example of ISS, the safety zones the Accords contemplate would occupy a certain portion of the land on the lunar surface. Therefore, it must be first called into question whether their legal status is similar to that of KOS or can be inferred by analogy from that of safety zones established around offshore installation or structures (e.g., oil rigs on the superjacent waters of continental shelf). Specifically for the latter safety zones, they are established on the superjacent waters of continental shelf which are free from national

111. The creation of lunar dust clouds, through take-off, landing, and any significant surface activity, is certain to occur, and almost impossible to truly prevent. Lunar dust in the form of tiny, glass-like particles can significantly impact machinery and human activities, totally destroying historic boot prints. Johnson, *supra* note 40.

112. The Accords, *supra* note 1, § 11.4.

113. *Id.* § 11.5.

114. *Id.* § 11.6.

115. TED A. NEWSOME, *THE LEGALITY OF SAFETY AND SECURITY ZONES IN OUTER SPACE: A LOOK TO OTHER DOMAINS AND PAST PROPOSALS* 16 (Aug. 2016) (LL.M. thesis, Institute of Air and Space Law McGill University); Kenneth Schwetje, *Protecting Space Assets: A Legal Analysis of "Keep-Out Zones,"*, 15 J. SPACE L. 131, 132 (1987).

116. DIANE S. KOONS ET AL., *RISK MITIGATION APPROACH TO COMMERCIAL RESUPPLY TO THE INTERNATIONAL SPACE STATION*, § 2.1 (2010), https://ntrs.nasa.gov/api/citations/20100014822/downloads/20100014822.pdf; Jessy Kate Schingler, *Imagining Safety Zones: Implications and Open Questions*, SPACE REV. (June 8, 2020), https://www.thespacereview.com/article/3962/1.

sovereignty. This is seemingly akin to the legal status of celestial bodies, so that the difference or similarity between those safety zones on celestial bodies and on the superjacent waters of continental shelf shall be first examined below.

According to the 1982 U.N. Convention on the Law of the Sea (UNCLOS),[117] the coastal state may establish reasonable safety zones around those installations. The safety zones shall be designed to ensure that they are "reasonably related to the nature and function of those installations," and shall not exceed a distance of 500 meters around them, measured from each point of their outer edge, except as authorized by generally accepted international standards or as recommended by the competent international organization.[118] In the safety zones the coastal state may take appropriate measures to ensure the safety both of navigation and of those installations.[119] The waters in which the safety zones are established are not subject to the sovereignty of the coastal state, but some coastal states extend their jurisdiction over the safety zones and the airspace above them and in the event of unauthorized access to those zones and space apply and enforce penalties for violations under their national legislations.[120]

Back to the Accords, in order to implement their obligations under the OST, the signatories would provide notification of their activities and coordinate with any relevant actor to avoid harmful interference.[121] A safety zone means the area wherein this notification and coordination will be implemented to avoid harmful interference and should be the area in which "nominal"[122] operations of a relevant activity or an

117. U.N. Convention on the Law of the Sea, opened for signature Dec. 10, 1982, 1835 U.N.T. S. 397, 3 (entered into force Nov. 16. 1994).

118. *Id.* art. 60, ¶¶ 4–6; see also id. art. 80.

119. *Id.* art. 60, ¶¶ 4–6; see also id. art. 80.

120. Law. 68–1181 of 30 December 1968 Relating to the Exploration of the Continental Shelf and to the Exploitation of its Natural Resources, Dec. 30, 1968, arts. 4, 32 (Fr.), [hereinafter French Act No. 68–1181], https://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/FRA_1968_Act.pdf; Law. 68-1181 of 2017 Relating to the Establishment of Safety Zone Pertaining to Structures at Sea, , arts. 5, 7 (Japan); Petroleum Act, 1987, art. 23 (U.K.), https://www.legislation.gov.uk/ukpga/1987/12/2009-11-13.

121. The Accords, *supra* note 1, § 11.7.

122. The term "nominal" as used in aerospace industry means "within acceptable tolerances" or "according plan or design." So, nominal operations mean those performed or achieved within expected and acceptable limits. Joshua Dance, *What Does 'Nominal' Mean When SpaceX Mission Control Says It?,* Medium (Feb. 11, 2018), https://joshdance.medium.com/what-does-nominal-mean-when-spacex-mission-control-says-it-39c2d249da27#:~:text=nominal%20%E2%80%94%20Aerospace,within%20expected%20and%20acceptable%20limits.

anomalous event could reasonably cause harmful interference.[123] In addition, as the nature of an operation changes, the size and scope of safety zones should be altered as appropriate, but such zones will "ultimately be temporary," ending when the relevant operation cease.[124] Particularly, the signatories will provide prior notification to and coordinate with each other before conducting operations in a safety zone, to avoid harmful interference[125] and respect the principle of free access to all areas of celestial bodies in their use of safety zones.[126] Read together, these provisions indicate that the concept of safety zones conceived by the Accords is not identical to that from the KOS and still less to the safety zones under the UNCLOS wherein the costal state may exercise its jurisdiction. The concept seems to focus on the prevention of harmful interference through prior notification and coordination, and safety zones are, as it were, precautionary areas that will require advance information to avoid a safety hazard to space-based activities. If that is the case, the concept will square with the intent of Article 9 of the OST that functions as proactive prevention of potential conflicts.

F. *Orbital Debris*

Since the first man-made object was launched into space in 1957, more than 5,600 launches have taken place across the globe. As of May 1 in 2022, of all 5,465 active satellites there are 4,700 placed in low Earth orbit (LEO; in altitude between 200–2,000 km), 140 in medium Earth orbit (MEO; 2,000–36,000 km), 60 in Elliptical (with an altitude at perigee of 200 km and an altitude at apogee of 800 km.), and 565 in geosynchronous equatorial orbit (GEO; at approximately 36,000 km).[127] There is no legal definition of space debris.[128] Technically,

123. *See, e.g.*, French Act No. 68–1181, *supra* note 120; Petroleum Act, *supra* note 120.

124. The Accords, *supra* note 1, § 11.7(c).

125. The Accords, *supra* note 1, § 11.10.

126. The Accords, *supra* note 1, § 11.11.

127. *UCS Satellite Database*, UNION OF CONCERNED SCIENTISTS, https://www.ucsusa.org/resources/satellite-database (last visited Dec. 7, 2022).

128. Although the Legal Sub-Committee of the COPUOS places the issue of space debris on its agenda 10 (General exchange of information and views on legal mechanisms relating to space debris mitigation and remediation measures, taking into account the work of the Scientific and Technical Subcommittee (COPUOS-STSC)), the development of any instrument of legally binding force is yet to come due to the lack of definition of space debris. The fundamental problem is whether or not space debris falls under the "space objects" as provided by the Liability Convention and the Registration Convention. Also, there are the difficulty of identifying the state of registry that has generated debris, the cost-benefit trade-offs of removing the debris, and some states demurring to any instrument of binding force. Carl Q. Christol, *Scientific and Legal Aspects of*

however, space debris is defined as "all man-made objects, including fragments and elements thereof, in Earth orbit or re-entering the atmosphere, that are non-functional."[129] Antisatellite (ASAT) missile tests, orbital collisions, and jettisoned capsules are among the principal sources of space debris.[130] The size of debris varies: the number of non-functional objects larger than 10 cm that are trackable is more than 21,000, and NASA's statistical model estimates that there are 600,000 objects up to 1 cm.[131] They pose a threat to all operational space systems (whether civil or military) since objects in outer space can reach extremely high velocities. Even small particles 10 cm across have such an impact that they can penetrate an American Silver Dollar when colliding with it.[132] In addition, the "Kesller syndrome"—a cascade effect describing the fact that collisions between space debris result in an exponential growth—contributes to the constant growth in debris.[133] The probability of collision risk is particularly high in the LEO and the GEO. The emergence of the mega-constellation of small satellites, called "cubesats," increases such risk and calls for the necessity of space traffic management.[134]

Space Debris, 36 PROC. ON L. OUTER SPACE 366, 372 (1993) (stating that new international space law for man-made debris is required because of the tension between the general principle of sovereign self-protection and the treaty-based principle of national jurisdiction and control over national space objects); Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixtieth Session, U.N. Doc. A/AC.105/1243, at 22, ¶ 156, 167 (2021).

129. U.N. OFF. FOR OUTER SPACE AFF., SPACE DEBRIS MITIGATION GUIDELINES OF THE COMMITTEE ON THE PEACEFUL USE OF OUTER SPACE, at 1, U.N. Sales No. V.09-88517 (2010).

130. Christopher D. Williams, *Space: The Cluttered Frontier*, 60 J. AIR L. & COM. 1139, 1143 (1995); Joshua Tallis, *Remediating Space Debris: Legal and Technical Barriers*, ASPJ AFRICA & FRANCOPHONIE 80, 81 (2015).

131. Rada Popova & Volker Schaus, *The Legal Framework for Space Debris Remediation as a Tool for Sustainability in Outer Space*, 5 AEROSPACE J. 1, 2 (May 9, 2018), https://www.mdpi.com/2226-4310/5/2/55.

132. Marietta Benkö & Kai-Uwe Schrogl, *The UN Committee on the Peaceful Uses of Outer Space: Adoption of the Resolution on Enhancing Registration Practice and of the UN COPUOS Space Debris Mitigation Guidelines*, ZLW 57. JG. 3/2008 335, 343 (2008). About the risk space debris poses, Professor Freeland cites a few recent cases of collision or near-collision: the collision case of American satellite (Iridium 33) and an inactive Russian communications satellite (Kosmos 2251) in 2009; the near collision case of two large 'dead' satellites – IRAS and GGSE-4 – passed within meters of each other in late January 2020. NASA has at various times been forced to move the International Space Station (ISS) when it calculates a higher-than-normal risk of collision with debris. Steven Freeland, *Space Debris: A Major Challenge for the Future of Humanity*, ILA REP. (2021), https://ilareporter.org.au/2021/07/space-debris-a-major-challenge-for-the-future-of-humanity-steven-freeland/.

133. Popova & Schaus, *supra* note 131, at 2.

134. Cubesats are miniaturized satellites only ten centimeters tall, wide, and deep, and less expensive and last a much shorter time than large and complicated satellites. Paul B. Larsen, *Small Satellite Legal Issues*, 82 J. AIR L. & COM. 275, 276–79, 294, 299 (2017).

The signatories to the Accords will plan for the mitigation of orbital debris, when appropriate, as part of their mission planning process, including the safe, timely, and efficient passivation[135] and disposal of spacecraft at the end of their missions.[136] The signatories will also limit, to the extent practicable, the generation of new, long-lived harmful debris released through normal operations, break-up in operational or post-mission.[137] These commitments are in line with or based on the Guidelines 1, 2, and 3 of the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space of 2007 ("Debris Mitigation Guidelines").[138] In the case of cooperative missions, such plans should explicitly include which signatory has the primary responsibility for the end-of-mission planning and implementation. This hortatory clause is unique to the Accords. The Debris Mitigations Guidelines as they stand now are not legally binding by nature like the LTS Guidelines. Dr. Benkö and Dr. Kai-Uwe Schrogl, however, quoting Professor Michael W. Taylor as saying "the space debris mitigation guidelines will certainly provide the legal standard for establishing negligence under the Liability Convention," argue as follows: "This correct line of argument shows that the space debris mitigation guidelines might not be legally 'binding' in a technical sense but still they might become highly relevant in legal practice."[139] Assuming that this line of argument is correct, is it also applicable to the cooperative space activities under the Accords? Who is liable for damage in case of unidentifiable space debris? In connection with the hortatory clause of the Accords as described above, does the signatory who has the primary responsibility for the end-mission planning and implementation acquire the status of the launching state as provided by the Liability Convention? Is the term "to the extent practicable" used in the Accords or "to the greatest extent feasible" in the Debris Mitigation Guidelines not associated with difficulties in establishing negligence, particularly in a field that requires a high degree of scientific and technological knowledge? In any way, there will be a long list of issues to be discussed on the subject moving forward.

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135. Passivation means the removal of all forms of stored energy, including residual propellants and compressed fluids and the discharge of electrical storage devices. Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, Guideline 5, Rep. of the Comm. on the Peaceful Uses of Outer Space, U.N. Doc. A/62/20, annex (2007) [hereinafter Debris Mitigation Guidelines].

136. The Accords, *supra* note 1, § 12.1.

137. *Id.* § 12.2.

138. Debris Mitigation Guidelines, *supra* note 135.

139. Benkö & Kai-Uwe Schrogl, *supra* note 132, at 346.

That said, the 10 principles underlying the Artemis Accords are, taken together, the international code of conduct among like-minded spacefaring nations and cautiously crafted so as not to run counter with existing international space law as exemplified by the principles of due regard and deconfliction of activities. The novel concepts of space heritage and safety zone as such do not seem to largely deviate from the non-appropriation principle of the OST, although their details will remain to be seen in the future. It is still more important that, even in respect of the controversial issue of space resources activities, the Artemis Accords never shut down the multilateral efforts to be undertaken particularly at the COPUOS. In this sense, the Accords partake in a broader trend consolidating the concept of staged governance for the exploitation of space resources.[140] It would not be surprising, however, that they do not refer to the Moon Agreement since all signatories other than Australia and Mexico do not ratify the Agreement. And we need to wait and see how exactly the bilateral agreements implementing the Artemis Accords be drafted and implemented,[141] from the viewpoint of international governance. There would be some doubt, however, that the Artemis Accords of a bottom-up model[142] might go ahead of and prevail over multilateral efforts in the governance of exploitation of space resources in the future. In the next section, we will evaluate to what degree we have succeeded in solving the issue of exploitation of space resources at the multilateral level, tracing back to the drafting history of the OST and the Moon Agreement.

III. Legal Issues of Space Resources Activities

A. *Background: Democratization and Commercialization of Space Activities*

The COPUOS has failed to attain any new legally binding instrument since the last time the Moon Agreement was adopted. One reason is

140. Rossana Deplano, *The Artemis Accords: Evolution or Revolution in International Space Law?*, 70 Int'l & Comp. L.Q. 799, 814, 816 (2021) (observing that a comparison between the provisions of the Accords and those of the Building Blocks embracing an adapting governance (as we shall see in Section IVC1 in this Article) shows the existence of a high degree of compatibility between the two instruments).

141. David Alexandre et al., *Artemis Accords: New law for the moon and outer space?,* DLA Piper, 10 (2020), https://www.dlapiper.com/en/insights/publications/2020/07/artemis-accords-new-law-for-the-moon-and-outer-space.

142. For the discussion about the comparative merits of the treaty-first and top-down model like the International Seabed Authority and the bottom-up model based on best practices, see Alfred B. Anzaldúa & Cristin Finnigan, *From the Truman Proclamation to the Artemis Accords: Steps Toward Establishing a Bottom-up Framework for Governance in Space*, The Space Rev. (Oct. 26, 2020), https://www.thespacereview.com/article/4053/1.

that nowadays, with the rapid progress in applied space technology (e.g., telecommunication, broadcasting and remote sensing), the actors in outer space are not confined to the traditional space powers such as the United States, the former Soviet Union, and European countries. "The contemporary difference is the emergence of lesser-known states intent on capturing industrial benefits, ranging from independent space powers like Japan, China, and India, to entrants such as Australia, Luxembourg, the United Arab Emirates (UAE), Israel, Pakistan, Turkey, and South Africa, to name a few."[143] From the membership aspect of the COPUOS alone, the number was 17 states and increased by over 5 times to 95 in 2019.[144] As a result of the proliferation and diversity of interested states, it has become more difficult to reach consensus, and the COPUOS has come to take the form of non-legally binding principles and resolutions as expressing any agreement among states concerning the exploration and use of outer space.[145] In addition, the North-South divide, as witnessed by the paucity of ratifying states of the Moon Agreement as well as the allocation of frequencies and slots on geostationary orbit, has often amplified the complexities of reaching any agreement among states.[146]

Another reason is the commercialization of outer space. According to the Sofia Guidelines for a Model Law on National Space Legislation adopted by the Space Law Committee of the International Law Association (ILA) in 2012, commercialization, or commercial space activity, is defined as a space activity for the purpose of generating revenue or profit whether conducted by a governmental or by a non-governmental entity.[147] Professor Arthur L. Levine distinguishes the following four types of commercialization.[148] One type is privatization where the space activities under the ownership and operation of the

143. Saadia M. Pekkanen, *Governing The New Space Race*, 113 AJIL UNBOUND 92, 92 (2019).

144. *Committee on the Peaceful Uses of Outer Space: Membership Evolution*, U.N. OFF. FOR OUTER SPACE AFF., https://www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html (last visited Oct. 16, 2022).

145. Tanja Masson-Zwaan, *New States in Space*, 113 AJIL UNBOUND 98, 98–99 (2019). Behind this trend there would also be a growing number of new topics such as ever-smaller satellites, large constellations of hundreds or even thousands of satellites, the prospect of suborbital flights, reusable launch vehicles, on-orbit servicing, and the use of resources from asteroids or the Moon. *Id.* at 99.

146. Kuribayashi, *supra* note 51, at 40, 44, 120.

147. U.N. Secretariat, Information on the Activities of International Intergovernmental and Non-governmental Organizations Relating to Space Law, U.N. Doc. A/AC.105/C.2/2013/CRP.6, at 4 (Mar. 26, 2013).

148. Arthur L. Levine, *Commercialization of Space: Policy and Administration Issue*s, 45 PUB. ADMIN. REV. 562, 563 (1985).

government are, wholly or partially, put under the control of the private sector (e.g., privatization of the Landsat in 1980s[149]). The second is marketing of privately owned technology currently used exclusively by the government (e.g., the shift of operation of the Atlas-Centaur launcher from NASA to the General Dynamics Corporation). The third is private development of new technology with major assistance from the government (e.g., the contract between NASA and McDonnell Douglas (working with Johnson and Johnson) for development of new pharmaceuticals through experiments aboard the space shuttle, with the company receiving free shuttle flights).[150] And the fourth is private development of new products or services without major governmental assistance (e.g., a private launch company like SpaceX). States have been the major players in the space arena since the onset of the space age. The space powers have invested a large amount of public funds in the new capital-intensive business primarily for the purposes of national prestige as well as security and strategic competition with other politically rival states.[151] In the 1990s, private companies started to shift their roles from serving as contractors and subcontractors for states to acting as their own operations. This transformation of the roles of private companies, as symbolized as the "Washington Consensus,"[152] is largely

149. The Carter and Reagan Administrations proposed and Congress approved policies in the 1980s to privatize Landsat under the leadership of the National Oceanic and Atmospheric Administration (NOAA) and a commercial entity, the Earth Observation Satellite Company (EOSAT). The so-called public-private partnership did not work well because the commercial market for Landsat was not robust due to high costs. One of the root causes of high costs is ascribed to non-discriminatory access to satellite data. In practice, equal access to the Landsat operator resulted in equally high prices charged to all users. Joanne I. Gabrynowicz, *Space Law: Its Cold War Origins and Challenges in the Era of Globalization*, 37 SUFFOLK UNIV. L. REV. 1041, 1050 (2004). The Land Remote Sensing Policy Act of 1992 reversed the privatization track for Landsat and returned the satellite system to the federal government. Currently, Landsat is operated under the system that the United States Geological Survey (USGS) operates for the satellites and manages and distributes the data. NASA and the Department of Interior supervise the USGS. ANNA E. NORMAN, CONG. RSCH. SERV., R46560, LANDSAT 9 AND THE FUTURE OF THE SUSTAINABLE LAND IMAGING PROGRAM 21–23 (2020).

150. Levine, *supra* note 148.

151. Ram Jakhu & Maria Buzdugan, *The Role of Private Actors: Commercial Development of the Outer Space Resources, Including Those of the Moon and other Celestial Bodies: Economic and Legal Implications*, *in* SESSION 2: THE ROLE OF PRIVATE ACTORS: COMMERCIAL DEVELOPMENT OF THE OUTER SPACE RESOURCES, INCLUDING THOSE OF THE MOON AND OTHER CELESTIAL BODIES: ECONOMIC AND LEGAL IMPLICATIONS 63 (McGill Univ. 2006).

152. Peter Jankowitsch, *The Background and History of Space Law*, in HANDBOOK OF SPACE L. 13 (Frans von der Dunk ed., Edward Elgar Publ'g 2015). The term Washington Consensus usually refers to the level of agreement between the International Monetary Fund (IMF), World Bank, and U.S. Department of the Treasury on those policy recommendations. All shared the view,

inspired by the politico-economic general trend for deregulation, privatization, globalization, and commercialization.[153]

The common activities for the new generation of private companies are classified into three types of missions: (1) Space Launch Vehicle (reusable and expandable); (2) space tourism; and (3) mining in space resources.[154] Space private companies accumulated from 1940 until 2011 are picking up,[155] and rosy projections suggest that the space industry will grow from U.S. $350 billion today to between U.S. $1–3 trillion by the 2040s.[156] Of the three missions above, the first is already put into practice, and the second comes closer to reality. Unlike the first two missions, the third one is still in the very early stage, and commercial development has not yet started on a large scale, although there are some visionary companies that plan to develop mining technology.[157] Space resources activities are economically in an infant stage because they require the lead time for investment recovery.[158] Yet, the

typically labeled neoliberal, that the operation of the free market and the reduction of state involvement were crucial to development in the global South. Stephen R. Hurt, *Washington Consensus*, ENCYCLOPEDIA BRITANNICA, https://www.britannica.com/topic/Washington-consensus (last updated May 27, 2020).

153. Jakhu & Buzdugan, *supra* note 151, at 67 (arguing that in an era when governments are much more cost-conscious in order to reduce government deficits while not increasing the taxes, more reliance on the private sector for funding new projects is to be expected).

154. Among all the resources on the Moon, minerals, metals, gasses, rare earth elements, helium 3 (to provide safer nuclear energy in a fusion reactor), and water are considered to be prospective. Particularly, water, when split into its constituents, hydrogen and oxygen, provides the most efficient chemical rocket propellants known. Water is also necessary for human settlement and is presumed to be trapped in ice in the polar regions of the Moon. Asteroids can be identified into categories based on their composition. Mining plans tend to focus on three types of asteroids, called NEOs: M-type (nickel, iron, gold and platinum-group metals such as platinum and iridium, helium 3 (as a fuel for safer nuclear fusion power generation), C-type (carbonaceous possibly containing water), and S-type (silicon, iron, magnesium); Ian Christensen et al., *New Policies Needed to Advance Space Mining*, 35 ISSUES SCI. & TECH. 26, 27 (2019).

155. JOANA RIBEIRO GOMES ET AL.,THE ROAD TO PRIVATIZATION OF SPACE EXPLORATION: WHATS MISSING?, 4 (2013), https://www.researchgate.net/publication/289635460_The_road_to_privatization_of_space_exploration_What_is_missing.

156. Pekkanen, *supra* note 143, at 93.

157. Such companies are Deep Space Industries, a U.S.-based venture (acquired by Bradford Space in 2019), Planetary Resources (acquired by ConsenSys in 2018), Moon Express, Shackleton Energy, Luxembourg-based SES, U.K.-based Asteroid Mining Co., and Japan-based iSpace. Michael Weinhoffer, *International Management of Space Resource Extraction: Don't Put the Cart Before the Horse*, 43 J. SPACE L. 171, 172–76 (2019). No private company is, however, close to extracting any resources and the first prospecting mission themselves are still years away. *Id.* at 186.

158. In order for the space resources activities to be economically profitable, Jaku and Buzdugan point out the following six requirements to be met: (1) There must be a market for the products; (2) There must be a reasonable payback time (not in excess of 5 years); (3) Reasonable

combination of commercial activity and use of space resources create perception of tension.[159] Some groups have expressed concern over a perceived gap in the law that creates uncertainty, while others have expressed concern that use of space resources might be conducted to benefit only a few companies and spacefaring nations, and still others argue that the activity is illegal until a binding international regime is put into place to oversee it.

B. *The Outer Space Treaty*

The OST lacks explicit provisions concerning the extraction of space resources. The Board of Directors of International Institute of Space Law ("IISL") in its position paper of 2015 states as follows:

> Therefore, in view of the absence of a clear prohibition of the taking of resources in the OST one can conclude that the use of space resources is permitted. Viewed from this perspective, the new United States Act is a possible interpretation of the OST. Whether and to what extent this interpretation is shared by other States remains to be seen.[160]

The rule that the acts that are not explicitly prohibited are legally permissive has been referred to as "residual or generally permissive rule of sovereignty" and often invoked to fill the gap in law under international law.[161] This rule was first postulated in the judgment rendered in 1927 by the Permanent Court of International Justice concerning the Lotus Case where the Turkish vessel and the S.S. Lotus collided on the high seas and the attribution of criminal jurisdiction was disputed.[162] According to the thrust of the position paper, the primary

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access to the resources; (4) Readily available technology; (5) Manageable risks; and (6) Legal protection of property rights. Jakhu & Buzdugan, *supra* note 151, at 69.

159. Christensen, *supra* note 154, at 27.

160. *Position Paper on Resource Mining*, INT'L INST. SPACE L. 3 (Dec. 20, 2015), https://iisl.space/iisl-position-paper-on-space-resource-mining/.

161. PETER MALANCZUK, AKEHURST'S MODERN INTRODUCTION TO INTE'L L. 44–45 (7th ed., Routledge 1997); Junichi Etoh, *Kokusaihō ni Okeru Kenketu Hojū no Hōri* [*The Legal Principle of Deficiency Replenishment under International Law*], 25 SEKAIHOU NENPOU [YEARBOOK OF WORLD LAW] 68, 71 (2006) (arguing that The ICJ judgment on the Nicaragua Case of 1986 supported the permissive rule to a limited extent in relation to the freedom of armament).

162. The judgment stated in its obiter dictum that "international law governs relations between independent States. The rules of law binding upon States therefore emanate from their own free will. Restrictions upon the independence of States cannot therefore be presumed," continuing that "In this sense jurisdiction is certainly territorial; it cannot be exercised by a State outside its territory except by virtue of a permissive rule derived from international custom or

reason for the absence of law is presumably based on the rationale that it is *less* clear whether the non-appropriation principle as provided by Article 2 of the OST also prohibits the extraction of resources or otherwise the free-use principle of Article 1 of the Treaty includes the right to take and consume the non-renewable natural resources including minerals and water on celestial bodies.[163] It might be open to question whether the rationale immediately warrants the absence of law.

Intrinsically, is the permissive rule of sovereignty applicable to space law? Or otherwise, can the free-use principle of Article 1 be interpreted as including the taking of natural resources? Not a few scholars argue the Lotus Case, which put the presumption in favor of the freedom of actions of states, cannot apply to space law, which requires cooperation and consultation for common interests as the international community becomes interdependent.[164] And indeed, IISL in its background paper of 2016 on the subject in turn does not invoke the generally permissive rule of sovereignty.[165] Through the interpretation of all the relevant provisions of the OST, Professor Stephan Hobe, who completed the paper, concludes that "space resource mining is not prohibited *per se* and that it is an activity falling under the freedom of the use of outer space as laid down in Article I para. 2 Outer Space Treaty, limited however by the fact that according to Article I para. 1 such use must be for the benefit of all mankind and according to Articles IV and IX must be in conformity with the provisions concerning military uses and environmental considerations."[166] Multiple discourses concerning the legality of space resources activities have focused on the interpretation of the OST. Therefore, we will drill down the matter a little deeper.

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from a convention," and ruled that "It does not, however, follow that international law prohibits a State from exercising jurisdiction in its own territory, in respect of any case which relates to acts which have taken place abroad, and in which it cannot rely on some permissive rule of international law." The Case of the S.S. "Lotus" (Fr. v. Turk.), Judgment, 1927 P.C.I.J. (Ser. A) No. 10, at 18–20.

163. *Position Paper on Resource Mining*, *supra* note 160, at 2.

164. Ram Jaku, *Legal Issues Relating to the Global Public Interest in Outer Space*, 32 J. SPACE L. 31, 41–43 (2006). Professor Jaku quotes Professor Wolfgang Friedmann as observing "The traditional system of international law regulates the rules of coexistence between sovereign States. It is essentially a collection of 'don'ts' (prohibitions). On the other hand, the developing 'cooperative' law of nations . . . bind[sl the nations, not in the traditional rules of abstention and respect, but in positive principles of cooperation for common interests."

165. *See generally* Stephan Hobe et al., Background Paper: Does International Space Law Either Permit Or Prohibit the Taking of Resources in Outer Space and on Celestial Bodies, and How is This Relevant for National Actors? What is the Context, and What are the Contours and Limits of this Permission or Prohibition? (Mar. 26, 2016) (unpublished background paper), https://iislweb.space/wp-content/uploads/2020/01/IISL_Space_Mining_Study.pdf.

166. *Id.* at 41–42.

Article 2 of the OST reads, "Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[167] One interpretation of "the prohibition of national appropriation" is that this clause means only the prohibition of establishing territorial sovereignty, irrespective of its means, and thus it is permissible for individuals and private companies to legally acquire a part of outer space including celestial bodies.[168] In contrast, the other is that it prohibits not only the establishment of sovereignty in public law, but also the creation of ownership (property rights) in private law. The latter interpretation was produced by the Government of France. France remarked at the First Committee of the U.N. General Assembly of September in 1966 that "we must be satisfied that three basic principles are affirmed: that is, the prohibition of the proclaiming of rights of sovereignty or ownership in outer space . . .," [169] while pointing out the ambiguity of application between the principle of non-sovereignty—which falls under public law—and that of non-appropriation, flowing from private law.[170] Although France came up with a hypothetical example that blurs the line between those two principles,[171] the French remark

167. This clause was already incorporated into the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space of 1963, in the exact same words. G.A. Res. 1962 (XVIII), at 3 (Dec. 13, 1963). During the drafting process of the Declaration, the three proposals were submitted by the U.S,S,R., the U.K. and the U.S.A. but there were not much all that appreciable difference in meaning. For example, the U.S.S.R. proposed that "sovereignty over outer space or celestial bodies cannot be acquired by use or occupation or in any other way." Rep. of the Legal Sub-Comm. on the Work of Its Second Session to the Comm. on the Peaceful Uses of Outer Space, U.N. Doc. A/AC.105/12, annex I(A) (May 6, 1963). The U.K. submitted that "outer space and celestial bodies are not capable of appropriation or exclusive use by any State and accordingly, no State may claim sovereignty over outer space or over any celestial body, nor can such sovereignty be acquired by means of use or occupation or in any other way." *Id.* at annex I(F). The proposal by the U.S.A. simply stated that "outer space and celestial bodies are not subject to national appropriation." *Id.* at annex I(G). The present wording put these three proposals together. *Id.* at 8–10.

168. Stephen Gorove, *Interpreting Article II of the Outer Space Treaty*, 37 FORDHAM L. REV. 349, 351 (1969). *But see* Jakhu & Buzdugan, *supra* note 151, at 84 (arguing that this view cannot be fully justified since letting private entities to appropriate outer space (including the Moon and other celestial bodies) would defeat the very purpose of Article II and consequently of the Treaty).

169. Comm. on the Peaceful Uses of Outer Space, Rep. of the Comm. to the General Assembly, U.N. Doc. A/C.-1/PV.-1492, at 36 (Jan. 27, 1967).

170. Comm. on the Peaceful Uses of Outer Space, Rep. of the Comm. to the General Assembly, U.N. Doc. A/AC.-105/PV.-44, at 41 (Oct. 25, 1966).

171. The French representative explains the example as follows: "while the principles established by the treaty would no doubt be easy to apply in the case of exploration of space, their application would be more difficult when space activities involve exploitation, and particularly

suggests that there was a general understanding at the COPUOS that establishment of ownership amounts to national appropriation.[172]

These conflicting views of the prohibition of national appropriation stem from the appreciable difference between common law and civil law in the way both understand the relationship between sovereignty and property rights.[173] In common law, ever since William the Conqueror confiscated the old nobility's lands after 1066, all property rights have derived ultimately from the King. Therefore, the prohibition of creating private ownership is automatically included in that of establishment of sovereignty. To the contrary, in civil law countries like France, the existence of territorial sovereignty has never been a prerequisite for property rights. In other words, they are based on the "natural law" principle of *pedis possessio*[174] or "use and occupation" that individuals mix their labor with the soil and create property rights independent of government. It should be noted that the prohibition of national appropriation, whether sovereignty or private property rights, is intended for "the Moon and other celestial bodies" (i.e., "a spatial area" such as place or land) and that the OST tells nothing about the resources. Distinguishing between such a spatial area subject to non-

where simple occupation has to be distinguished from appropriation, which is barred by the treaty." U.N. Doc. A/C.-1/PV.-1492, *supra* note 169.

172. Also, according to the Belgian representative's remark at the COPUOS-LSC of August 8 in 1966, no one had denied during the negotiations that the term "appropriation" covered both the establishment of sovereignty and the creation of titles to property and private law. Unfortunately, the often-cited document (U.N. Doc. A/AC.105/C.2/SR 71, 4 August 1966) is missing in the Travaux Préparatoire of the Outer Space Treaty and not yet confirmed. Stephan Hobe, *Adequacy of the Current Legal and Regulatory Framework Relating to the Extraction and Appropriation of Natural Resources*, 32 ANNALS AIR & SPACE L., 115, 122 (2007).

173. *See* Alan Wasser & Douglas Jobes, *Space Settlements, Property Rights, and International Law: Could a Lunar Settlement Claim the Lunar Real Estate It Needs to Survive*, 73 J. AIR L. & COM. 37, 48–49 (2008).

174. The principle "pedis possessio," which finds its origin in Roman Law and literally means "possession-of-a-foot," was also succeeded into common law statutes like in the United States. *See* General Mining Act of 1872, 30 U.S.C. §§ 22–76. Under the principle, the U.S. Supreme Court in 1919 stated that a prospector actively searching for minerals in the public domain is entitled to protection of the land he occupies against forcible, fraudulent, clandestine, or surreptitious intrusions, if the following essential requirements are met: persistent and diligent work toward discovery; actual occupancy; the exclusion requirement. Thus, the principle has something in common with the theory of occupation of *terra nullius* under international law. It is true that international law of early modern ages, typically the occupation theory, was influenced by the Roman Law, but the application of *pedis possessio* principle to outer space as *res communis*, including the Homestead Act of 1862, squarely runs counter to the non-appropriation principle under Article 2 of the Outer Space Treaty. Brandon C. Gruner, *A New Hope for International Space Law: Incorporating Nineteenth Century First Possession Principles into the 1967 Space Treaty for the Colonization of Outer Space in the Twenty-First Century*, 35 SETON HALL L. REV. 299, 345 (2004).

appropriation and the resources taken out of there, Professor C. Q. Christol succinctly argues as follows:

> Appropriation in the sense used in Article 2 to acquisition of national sovereignty with the consequence that the sovereign would have the ultimate power to dispose of property rights in outer space. Article 2 denies such exclusive rights to a national sovereign. In rejecting such a possibility the Treaty accepted the res communis principle, *thereby allowing for competing users, but not owners or potential owners of spatial areas* [emphasis added], to exploit the available resources *by taking them into possession* [emphasis added].[175]

In other words, to the extent that the prohibition of national appropriation relates to a spatial area, a valid right of property can exist only with a legal system established by a state in relation to property over which the state has sovereignty. Since state claims to sovereignty in space cannot exist, neither can title to immovable property on celestial bodies in space.[176] This interpretation of the all-inclusive principle of non-appropriation seems reasonable, given the fact that Article 2 of the OST was inserted by analogy from Article 4 of the Antarctic Treaty of 1959,[177] which declares that no national activities on Antarctica can result in appropriation subject to national sovereignty.[178] On the other

175. Carl Q. Christol, *International Space Law and the Use of Natural Resources: Solar Energy*, 15 REV. BDI 28, 34 (1980).

176. FRANCIS LYALL & PAUL B. LARSEN, SPACE LAW: A TREATISE 184–85 (2009). For the same reason, Professor Bin Cheng also agrees that outer space and celestial bodies are not only not subject to national appropriation, but also not subject to appropriation under private law. BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 233 (Oxford Univ. Press 1997); *see also Statement by the Board of Directors of the International Institute of Space Law On Claims to Property Rights Regarding the Moon and Other Celestial Bodies*, ILSA (2004), https://iislweb.space/wp-content/uploads/2020/01/IISL_Outer_Space_Treaty_Statement.pdf (stating that "according to international law, and pursuant to Article VI, the activities of non-governmental entities (private parties) are national activities. The prohibition of national appropriation by Article II thus includes appropriation by non-governmental entities . . . .").

177. The Antarctic Treaty, June 23, 1961, 402 U.N.T.S. 71.

178. The case of the claim by Nemitz to the Asteroid 433 Eros is in point. He had a registered claim of title to the Asteroid on a website. NASA's spacecraft, NEAR Shoemaker, landed on the Asteroid. He charged NASA for parking on his asteroid. Although the case seemed like nonsense, NASA rejected the payment of parking fee because the Outer Space Treaty does not permit private ownership of celestial bodies. The position of the Department of States was the same as that of NASA. Nemitz v. United States, Plaintiff's Ex. #1, U.S. DOS, August 15, 2003; Nemitz v. United States, Plaintiff's Ex. #10d, NASA, March 9, 2001. Afterwards, Nemitz brought the case before the Federal District Court of Nevada for his ownership being invaded, but his claim was

hand, this does not mean exclusion of resources activities, in relation to Article 1 of the OST. Article 1 reads as follows:

> The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind. Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.[179]

This provision is considered the same concept as the freedom of the high seas.[180] Not to mention, the authors of the OST did not anticipate the commercial use of outer space to include emerging space resources activities as they stand now. In the 1960s the front runner of space commercialization was, at most, the telecommunication network represented by U.S. Comsat. It is possible, however, to interpret the free use of outer space as including resources activities because they are not prohibited *of themselves*, in the same way as fishing on the high seas, in view of the legal status of outer space including celestial bodies as *res communis omnium* or *res extra commercium*.[181]

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rejected. Then he appealed to the Federal 9th Cir. Court but the case was again dismissed for the reason that the legal ground for his ownership was not established. Robert Kelly, *Nemitz v. United States, A Case of First Impression: Appropriation, Private Property Rights and Space Law Before the Federal Courts of the United States*, 30 J. SPACE L. 297, 297–305 (2004).

179. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, art. 1, Jan. 27, 1967, 610 U.N.T.S. 205.

180. *Treaty on Outer Space: Hearing Before the S. Comm. on Foreign Rel.*, 90th Cong., 1st Sess. 10, 63 (1967). It should be noted in passing that the inserted phrase "irrespective of their degree of economic or scientific development" was proposed by the Brazilian representative and the term "province of all mankind" has the same meaning as "for the benefit of all mankind." *Id.*

181. In the Roman Law, the concept of *res communis omnium* was "structured as a complex category, made of two things in one. The first one – the 'container' - was the physical domain at large: the air, the flowing waters, the seas and, as a consequence, the seashores. The second one — the 'content' – was the set of all things that could be found in that domain, such as birds in the air, fish in the sea or pebbles on the seashores." Andrea Capurso, *The Non-Appropriation Principle: A Roman Interpretation*, 69th Int'l Astronautical Cong. 4 (Oct. 2018), https://iislweb.space/wp-content/uploads/2020/01/The-NonAppropriation-Principle-A-Roman-Interpretation.pdf. "[T]he content was . . . considered a *res nullius*, out of anyone's patrimony (in its natural state), but susceptible to be appropriated once seized." *Id.* "[T]hose domains were essential for the survival of ancient societies. Fishing, haunting, sailing, were all critical activities on which the economy of every village and city was

That said, the problem underlying resource activities is the issue of whether they are legal or illegal alone cannot fully satisfy substantial reasonableness of their consequence. Eilene Galloway criticizes the proposal advocating property rights in space and on celestial bodies and argues as follows:

> The proposal evidently arises from the unquestioned assumption that an accepted practice on Earth can automatically be transferred to outer space. Actually, all space activities must conform by means of space science and technology to the unique condition of the outer space environment which is lethal, hostile to humans and vehicles, and extremely expensive to develop. We could expect rival claims among nations. . .Commercial space uses are apt to differ, but their unique characteristics could be accommodated as long as they are in compliance with the safety and order required for maintaining peace.[182]

This caution would also apply to space resources activities that are not subject to the non-appropriation principle. Drawing upon the caution Professor Matt Craven gives, it is imperative to ward off the potential that Outer Space configured as a global commons might be a site of rivalry or primitive accumulation.[183] That is, even if the use of outer space including celestial bodies is free under the OST, in the event it lacks the due regard to the corresponding interests of all other state parties to the treaty and results in creating the situation "first comes, first served," would it be contradictory to the goal of the benefit of all mankind? To avoid such results in advance and keep the space environment sustainable, would it be necessary to form cooperation? These challenges have yet to be dealt with.[184]

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based. That is why the physical domain in which those activities were conducted could not be restricted from the common use through appropriation . . . and it is why the things that were contained in them had to be appropriable (*res nullius*)." *Id.* In Capurso's article, however, the question is raised whether or not the use of the celestial body is in practice equal to the appropriation of the celestial body itself if a dwarf asteroid is mined until its resources are completely consumed. *Id.* at 7.

182. Eilene Galloway, *Commentary Maintaining International Space Cooperation For Peaceful Uses*, 30 J. SPACE L. 311, 314–15 (2004).

183. Matt Craven, *'Other Spaces': Constructing the Legal Architecture of a Cold War Commons and the Scientific-Technical Imaginary of Outer Space*, 30 EUR. J. INT'L L. 547, 556 (2019).

184. Professor Henry Hertzfeld presents, in addition to the issue of property rights, the following complicated issues facing the growing area of commercial space: how to balance the requirements not to harm the space environment; how to collectively approach safety regulations

C. *The Moon Agreement Revisited*

1. The Concept of CHM

Why have many space-faring states not ratified the Moon Agreement? The very low number of ratifications is attributable to some factors external to the Agreement, such as the lack of interest of the United States and the Soviet Union in carrying on with the lunar exploration in the 1980s and 1990s and the budgetary limits faced by state space agencies that forced them to invest resources in activities that generate certain and immediate financial benefits (e.g., the development of telecommunication satellites), but the main reason behind the failure of the Agreement is to be found in the provision of Article 11.[185] At the United Nations, the deliberations of the Moon Agreement were synchronized with those of the UNCLOS in which the deep-sea bed and its resources are characterized as the CHM, the exploration and exploitation of the resources shall be undertaken under the centralized control by the International Seabed Authority, and serious discord had arisen among states over the terms and conditions of development in favor of developing countries such as production policy, mandatory transfer of technology and revenue sharing. Such bitter experience that developed countries have been through is behind their sense of resistance to the CHM concept as such. Interestingly enough, the United States was willing to introduce the concept into the Moon Agreement from the outset of negotiations. The United States did not believe that the concept carried with it substantial legal baggage, and the U.S. position in essence was that the concept would simply parallel and conform to Articles 1 and 2 of the OST.[186] In contrast, developing countries considered the concept as common property in essence and thus developed and developing countries differed in interpretation of the

for human beings; and how to develop civil and government cooperative programs in the most advantageous way. Henry Hertzfeld, *Current and Future Issues in International Space Law*, 15 ILSA J. INT'L & COMPAR. L. 325, 334 (2009). In the words of Professor Steven Freeland, we need to carefully consider the potential for a 'tragedy of the commons' situation in relation to space resources. Steven Freeland, *Common Heritage, Not Common Law: How International Law Will Regulate Proposals to Exploit Space Resources*, 35 QUESTIONS INT'L. L. 19, 33 (2017).

185. Fabio Tronchetti, *The Moon Agreement in the 21st Century: Addressing its Potential Role in the Era of Commercial Exploitation of the Natural Resources of the Moon and Other Celestial Bodies*, 36 J. SPACE L. 489, 491 (2010).

186. *The Moon Treaty: Hearings before the Sub-Comm. on Science, Tech., and Space of the Comm. on Commerce, Science and Transp.*, 96th Cong. 13 (July 29 & 31, 1980) (statement of Roberts B. Owen, Legal Advisor, Dept. Of State) [hereinafter Moon Treaty Hearings].

concept as well as its legal effect.[187] Argentina was the first to propose a draft Moon Agreement at the COPUOS-LSC in July, 1970, in reply to the question raised by the U.S.S.R. that the term "heritage" had a philosophical rather than a legal sense. Argentina stated that the term means *patrimonio* of which ownership was equivalent to *dominio útile* (beneficial ownership). It explained about the term as follows:

> There undoubtedly exists on the moon beneficial ownership, pertaining to its utilization and to the possible exploitation of its natural resources. What is one to call this community of ownership, this conjunction of profits, this joint receipt of fruits and products —in a word, this common property of the moon? There is no need to create anything new. The idea of heritage- which can even be intangible - has existed since olden times, and it resolves the issue without any major difficulty. Moreover, international law has always recognized, in addition to sovereignty, a right of ownership on the part of States, which is no different from the concept of ownership under general law.[188]

Argentina also referred to the 1979 Declaration of Principles Governing the Sea-Bed and the Ocean Floor, and the Subsoil Thereof, beyond the Limits of National Jurisdiction[189] as definite proof of the existence of the above-mentioned legal viewpoint.[190] This clearly indicates that Argentina's initial proposal tried to use the CHM concept as an analogy from the law of the sea. It is difficult to say, however, that such attempt was successfully reflected in the Moon Agreement adopted. That can be evinced by the following negotiating history of Article 11, paragraph 1, of the Agreement. The U.S.S.R. had consistently opposed the insertion of the CHM concept since 1973. Once the draft clause of April in 1978, providing that "the Moon and its natural resources *shall be considered* the common heritage of mankind, which find its expression in the *relevant* provisions of this Agreement *and* in particular in paragraph 5 of this article [emphasis added],"[191] changed to the

187. Leigh Ratiner (Legal Counselor, Non-Profit L-5 Society), Statement, *id.* at 108–111; Trochetti, *supra* note 185, at 491–92.

188. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixteenth Session, U.N. Doc. A/AC.105/196, annex I, at 14 (1977).

189. G.A. Res. 2749 (XXV) (Dec. 12, 1970).

190. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixteenth Session, U.N. Doc. A/AC.105/196, annex I, at 16 (1977).

191. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on its Seventeenth Session, U.N. Doc. A/AC. 105/218, annex I, at 6 (1978) (emphasis added).

present wording, which reads that "the Moon and its natural resources are common heritage of mankind, which find its expression in the provisions of the Agreement, in particular in paragraph 5 of this article," the U.S.S.R. ceased to block consensus.[192] That is, the CHM concept of the Moon Agreement was detached from that of the UNCLOS, and its content was to be clarified within the framework of the future international regime, which became acceptable to the U.S.S.R.[193] As Professor Christol states as underlying premises of the CHM principle in his letter addressed to the Senate Hearings of the U.S. Congress in 1980, "A legal principle is a starting point for legal reasoning. It is not the function of a principal to provide specific and detailed consequence-laden requirements. That is the function of rules, and these most frequently emerge as the principle is applied to the practical situations."[194] Thus, the CHM is an evolving principle and not one frozen in time.[195] Indeed, the Moon Agreement is a groundbreaking treaty that first embraced the CHM concept, but the Agreement itself is hardly clear about what its substance is like.[196]

The main purposes of the international regime to be established include: "(a) the orderly and safe development of the natural resources of the moon; (b) the rational management of those resources; (c) the expansion of opportunities in the use of those resources; (d) an equitable sharing by all states parties in the benefits derived from those resources . . ."[197] In sharing the benefits as described in sub-paragraph (d) above, the interest and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special

192. Moon Treaty Hearings, *supra* note 186, at 59, 175 (statements of NASA General Counsel S. Neil Hosenball and Eilene Galloway, Honorary Director, International Institute of Space Law of the International Astronautical Federation). With respect to the time frame of establishing the international regime in paragraph 5 of Article 11, the square bracket attached to the previous draft clause came off and the phrase "as such exploitation is about to become feasible" as it stands now was finalized in the said Austrian working paper. This factor also seems to be behind the compromise. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Third Session, U.N. Doc. A/AC.105/240 (Apr. 10, 1979), Annex III, at 2.

193. Moon Treaty Hearings, *supra* note 186, at 19–20.

194. Moon Treaty Hearings, *supra* note 186, at 196 (statement of Robert B. Owens).

195. U.N. Office for Outer Space Affairs, 20 Years of the Moon Agreement: Space Law Challenges for Returning to the Moon, at 347, U.N. Doc. ST/SPACE/28, U.N. Sales No. E.05.I.76 (2005).

196. Tadao Kuribayashi, *Tsuki-Kyoutei no Seiritsu to sono Igi* [*The Moon Agreement Adopted and Its Significance*], *in* Festschrift For 125-Year Anniversary Of The Foundation Of Keio University: Faculty Of Law - Legal Affairs 215 (Keio University Press 1983).

197. The Moon Agreement, *supra* note 10, art. 11.7.

consideration. Therefore, subparagraph (d) does not mean "equal sharing," and the object of sharing is not a commodity, but relates to the benefits "derived from" those resources.[198]

As the models of the international regime that meet those purposes above, the schemes like the pre-privatized International Telecommunications Satellite Organization (INTELSAT) and International Maritime Satellite Organization (INMARSAT) were presented and recommended at the U.S. Senate Hearings of 1980.[199] In 2002, Professor Christol submitted a concrete proposal on equal sharing to the Space Law Committee of the International Law Association (ILA) held in New Delhi.[200] According to his proposal, in case of exploitative activity by a private firm, when it has realized a net profit on its investment in the exploitation of moon and celestial bodies for a period of seven successive years, it shall thereafter pay a certain percentage (for example, twenty five percent) of its net profit to the United Nations.[201] Such funds are to be used by the United Nations to promote and advance, in accordance with the CHM principle, the Human Rights and human needs particularly of the peoples of developing countries.[202] In any year in which a private firm realizes no net profit there shall be no duty to make this payment.[203] In case of exploitative activity by a state or a public international organization, the conditions of

198. Kuribayashi, *supra* note 196, at 214.

199. The reasons why INTELSAT and INMARSAT are successful for those purposes could be summarized as follows. (1) Each covers a definite function whose elements can be identified and dealt with specifically. (2) Both multilateral agreements were worked out with due regard for general outer space principles. (3) There was recognition in both cases that economic and technical particularities must be efficient and feasible. As to INMARSAT, (4) it is non-discriminatory on the basis of nationality, (5) it is established with an organization with to act "exclusively for peaceful purposes" on a "sound economic and financial basis having regard to accepted commercial principles," (6) Like the INMARSAT's Operating Agreement specifies management and administrative procedures to improve maritime distress and safety system, etc., "orderly and safe development" as described in subparagraph (a) of Article 11, paragraph 7, requires similar specific approach, (7) "rational management" in subparagraph (b) means using suitable advanced space technology for the most efficient and economic facilities, (8) serving all areas where there is need for maritime communication leads to "the expansion of opportunities" in subparagraph (c), and (9) the purpose of equitable sharing in subparagraph (d) is aligned with the provision that financial interests of states parties to INMARSAT are in accordance with the proportion of their investment shares. The Moon Treaty Hearings, *supra* note 186, at 180–181 (statement of Eilene Galloway).

200. Maureen Williams, Final Report on the Review of Space Law Treaties in view of Commercial Space Activities - Concrete Proposals, *in* ILA NEW DELHI CONFERENCE, SPACE LAW COMMITTEE (2002).

201. *Id.* at 13.

202. *Id.* at 14.

203. *Id.*

revenue sharing are basically the same as the case of a private firm, except for the period required for making a profit and the percentage of profit to be paid.[204]

Another idea takes a cue from the credit scheme adopted in the 1985 Montreal Protocol on Substances that Deplete the Ozone Layer[205] and adapts the scheme to the future international regime to govern the exploitation of lunar resources. In this idea,[206] each country would be allocated a certain amount of lunar mining credits, which would allow the holder of the credits to engage in mining certain tonnage of natural resources. The number of credits allocated to a country would be determined in proportion to its population. An equitable distribution of credits could be obtained if an allowance for increasing allocations would go to especially needy countries. Countries with the technological ability to mine the Moon would be allowed to do so in amounts commensurate with their credit allotment. If they wanted to mine more than they were allowed, they could purchase credits from countries not wanting or not able to mine, or alternatively could associate these countries in their mining activities. The allocation of credits by country in proportion to its population is, however, advantageous to the countries with a large population like China and India, and there would be a potential competitive claim of mining sites.[207]

In 1996, the United Nations adopted by consensus 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 ("Space Benefits Declaration").[208] The Space Benefits Declaration provides an authoritative interpretation of the principle on international cooperation as stipulated by Article 1 of the OST mitigates the requirement of mandatory transfer of technology for which is provided in the UNCLOS. In the discussions on the subject which started at the initiative of the developing countries in the COPUOS-LSC in 1986, some

204. *Id.*

205. Montreal Protocol on Substances that Deplete the Ozone Layer, Sept. 16, 1987, 1522 U.N. T.S. 1-26369.

206. Edwin W. Paxson III, *Sharing the Benefits of Outer Space Exploration: Space Law and Economic Development*, 14 MICH. J. INT'L L. 487, 513–15 (1993).

207. Abigail D. Pershing, *Interpreting the Outer Space Treaty's Non Appropriation Principle: Customary International Law from 1967 to Today*, 44 YALE J. INT'L L. 149, 172 (2019).

208. 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, U.N. Doc. A/RES/51/122, annex (Feb. 4, 1997) [hereinafter Space Benefits Declaration].

proposals to impose preferential treatments to the developing countries on the developed countries were submitted in 1991.[209] These proposals, however, came up against opposition from the developed countries and the initial demand for preferential measures was toned down in the end. The Space Benefits Declaration provides that states are free to determine all aspects of their participation in international cooperation in the exploration and use of outer space on *an equitable and mutually acceptable basis*.[210] Furthermore, the Declaration advocates that international cooperation, while taking into particular account the needs of developing countries, should aim, *inter alia*, at the following goals: promoting the development of space science and technology and of its applications; fostering the development of relevant and appropriate space capabilities in interested states; and facilitating the exchange of expertise and technology among states on a mutually acceptable basis.[211] Therefore, in light of the Space Benefits Declaration, the alternatives for monetary or credit schemes mentioned above also need to be considered which include the mode of engaging the developing countries in the lunar exploration programs of the space-faring states on an equitable and acceptable basis.

In any way, while the establishment of international regime is left to the deliberations at the review conference[212] to be convened under Article 18 of the Moon Agreement, not a single review conference has been held among the states parties in the past 17 years after the entry into effect of the Agreement.

2. Space Resources Activities and Moratorium Issue

a. Relationship Between the Moon Agreement and the Outer Space Treaty

While the Moon Agreement mixes the provisions involving the CHM principle with those which follow or evolve the OST on the basis of the concept of *res communis*, the latter provisions are more than the former

209. For example, these proposals included special responsibility for international cooperation, access to the space knowledge and application, enjoyment of benefits from the preferential treatments, and transfer of technology. These were influenced by the trend for the New International Economic Order. Fabio Tronchetti, The Exploitation of Natural Resources of The Moon And Other Celestial Bodies 62, 65–77, 79 (F.G. von der Dunk et al., eds., 2007).

210. Space Benefits Declaration, *supra* note 208, ¶ 2, at 3.

211. *Id.* ¶ 5.

212. The review conference can be convened at the U.N. General Assembly to be held ten years after the entry into force of the Agreement or at any time after five years from the effective date. *See* The Moon Agreement, *supra* note 10, art. 18.

in whole.[213] For example, Article 4, paragraph 1, stipulating that 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, follows the OST. The same paragraph adding that due regard shall be paid to interests of present and future generations as well as to the need to promote higher standards of living conditions of economic and social progress and development in accordance with the Charter of the United Nations embraces the demand for sustainable space evolving after the OST and gives more concrete shape to the benefit of all mankind. The provision of non-appropriation (Article 11, paragraph 2) exactly mirrors Article 2 of the OST. Article 11, paragraph 3 of the Agreement denies the property rights of any state, IGO or NGO, non-governmental entity or natural person not only to any part of celestial bodies but also to natural resources in place.[214] Given the fact that the term "in place" specifically inserted in this paragraph means that the natural resources once extracted from the surface or subsoil of the moon can be subject to ownership rights, the term clarifies the interpretation of non-appropriation principle of the OST.

The provisions on the freedom of scientific investigation also detail the pertinent articles of the OST, stipulating as follows:

> In carrying out scientific investigations and in furtherance of the provisions of this Agreement, the states parties shall have the right to collect on and remove from the moon samples of its mineral and other substances. Such samples shall remain at the disposal of those States Parties which caused them to be collected and may be used by them for scientific purposes.[215]

Even in this case, states parties shall have regard to the desirability of making a portion of such samples available to other interested states parties and the international scientific community for scientific investigation. In practice, the Moon rocks collected and brought back to

213. Frans G. von der Dunk, *Back in Business?: The Moon Agreement, Private Actors and Possible Commercial Exploitation of the Moon and Its Natural Resources*, *in* SESSION 5: THE ACCEPTABILITY OF THE MOON AGREEMENT AND ROAD AHEAD? 256 (McGill Univ. 2006).

214. The same paragraph also prohibits the creation of ownership through the placement of personnel, space vehicles equipment, facilities, stations and installations. As the paragraph also adds that the foregoing provisions are without prejudice to the international regime referred to in paragraph 5 of this Article, it does not prohibit even the ownership rights of the future international regime. The Moon Agreement, *supra* note 10, art.11.3.

215. The Moon Agreement, *supra* note 10, art. 6.2.

Earth by Apollo 11 have been handed over to NASA as national property.[216] The same goes for the Soviet Union. As seen above, in case of scientific investigation, without the use of such words as "property" and "ownership," the article allows the exclusive use of the identified substances. Space-resource states were given specific power to use the identified materials in quantities needed to engage in the present and immediate need of carrying on scientific investigation, but Professor Christol states that since, over time, the nature and extent of such investigations may be far-ranging, this provision will allow for very substantial uses of natural resources.[217] Article 7 of the Agreement dealing with the prevention of the disruption of the existing balance of the Moon[218] and the designation of areas of the Moon as having special scientific interest as international scientific preserves also can be seen as the evolution of Article 9 of the OST. Article 14 (international responsibility) as well as Article 12 (the legal status of personnel, space vehicles, equipment,

216. Pershing, *supra* note 207, at 158. In Cicco v. NASA, in connection with ownership of lunar dust, the subject matter jurisdiction was disputed in the U.S. Court. Plaintiff Laura Muray Cicco filed suit against Defendant NASA. She brought this action seeking a declaratory judgment that she was a rightful owner of a glass vial containing dust from the surface of the moon given to her from famous astronaut Neil Armstrong. Although NASA did not actually confiscate her property, NASA's longstanding position was that all lunar material belongs to the nation. The Court found that it lacked subject matter jurisdiction because of Plaintiff's failure to establish a waiver of sovereign immunity and granted NASA's motion to dismiss. Cicco v. Nat'l Aeronautics and Space Admin., No. 18-1164-EFM-TJJ, 2019 WL 1670759 (D. Kan. Apr. 17, 2019). In re One Lucite Ball Containing Lunar Material, the moon rock and plaque collected by NASA gifted by then President Nixon to the government and people of Honduras. While in Honduras on business, Rosen, an American, purchased the moon rock and plaque without knowing they were in fact stolen from the Honduran Presidential Palace and brought them back to the United States. The court ruled that ownership of the moon rock had never changed after it was given by the United States to Honduras –and therefore was not Rosen's property, even if he was an innocent third party. The rock and plaque were therefore properly seized by the authorities and returned to Honduras. United States v. One Lucite Ball Containing Lunar Material, 252 F. Supp. 2d 1367 (S. D. Fla. 2003).

217. Carl Q. Christol, *The Common Heritage of Mankind Provision in the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, 14 INT'L L. 429, 465–66 (1980).

218. According to the understanding of COPUOS, this provision on environmental protection does not aim at prohibiting the exploitation of natural resources but conducting the resources activities so as to minimize their environment load as much as possible. Comm. on the Peaceful Uses of Outer Space, Rep. of the Comm. to the General Assembly, U.N. Doc. A/AC.105/PV.203, at 22–23 (July 16, 1979). The Planetary Protection Panel of Committee on Space Research (COSPAR) updates its policy on planetary protection from time to time. *See Planetary Protection Policy*, COMM. ON SPACE RSCH. (2020), https://cosparhq.cnes.fr/assets/uploads/2021/01/Research_Outreach_PPP_2020.pdf. Incidentally, the U.S.-Japan Gateway MOU also provides in its Article 20 that the parties shall apply biological planetary protection measures, consistent with the guidelines contained in the COSPAR Planetary Protection Policy.

stations, etc.) of the Agreement apply *mutatis mutandis* the relevant U. N. space-related treaties. All in all, Professor Kuribayashi sums up the relationship between the Moon Agreement and the OST as follows:

> While the Moon Agreement transcends the reciprocity of inspection system on stations and emphasizes the importance of consultation more than the OST and in this respect evolves more specifically the general principles of the OST, it includes the issue areas which substantially surpass the scope of space activities covered by the OST in the sense that it adds the issue of exploitation of natural resources as one of its significant challenges.[219]

b. The Resources Activities and Moratorium Issue

The primary issue of the Moon Agreement concerned the question of whether exploitation of resources would be prohibited pending the establishment of an international regime, that is, the moratorium issue. At the COPUOS-LSC three different views on the subject were expressed, which blocked the consensus.[220] One view was that space activities should only be permitted for scientific purposes; another one was that in addition to utilization for scientific purposes, utilization should also be allowed for other experimental purposes. The third view held that exploitation should be allowed for any peaceful purposes. In March 1973, the Indian delegate in its working paper proposed that exploitation of the resources of the Moon and other celestial bodies and their subsoil shall not be done except in accordance with the international regime to be established. [221] The Iran delegate also expressed in October 1974 its view that the natural resources of the Moon and celestial bodies should be the common heritage of mankind and should be exploited only within the framework of an appropriate international regime.[222] In May 1976 Mexican delegation argued for a moratorium, too, saying that the term "when such exploitation was feasible" was subject to various interpretations, and that the provision could be taken to

219. Kuribayashi, *supra* note 196, at 219–220.

220. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Twelfth Session, U.N. Doc. A/9020 , annex II, at 23 (1973).

221. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixteenth Session, U.N. Doc. A/AC.105/196 , annex I, at 10 (Apr. 11, 1977).

222. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Thirteenth Session, U.N. Doc. A/AC.105/C.2/SR.209, at 26 (May 4, 1974).

mean that there should be a moratorium.[223] The Italian delegation expressed in its working paper the view that while natural resources of the Moon can be freely used by states for the purpose of exploration of outer space and its celestial bodies in the interest and for the benefit of all countries, the natural resources of the Moon cannot be transferred to the Earth by any country for its own exclusive economic benefit: those resources shall be transferred on to the Earth only under the provisions of an international regime as specified by the following article.[224] This view seems to need some explanation. The purpose of this view is not clear about whether the exploitation as such must await the establishment of the international regime, but in this regard the Italian delegation explains that those resources may be used by anyone *in loco*, that is on the spot, and that they should be subject to an equitable distribution among all the people of the world.[225] Therefore, if the exploitation on the spot is permitted but the transfer of resources on to the Earth is not allowed until an equitable distribution of benefit is in place, this view may amount to be a moratorium pending the international regime. With respect to these proposals for a moratorium, S. Neil Hosenball, chief of the U.S. Delegation, testified in the Senate Hearings that: (i) the words "in place" referred to in its working paper 15 produced on April 17, 1973, are intended to indicate the prohibition against assertion of property rights would not apply to natural resources once reduced to possession through exploitation either in pre-regime period or, subject to the rules and procedure that a regime would constitute, following the establishment of the regime; and (ii) proposals for such a moratorium were submitted for the record by India, Italy, and other delegations, but no such provisions appear anywhere in the Treaty and the United States through numerous statements in the record said it would not accept a moratorium.[226]

In fact, the proposal for a moratorium was inserted in square bracket in the draft agreement of 1975[227] produced by the working group, but the moratorium provision as such was withdrawn from the draft text

223. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifteenth Session, U.N. Doc. A/AC.105/C.2/SR.249, at 8 (May 7, 1976).

224. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifteenth Session, U.N. Doc. A/AC.105/171, annex I, at 2 (May 28, 1976).

225. COPUOS, 20th Sess., 172d mtg. at 62, U.N. Doc. A/AC.105/PV.172 (July 20, 1977).

226. Moon Treaty Hearings, *supra* note 186, at 59 (statement of S. Neil Hosenball).

227. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixteenth Session, U.N. Doc. A/AC.105/196, annex I, art. X bis, ¶ 6 at 7 (Apr. 11, 1977).

of 1978[228] prepared by Austria which served as chairman of the working group. Furthermore, the United States which persistently had opposed to the moratorium remarks at the plenary meeting of the COPUOS in 1979 in which consensus was finally reached as follows:

> The draft agreement—and I am particularly pleased about this, as a member of NASA—as part of the compromises made by many delegations, places no moratorium upon the exploitation of the natural resources on celestial bodies pending the establishment of an international regime. This permits orderly attempts to establish that such exploitation is in fact feasible and practicable, by making possible experimental beginnings and, then, pilot operations, a process by which we believe we can learn if it will be practicable and feasible to exploit the mineral resources of such celestial bodies.[229]

From the foregoing drafting history, it is reasonable to conclude that no moratorium is placed upon the exploitation pending the establishment of an international regime. Professor Christol is right in saying, "The Moon Treaty is not designed to turn the clock back on this major achievement. Rather, the treaty, through the establishment of legal rights and duties, has sought to normalize and regularize the rights to exploit the particular resources identified in the treaty."[230]

In 2008, the seven States Parties to the Moon Agreement issued a joint statement for the purpose of providing the COPUOS with the elements for reflection in the framework of its activities aiming at the development and the wider application of outer space law.[231] The joint statement, with respect to Article 11 of the Moon Agreement, empha

228. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Eighteenth Session, U.N. Doc. A/AC.105/240, annex III, at 9–10 (Apr. 10, 1979).

229. COPUOS, 22d Sess., 203d mtg. at 22, U.N.Doc. A/AC.105/PV.203 (July 16, 1979).

230. Christol, *supra* note 217, at 478. On the issue of moratorium, Stephan E. Doyle also maintains that materials "in place" on the moon are the property of everyone, but once they are reduced to use this point is moot and negates the moratorium. Stephan E. Doyle, *Using Extraterrestrial Resources Under the Moon Agreement of 1979*, 26 J. SPACE L. 111, 122 (1998) (saying that to argue for a moratorium, "one must ignore the explicit provisions of Article 6, paragraph 2, which states that States parties may . . . use mineral and other substances of the moon in quantities appropriate for the support of their missions.").

231. Joint Statement on the Benefits of Adherence to the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies of 1979 by States Parties to that Agreement, U.N. Doc. A/AC.105/C.2/2008/CRP.11 (Apr. 2, 2008). This statement was announced by Austria, Belgium, Chile, Mexico, the Netherlands, Pakistan, and the Philippines.

sized the following aspects.[232] First, although such exploitation is not prohibited by international law, it must be considered subject to respect for the principles applicable to outer space, in particular Article 2 of the OST. Second, the Moon Agreement doesn't propose a closed and complete mechanism. To wit, the Moon Agreement leaves the responsibility to define, set up and implement such a regime, responding to the status of CHM and other principles of outer space law to the states involved at the time the exploitation of Celestial Bodies' natural resources will become feasible. And this should be done by taking into account simultaneously the reality of political, legal and technical facts, possibilities and requirements as known at that time. Third, the Agreement does not preclude any modality of exploitation, by public and/or by private entities, nor forbids commercial treatment, as long as such exploitation is compatible with the requirements of the CHM regime. Nonetheless, as represented in his statement at the Senate Hearings by Ratiner who once involved in the negotiations of the UNCLOS, the view still remains deeply rooted in the United States that Article 11 of the Agreement places an implied moratorium on the exploitation and that the COPUOS-LSC should set out the definition of CHM which will be a potentially crippling disincentive to investment in R&D activities.[233]

In his Executive Order of April in 2020, Former U.S. President Donald Trump set out that the United States did not view outer space as a global commons and states as follows:

> The United States is not a party to the Moon Agreement. Further, the United States does not consider the Moon Agreement to be an effective or necessary instrument to guide nation states regarding the promotion of commercial participation in the long-term exploration, scientific discovery, and use of the Moon, Mars, or other celestial bodies. Accordingly, the Secretary of State shall object to any attempt by any other state or international organization to treat the Moon Agreement as reflecting or otherwise expressing customary international law.[234]

232. *Id.* at 5.

233. Moon Treaty Hearings, *supra* note 186, at 120–21, 123 (statement of Leigh S. Ratiner).

234. Encouraging International Support for the Recovery and Use of Space Resources, 85 Fed. Reg. 20381, 20381–82 (Apr. 6, 2020).

This is a decisive declaration of intent to break with the Moon Agreement on the part of the United States. Section 1 of the Executive Order provides that successful long-term exploration and scientific discovery of the Moon, Mars, and other celestial bodies will require partnership with commercial entities to recover and use resources, including water and certain minerals, in outer space. Accordingly, the Executive Order encourages the governmental departments and agencies concerned to take all appropriate actions to encourage international support for the public and private recovery and use of resources in outer space. The Trump administration's rejection of viewing outer space as a global commons sounds perplexing and rather provocative against the conventional wisdom that the atmosphere, the oceans, the ocean-atmospheric system, and the ozone layer, including outer space and Antarctica, are examples of global commons.

However, there is no precise legal definition of global commons. Professor Henry R. Herzfeld et al. argue that there is a logical contradiction in this discussion about outer space being treated as a commons, and that thinking about space as a global commons may be a laudatory ideal, and one that perhaps can be regarded as a very long-term goal for society.[235] On the other hand, traditionally a commons constitutes an area to which one cannot prevent access. A global commons that we all share does not always come with common property. From an ethical and ecological perspective, Professor Edith B. Weiss draws attention to the meaning of a commons as follows: "One could argue that the Earth constitutes common property for us, but this could not imply that we could do with the Earth whatever we wanted to do. Rather we are intrinsically part of the system and, in this sense, we are owners of the global commons."[236] There is no way for us to know the meaning of "a global commons" as used in the Executive Order. John S. Goehring, a

235. One reason for a logical contradiction is that if a commons needs a sovereign government to grant the open territory to the use of all people, it is that government that has to oversee, regulate, and enforce that charter. However, outer space is an area without a government pursuant to Article 2 of the Outer Space Treaty. The other reason for a logical contradiction is that even if all nations regard outer space as a "commons," it is a very different concept from any commons that has been established in the past.There is no real legal precedent, no true means of oversight or enforcement. According to this argument, outer space is neither a commons nor a public good. It is a geographic location with many different regions. Exploring and using each region of interest to humankind will require different legal and practical approaches. HENRY R. HERTZFELD ET AL., HOW SIMPLE TERMS MISLEAD US: THE PITFALLS OF THINKING ABOUT OUTER SPACE AS A COMMONS 11 (Int'l Astronautical Fed'n 2015).

236. Edith Brown Weiss, *Nature and the Law: The Global Commons and the Common Concern of Humankind*, *in* SUSTAINABLE HUMANITY SUSTAINABLE NATURE OUR RESPONSIBILITY 407, 408 (Pontifical Acad. of Sci., Vatican City 2014).

space and international law attorney for the U.S. Department of Defense, however, distinguishes the idea of a commons in a military and geopolitical context from that in an economic context. According to this differentiation, the former is described as an enabling concept in the sense that it functions as an enabler of prosperity, security and global order through the use of an open access domain, while the latter is described as a constraining concept in the sense that it is often associated with notions of shared ownership, public governance or limitations of use.[237] The constraining concept is sometimes associated with the common heritage of mankind concept, particularly in the context of outer space. Right or wrong, as long as the term "global commons" in the Executive Order refers to common property or CHM, the United States' negative view of outer space might make sense. In any event, the Artemis Accords as described in detail in Section II of this Article are the outcome of those appropriate actions, as well as a solution to an international framework for space resources activities that the United States for its part worked out instead of the Moon Agreement.

IV. Governance of Space Resources Activities

A. *National Legislations*

1. United States

In November 2015, the U.S. Congress passed the Space Resource Exploration and Utilization Act which finally recognized the property rights to the resources extracted from celestial bodies, and incorporated it into Commercial Space Launch Competitiveness Act (CSLCA) as its Title IV.[238] The Act is based on the recognition that, whereas the successful exploration and use of in-situ asteroid resources is an important step in humanity's development and is in the national interests of the United States, continued private sector investment in resource exploration and utilization is threatened by uncertainty as to the rights of U.S. private entities to remove, take possession of, and use in-situ asteroid resources.[239] Thus, the House Committee found that it was imperative to enact domestic legislation that gives effect to OST provisions

237. John S. Goehring, *Why Isn't Outer Space a Global Commons?*, 11 J. Nat'l Sec. L. & Pol'y 573, 576–77, 580–81 (2021).

238. *See* U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (2015).

239. H.R. Rep. No. 114–153, at 7 (2015).

relating to private sector in-situ asteroid resource removal, possession and use.[240]

Pursuant to §51303 of the CSLCA as amended, a United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.[241] The term "asteroid resource" herein means a space resource found on or within a single asteroid[242] and the term "space resource" is defined as an abiotic resource in situ in outer space, including water and minerals.[243] The Bill (H.R.1508, June 15, 2015) provided that "[a]ny asteroid resources obtained in outer space are the property of the entity that obtained such resources, which shall be entitled to all property rights thereto, consistent with applicable provisions of Federal law.''[244] It also defined "a space resource" as "natural resource of any kind found in situ in outer space." It further defined an "asteroid resource" as "found on or within a single asteroid." The Bill was addressing unextracted resources.

According to Professor Joanne I. Gabrynowicz, who was requested to review H.R.1508 and provide a comment by congressional staff, the Bill attempts to grant U.S. jurisdiction over "any asteroid resource" in situ in order to authorize and require the "President ... to facilitate the commercial exploration and utilization of space resources to meet national needs." Making unextracted, in situ "asteroid resources" subject to U.S. Federal law and requiring the President "to meet national needs" is a form of national appropriation by "other means."[245] The purpose of these amendments is to stave off the potential conflict with the non-appropriation principle of the OST. For avoidance of doubts, the CSLCA provides that it is the sense of Congress that by the

240. *Id.*

241. *See* U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, § 51393, 129 Stat. 704 (2015).

242. H.R. 1508 (June 15, 2015) adopted an amendment to strike from "an asteroid" and inserted "a single asteroid." The purpose of this amendment is to ensure that an ''asteroid resource utilization activity'' is interpreted as on a single asteroid and not on any asteroid. H.R. REP. NO. 114–153, *supra* note 239, at 10.

243. U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114–90, § 51301, 129 Stat. 704 (2015).

244. H.R. REP. NO. 114–153, *supra* note 239, at 2 (emphasis in original).

245. 123 CONG. REC. 3, 513 (2015) Letter from Professor Joanne I. Gabrynowicz addressed to Hon. Representative Eddie Bernice Johnson (2015) [hereinafter Gabrynowicz Letter].

enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body.[246] Professor Gabrynowicz also points to the lack of a specific licensing regime in the Bill.[247] In this respect, both the Bill and the CSLCA as amended only provide for a report to be submitted by the President to recommend which Federal agencies will be necessary to meet U.S. international obligations.[248] It goes without saying that these international obligations particularly include the obligation to authorize and supervise the activities of non-governmental entities under Article 6 of the OST.[249] According to the Congressional Report on the deliberation of H.R. 1508, the reason for qualifying this report with respect to exploration and utilization of space resources is that the House Committee is aware of other proposed private sector activities in outer space (e.g., on-orbit satellite servicing, space tourism, human habitation, space solar generation, etc.) and is not directing the President to report on the sufficiency of existing authorities to meet international obligation.[250] Although reports are not the equivalent of licensing regulations that go through the Administrative Procedure Act process with respect to these other activities, this is a federalism question, not a space law question.[251]

246. U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114–90, § 403, 129 Stat. 704 (2015).

247. Gabrynowicz Letter, *supra* note 245.

248. See U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114–90, §§ 51302 (b) (2), 51302 (b) (1), 129 Stat. 704 (2015)l; see also id.

249. States Parties to the Outer Space Treaty bear international responsibility for national activities in outer space, pursuant to Article 6 of the Treaty. The scope of "national activities" has been at issue. They naturally include the activities of non-governmental entities carried out under their own jurisdiction. Some argue that they also include the joint activities which are conducted with other countries within the other country's jurisdiction. Further, others argue, in a broader sense, that a state is not exempt from international responsibility even if a company incorporated in a foreign country carries out space activities in the third country when the company is financed, organized or controlled by its own nationals. Yutaka Osada, *Dai Sanshou: Beikoku no Shougyou Uchu Uchiage-hou* [*Chapter 3: The U.S. Commercial Space Launch Act*], *in* THE REPORT ON THE RESEARCH AND EXAMINATION OF THE LEGAL ISSUES SURROUNDING THE UTILIZATION OF THE SPACE ENVIRONMENT: PART 2 30–31 (Institute of Future Engineering 1991).

250. H.R. Rep. No. 114–153, *supra* note 239, at 9. The Department of Commerce, Department of Transportation, and the Federal Communications Commission all have authority to authorize and supervise the activities of nongovernmental entities in outer space.

251. Gabrynowicz Letter, *supra* note 245.

2. Luxembourg

On 3 February 2016, Luxembourg's Deputy Prime Minister and Minister of the Economy Étienne Schneider proclaimed an intention to develop a set of measures to position Luxembourg as a European hub for the exploration and use of space resources.[252] One of the main steps of this SpaceResources.lu initiative was to provide a legal and regulatory framework that ensures legal certainty for ownership rights to minerals or other valuable space resources identified in particular on asteroids.[253] The Luxembourg Law of 2017[254] ("The Space Resources Act") reified the SpaceResources.lu initiative. The Law declares that space resources are capable of appropriation.[255] There is no definition of space resources in the Law itself, but like the U.S. CSLCA, they are commonly understood as abiotic resources that can be found in situ in outer space and that can be extracted.[256] This understanding includes for example mineral resources and water, but not the satellite orbits or radio spectrum.[257]

As shown by the succinct sentence of Article 1 above, celestial bodies which space resources source from are not specified. Moreover, in the Draft Law of November 2016 the phrase "in accordance with international law" was attached to the end of the sentence, but finally deleted in its final version, following an advice by the Conseil d'État.[258] While the Conseil d'État recognized that it did not make much difference whether or not the phrase was attached, it did question the project's raison d'être.[259] The Conseil d'État expressed its concern that

252. Philip de Man, *Luxembourg Law on Space Resources Rests on Contentious Relationship with International Framework* 4 (Leuven Centre for Glob. Governance Stud., Working Paper No. 189, 2017), https://ghum.kuleuven.be/ggs/publications/working_papers/2017/189deman.

253. *The Explanatory Statement of the Draft Law on the Exploration and Use of Space Resources*, THE LUXEMBOURG GOVERNMENT (Nov. 11, 2016) [hereinafter The Explanatory Statement], https://gouvernement.lu/dam-assets/fr/actualites/communiques/2016/11-novembre/11-presentation-spaceresources/Draft-law-space_press.pdf.

254. *See* Luxemburg Lou 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace [Law of July 20th 2017 on the Exploration and Use of Space Resources] [hereinafter The Space Resource Act].

255. The Space Resources Act, *supra* note 29, art. 1. The concept of appropriation includes all of the classic attributes of the right of ownership and in particular the rights to possess, transport, use or sell resources. The Explanatory Statement, *supra* note 253, at 6.

256. The Explanatory Statement, *supra* note 253, at 1.

257. Mahulena Hofmann & Federico Bergamasco, *Space resources activities from the perspective of sustainability: legal aspects*, 3 GLOB. SUSTAINABILITY 1, 2 (2020).

258. Lorenzo Gradoni, *Trawling in Outer Space*, MAXPLANKRESEARCH 12 (2018), https://www.mpg.de/12105806/W001_Viewpoint_010-015.pdf.

259. *Id.*

international space law as it stands now on the subject was vague.[260] The question of appropriation of natural resources in outer space cannot be considered to be definitely settled and can therefore not benefit from the legal certainty that the drafters of the proposed law wish to attribute to it.[261] The conclusion drawn by the Conseil was so radical that it recommended that Article 1 itself be suppressed.[262] At the same time, it did not wish to torpedo the legislation. Instead, the Conseil sent the following message to the Parliament: A bill that indicates that international law generally tolerates the appropriation of space resources would simply be misleading, and the legislator should confine itself to introducing an approval procedure to decide on outer space "permits" on a case-by-case basis.[263] In the end, only this message was submitted to the deliberations at the Parliament (the Chamber of Deputies), and Article 1 was maintained in the current form (without mentioning the phrase in question).

The Explanatory Statement accompanying the Draft Law legally bases Article 1 partly on the underlying idea of the Mining Law of 1810 which differentiates the ownership of a mine and that of the surface and partly on the work of François Laurent, born in Luxembourg and a famous French civil law theorist who, writing in 1878, described shellfish, fish, and other "wild animals" with reference to Roman civil law as "res nullius."[264] Thus, the reasoning behind the provision of Article 1 focuses on the protection of Luxembourg's legal system which received the Napoleonic Code instead of the discussions in detail of international space law. Consequently, however, it turns out to be an interpretation of Article 2 of the OST for Luxembourg's part. Professor de Man criticizes the way the Space Resources Act was abruptly formulated without solid basis in the existing international legal regime.[265] Unlike §51303 of the U.S. CSLCA, with the phrase "in accordance with international law" dropped, Article 1 does not limit itself to a statement of internal law but directly pronounces itself on the state of international space law. In this respect, his argument goes so far as to indicate that the problems arising are also in terms of legal superiority in the

260. *Id.*

261. de Man, *supra* note 252, at 10.

262. The Conseil d'État advised that "l'article 1er de la loi en projet doit être supprimé," Conseil d'État, Projet de loi sur l'exploration et l'utilisation des ressources de l'espace, Avis du Conseil d'État (7 avril 2017), N° CE : 51.987: N° dossier parl.: 7093, at 11, https://conseil-etat.public.lu/dam-assets/fr/avis/2019/15022019/52879.pdf

263. Gradoni, *supra* note 258.

264. The Explanatory Statement, *supra* note 253, at 3–4.

265. de Man, *supra* note 252, at 14.

Luxembourg order.[266] Against the backdrop of criticism about the Space Resources Act, on 23 January 2019, Luxembourg and Belgium signed a joint declaration in which the two countries committed to collaborate on the development of an international framework for the exploration and utilization of space resources.[267] The joint declaration supports multilateralism on the subject but does not mention the legality of space resources extraction under existing space law at all and goes no further than mutually acknowledging the political and economic positions of both countries.[268]

No one can explore or utilize space resources without holding a written mission authorization from the minister or ministers in charge of the economy and space activities.[269] The Space Resources Act then specifies the following detailed operational procedure and requirements as referred to in Article 6 of the OST. Authorization shall be granted to an operator for a mission of exploration and use of space resources for commercial purposes upon written application, following an investigation by the ministers to establish whether the conditions laid down by the present Law are fulfilled.[270] Launch activities do not include the exploitation and use of space resources and separately

266. These do not affect the U.S. 2015 Act as such, for no comparable hierarchy between the internal laws of the U.S. and its international treaties exists that would restrain the American legislator. *Id.* at 11-12.

267. Press Release, The Luxembourg Gov., The Grand Duchy of Luxembourg and Belgium Join Forces to Develop the Exploration and Utilization of Space Resources (Jan. 23, 2019), https://gouvernement.lu/en/actualites/toutes_actualites/communiques/2019/01-janvier/23-schneider-ressources-espace.html.

268. In the joint declaration, Didier Reynders, Deputy Prime Minister, Minister for Foreign Affairs and Defense of the Kingdom of Belgium said: "Belgium is contributing actively to ongoing discussions within the United Nations on the elaboration of a common legal framework for the exploration, use and exploitation of space resources. The space economy is growing rapidly, and it is important to start working now on international rules to allow the full and orderly development of the huge potential this sector offers. In line with our strong support for multilateralism, we favour an approach which reconciles individual rights with the collective interest of mankind. We are pleased to join hands today with Luxembourg in this endeavor." On the other hand, Etienne Schneider added: "I am very pleased with the enhanced cooperation between Belgium and Luxembourg which will enable us to identify and discuss our common interests in the exploration and use of space resources. . .The Grand Duchy is firmly committed to supporting the competitiveness of the commercial space industry in Europe. Together with our partners, we want to further develop knowledge and skills, while encouraging investment, particularly from the private sector, to develop and implement technological, operational and financial solutions." *Id.*

269. The Space Resources Act, *supra* note 29, art. 2.

270. *Id.* art. 3.

need an authorization.[271] And commercial purposes refer to a business activity and activities in space for purely private purposes are not susceptible to be granted an authorization.[272] Authorization for a mission may only be granted if the applicant is a legal person incorporated under Luxembourg law, which is established in the form of a société anonyme or a société en commandite par actions.[273] "The difference between the U.S. space mining law and the Luxembourg space mining law is that in U.S. law, a majority of a company's stakeholders must be in the U.S., while the Luxembourg law places no restrictions on stakeholder locations," claimed Amara Graps, a planetary scientist, asteroid mining advocate, and independent consultant for the Luxembourg Ministry of Economy.[274] The authorization is for the purpose of the mission only that it covers, time-limited but renewable, and personal and non-assignable.[275] The application for authorization must be accompanied by all such information as may be useful for its assessment thereof as well as by a mission program.[276] The applicant is required to produce the evidence of the existence in Luxembourg of the central administration and of the registered office of the applicant, and shall have robust internal governance arrangements in place such as transparent and clear lines of responsibility, risk management processes, sound accounting procedures, etc.[277] Since the Act entered into force, Planetary Resources Inc. has established a European headquarters in Luxembourg and Deep Space Industries, another Silicon Valley space mining company, and an office in Luxembourg.[278] Where these companies only have their administrative center while conducting significant operations elsewhere, it may be somewhat asked whether the activities of these companies fall in the scope of "national activities" as previously explained[279] and whether Luxembourg is equivalent to the "appropriate state party" issuing an authorization under Article 6 of the OST. Luxembourg seems to adopt the view that incorporation of a space mining company in Luxembourg

271. The Explanatory Statement, *supra* note 253, at 7.

272. *Id.*

273. The Space Resources Act, *supra* note 29, art. 4.

274. Andrew Silver, *Luxembourg passes first EU space mining law. One can possess the Spice*, THE REGISTER (July 14, 2017), https://www.theregister.com/2017/07/14/luxembourg_passes_space_mining_law/.

275. The Space Resources Act, *supra* note 29, art. 5.

276. *Id.* art. 6.

277. *Id.* art. 7.1–7.2.

278. Isabel Feichtner, *Mining for humanity in the deep sea and outer space: The role of small states and international law in the extraterritorial expansion of extraction*, 32 LEIDEN J. INT'L L. 255, 274 (2019).

279. Osada, *supra* note 249.

makes space mining by such a company a national activity of Luxembourg in the sense of Article 6 of the OST.[280]

There are other provisions in the Act relating to the fitness requirements of an operator such as the identities of the shareholders that have qualifying holdings, sufficiently good repute, sufficient knowledge, skill, and professional experience to perform its duties, the financial soundness, no criminal record, an adequate financial base intended to cover the risks relating to the mission (insurance and others), annual accounts audited, and accompaniment of a book of obligations.[281] In the event an operator contravenes these provisions, it shall be subject to punishment such as imprisonment and a fine.[282] Furthermore, the ministers are in charge of the continuing supervision of missions for which an authorization has been granted, and the operator that is granted an authorization for a mission is fully responsible for any damage caused at the occasion of the mission.[283]

In addition to these regulations, Luxembourg intends to lure private space miners by giving them financial incentives. Namely, while the law on the exploration and use of space resources envisages the collection of licensing fees, the government has signaled that it does not seek to impose any financial burdens that might disincentivize mining companies to incorporate in Luxembourg.[284] For instance, private companies now have their capital bolstered by venture capital from Luxembourg, and the Government Council already allocated a €200 million budget for this purpose.[285] In 2016, following the conclusion of a MOU with Planetary Resources Inc., the government of Luxembourg, the Luxembourg investment bank Societé Nationale de Crédit et d'Investissement (SNI) and Planetary Resources Inc. signed an investment and co-operation agreement according to which Luxembourg provides direct capital and R&D grants in an amount of €25 million.[286] Apart from financial support to private mining companies, Luxembourg also embarks on a global footprint building for R&D and economic aspects concerning the use of space resources. On 18 November 2020 it entered a strategic partnership with the European Space Agency (ESA) to create a European Space Resources Innovation

280. Feichtner, *supra* note 278, at 267
281. The Space Resources Act, *supra* note 29, arts. 8–12.
282. *Id.* art. 17.
283. *Id.* arts. 14–15.
284. Feichtner, *supra* note 278, at 268–269.
285. *Id.* at 268.
286. *Id.* at 269.

Centre (ESRIC).[287] ESRIC, based in Luxembourg, aims to become an internationally recognized center of expertise for scientific, technical, business and economic aspects related to the use of space resources for human and robotic exploration, as well as for a future in-space economy.[288]

3. U.A.E.

According to the National Space Policy, which was announced by the U.A.E. Space Agency in 2016, the interest of the U.A.E.'s government and its people in pursuing ambitions in space and space sciences was first driven by the talks at the meeting that the late Sheikh Zayed bin Sultan Al Nahyan, U.A.E.'s founder, had with a delegation from NASA in February 1976.[289] Nowadays, the U.A.E.'s space sector has grown to be the largest in the region in terms of both diversity and scale of the investments as shown by the establishment of the Mohammed Bin Rashid Space Centre (MBRSC), Al Yah Satellite Communications Company (Yahsat), and Thuraya Telecommunications Company.[290] As of 2020, the U.A.E. has 10 satellites in orbit with 8 more in development, mainly of which are CubeSats.[291] In 2014, the U.A.E. Space Agency[292] was launched, which made a major turning point in enhancing the space sector to advance the development, regulation and sustainable growth. To mark its 50th anniversary of the founding of the country, in July 2020, the U.A.E. launched a Hope Mars orbiter aboard JAXA's H-II rocket, and it arrived safely in orbit around Mars on 9

287. Press Release, The Luxembourg Gov., Luxembourg teams up with ESA to create a unique "European Space Resources Innovation Centre" to be established in the Grand Duchy (Nov. 18, 2020), https://gouvernement.lu/en/actualites/toutes_actualites/communiques/2020/11-novembre/18-luxembourg-spaceresources.html.

288. *Id.*

289. U.A.E. Gov., NATIONAL SPACE POLICY OF THE UNITED ARAB EMIRATES 11 (Sept. 2016) [hereinafter U.A.E. National Space Policy], https://space.gov.ae/Documents/PublicationPDFFiles/UAE_National_Space_Policy_English.pdf.

290. *Id.* at 15.

291. RENATA KNITTEL KOMMEL ET AL., EXPLORING INSIGHTS FROM EMERGING SPACE AGENCIES 39 (2020), http://aerospace.csis.org/wp-content/uploads/2020/10/2020_GWU_ExploringInsights_FINAL_2nd-Edits-101920-compressed.pdf.

292. The U.A.E. Space Agency is currently led by the Chairman, Dr. Ahmad bin Abdulla Humaid Belhoul Al Falasi, who also serves as the U.A.E.'s Minister of State for Higher Education and Advanced Skills. The Chairman sits on the Board of Directors, which manages the Agency, and its members typically serve for roughly 3 years (extendable as needed). The Board currently consists of a mix of individuals involved in federal, state-owned commercial enterprises, academia, and military. *Id.* at 31.

February 2021.[293] The National Space Policy also includes the space resources activities.[294]

The Federal Law of 2019[295] that is a basic law of the space sector was initially drafted as two separate laws but integrated into a single law which consists of 9 chapters and 54 articles with the abrogation of the SPACE AGNCY Establishment Law.[296] The Federal Law aims at (1) stimulating investment and encouraging private and academic sector participation in the Space Sector and related activities; (2) supporting the implementation of the necessary safety, security and environmental measures to enhance the long-term stability and sustainability of Space Activities and related activities; and (3) supporting the principle of transparency and the commitment of the state to implement the provisions of international conventions and treaties related to Outer Space and to which the state is a party.[297] Particularly, objective 3 as such is a talking point in terms of the domestic implementation of the rules of international space law, but our present examination will be limited to the legal aspects of space resources activities.

The Federal Law applies to the nationals of the state and the companies that have a headquarters in the state and regulates their space resources exploration or extraction activities as well as the activities for the exploitation and use of space resources for scientific, commercial, or other purposes.[298] The space resources, like the U.S. CSLCA, refer to any non-living resources present in outer space, including minerals and water.[299] Thus, this phrasing without mentioning the celestial bodies from which space resources are extracted is similar to the Luxembourg's Space Resources Act. Without obtaining a permit from the Agency, it is prohibited to own a space object, carry out or participate in space activities, or establish, use, or possess related facilities or utilities,[300] and the space activities as provided herein include space

293. Jeremy Rehm and Meghan Bartels, *UAE Hope Mars Orbiter: The Arab World's First Interplanetary Mission* (May 3, 2021), https://www.space.com/hope-mars-mission-uae. The U.A.E. promotes Mars exploration and launches the project "Mars 2117." In 2019, the U.A.E. flew Hazzaa Ali Almansoori, the U.A.E.'s first astronaut, on board ISS and actively carried out space activities.

294. U.A.E. National Space Policy, *supra* note 289, at 44–45.

295. U.A.E. Federal Law, *supra* note 29.

296. Renata Knittel Kommel et al., *supra* note 291, at 36.

297. U.A.E. Federal Law, *supra* note 29, art. 2.

298. *Id.* art. 3, 4(1) (i)–(j).

299. *Id.* art. 1.

300. *Id.* art. 14.1.

resources activities.[301] The conditions and controls relating to permits mentioned above for the exploration, exploitation, and use of Space Resources, including their acquisition, purchase, sale, trade, transportation, storage, and any Space Activities aimed at providing logistical services in this regard shall be determined by a decision issued by the Council of Ministers or whomever it delegates.[302] The permits shall be granted by a decision of the Board of Directors upon the proposal of the Director General.[303] The Agency shall undertake the necessary supervision and inspection work to ensure compliance with the provisions of this Law and the decisions issued in implementation thereof.[304] This provision, together with permits, is based on Article 6 of the OST. In passing, the Federal Law specifically provides for the legal status of meteorites. The Agency shall prepare a special register for Meteorites, wherein registration and modification of the data entered therein shall be done in accordance with the controls and procedures issued by a decision of the Board of Directors, any meteorite that falls in the state's territory shall be the property of the emirate in which it falls, and if it falls on a common border between the emirates or makes a noticeable impact in more than one of the emirates, then it shall be the property of the state.[305] It is prohibited to sell, buy, trade, store, transport, export outside the state or import, or conduct any experiments on a meteorite, unless such act is authorized by the concerned Government Entities and approved by the Agency, but the specialized scientific centers approved by the Agency shall be excluded from this prohibition.[306]

4. Japan

On 15 June 2021, the House of Commons at the National Diet, 204th session, passed the Bill on the Promotion of Business Activities for the Exploration and Exploitation of Space Resources (Act No. 83).[307] The reasons for the proposal of this Bill are explained at the Cabinet Committee of the House of Representative (H.R.) as follows: (1) with the expansion of the province of humankind into the Moon, Mars and

301. *Id.* arts. 1, 4(1)(i).

302. *Id.* art. 18.1.

303. *Id.* art. 18.2.

304. *Id.* art. 35.1.

305. *Id.* art. 30.1–.3.

306. *Id.* art. 30.6–.7.

307. Kanpō [Official Gazette], Extra No. 141 (June 26, 2021) [hereinafter Act No. 83] (Japan). This Act consists of 8 articles attached with 5 supplementary provisions. English version of this Act is now available on the website of the Cabinet Office of Government of Japan at https://www8.cao.go.jp/space/english/resource/application.html.

Deep Space as witnessed by the Artemis programs fully in progress, it is expected that novel space activities of the exploration and exploitation of space resources will be intensified moving forward; (2) some countries such as the United States already have national legislations in place and the discussions for rulemaking on the subject at the COPUOS are now underway; (3) also in Japan, private operators have gradually increased to embark on these activities and for this reason to support these business activities under its appropriate supervision is the policy challenge to be addressed by this state which aims at becoming an autonomous spacefaring nation.[308] The objective of the Law is to encourage business activities relating to the exploration and exploitation of space resources by private operators while seeking to accurately and smoothly implement the treaties relating to the development and use of outer space, by prescribing the requirements for the exploration and exploitation of space resources in line with the fundamental principles of the Basic Law of Space.[309]

Space resources are defined as water, minerals, and other natural resources that exist in outer space, including the Moon and other celestial bodies.[310] The exploration and development of space resources means any activities listed in any of the following subitems (excluding those conducted exclusively as scientific research or for the purpose of scientific research): (a) examination of the existence of space resources that contribute to the mining, extraction and other similar activities specified by Cabinet Office Order (referred to as "mining, etc." or "mined, etc." in (b) and Article 5); (b) mining, etc. of space resources and related processing, storage and other acts specified by Cabinet Office Order.[311]

It is noteworthy that this Act takes the form of special provisions of the Act on Launching of Spacecraft, etc. and Control of Spacecraft of

308. Takeo Kawamura (H.R. member, the LDP), representative co-sponsor of the Bill, Statement, the Minutes of the Cabinet Committee No. 31, House of Representative of the Diet, 204th sess., June 9, 2021, at 13. [This document is published in Japanese only], https://kokkai.ndl.go.jp/#/detailPDF?minId=120404889X03120210609&page=13&spkNum=102&current=113.

309. *Id. See also* The Basic Space Act (Act No. 43 of 2008), Art. 1, which provides for underlying principles and their realization concerning space development and was enacted on 28 May 2008. The fundamental principles of the Basic Law are peaceful use of outer space, improvements of livelihood of the people, promotion of industry, service to the evolution of human society, international cooperation and due regard to the environment. Basic Space Act, Articles 2-7. For English version of this Basic Act, please visit https://www.japaneselawtranslation.go.jp/ja/laws/view/4087. The space resources activities are not particularly addressed herein, but these activities shall align with those principles.

310. Act No. 83, *supra* note 307, art. 2.1.

311. *Id.* art. 2.2.

2016 (Act No. 76) ("Space Activities Act")[312] and intends to apply to business activities on the exploration and development of space resources carried out with use of spacecraft and its control facility. Thus, first of all, the applicant for license of these activities from the Prime Minister shall be the person who uses the spacecraft control facility located in Japan under Article 20.1 of the Space Activities Act. In addition to the requirements for issuing a license under the Space Activities Act, the applicant must submit business activity plan in writing to the Prime Minister. The business activity plan should specify the purpose and period of its business activity, intended location and methods of the exploration and exploitation of space resources, description of its business activity other than location above, and other matters as prescribed by Cabinet Office Order.[313] Once again, the business activity plan shall be in compliance with the fundamental principles of the Basic Law of Space and shall not be likely to cause any adverse effect on the accurate and smooth implementation of the conventions on development and use of outer space and the ensuring of public safety.[314] The applicant shall also have sufficient ability to execute the business activity plan.[315] The Prime Minister shall consult with the Minister of Economy, Trade and Industry in advance as to whether the application for the license for the exploration of space resources conforms to each subparagraphs of preceding Article 3.2.[316]

If a person who mines, etc. space resources pursuant to the business activity plan pertaining to the license above possesses them with intent of ownership, that person shall acquire the ownership of those resources.[317] With respect to this provision, Keitarou Ohno (H.R. member, LDP), co-sponsor of the Bill, explains that the Bill does not specifically provide for mining right or development right and that for an operator to acquire ownership needs to obtain a license under the Bill, but the license is intended to ascertain whether the business activity plan conforms to the principle of peaceful use of outer space of the OST or a period or range of planned activity compromises the spirit of international collaboration with other countries, but not to give mining right or development right to an operator.[318] He also emphasizes that the

312. Kanpō, Extra No. 252 (Nov. 16, 2016). English version of this Act is available at https://www8.cao.go.jp/space/english/activity/documents/space_activity_act.pdf.

313. Act No. 83, *supra* note 307, art. 3.2(ii).

314. *Id.* art. 3.2(i).

315. *Id.* art. 3.2(ii).

316. *Id.* art. 3.3.

317. *Id.* art. 5.

318. Kawamura, *supra* note 308, at 13.

license does not give exclusive rights to certain land. In reply to the question from Tetsuya Shiokawa (H.R. member, Communist Party) of how ownership can be protected without mining right or development right, the co-sponsor answers as follow:

> On earth, generally speaking, ownership right is supposed to be protected by dint of various rights given after coordination of interests with others, but at present there is basically no need to coordinate interests on celestial bodies. On the other hand, there is no established international rule for coordination mechanism. That is, space activities such as use or exploration of outer space are fundamentally protected as permitted by the OST. Therefore, mining, etc. is permissible as long as it is carried out in a specified period of time or for a short time on certain location and it is necessary to achieve the purpose.[319]

This reply by the co-sponsor shows that the Act denies the concept of mining right under the Mining Act of 1950[320] or of right to develop land and aligns with national legislation of other countries such as the United States, Luxembourg, and the U.A.E. in respect of legality of space resources activities under the OST. The reply does not mean that the Act sells short coordination of interests with other countries. The Act provides that once a license is issued, the Prime Minister shall make public to that effect and the items as prescribed by the Act without delay through the use of the internet or other appropriate means.[321] Satoshi Asano (H.R. member, DPP), co-sponsor of the Bill, explains that the review of the application for and the publication of a license also contribute to preventing conflicts with operators of other countries and fostering international collaboration.[322] Furthermore, the Act provides that the state shall seek to establish the internationally consistent regime of the exploration and exploitation of space resources in collaboration with each foreign government, through cooperation in international

319. *Id.* at 13–14.

320. Article 5 of the Mining Act defines the term "mining right" as the right to mine the registered minerals and other minerals that occur in the same type of ore deposit in the area of certain land registered (hereinafter referred to as "mining area"), and acquire them. Mining rights shall be prospecting rights and digging rights. Mining Act, 1950 (Act No. 289/1950) art.11 (Japan). Thus, mining rights are linked to certain land and treated as real property.

321. Act No. 83, *supra* note 307, art. 4.

322. Kawamura, *supra* note 308, at 14.

organizations and other international frameworks.[323] The state shall also take measures necessary to promote the sharing of information among nations, provide international coordination, and otherwise ensure international alignment in connection with business activities for the exploration and exploitation of space resources by private operators.[324] The co-sponsors share the view that it is imperative to have in place not only a domestic law, but international rule on the subject eventually. In this context, Takeshi Akabori, Deputy Director General of the Minister's Secretariat, the Ministry of Foreign Affairs, speaks about the way forward as follows: "The Government of Japan will be willing to participate in the on-going discussions about the development and use of space resources under the policy in line with the Artemis Accords and the relevant international organization."[325] Therefore, the Act is susceptible to change in the future, depending on what is going to happen at the discussions at the COPUOS-LSC. The Act itself proactively provides for the fundamental review of the Law.[326] As such, the Act was laid down as legislation sponsored by a cross-party group of lawmakers and took effect on December 23, 2021.[327]

5. Appraisals of National Legislation on Space Resources Activities

During the 2016 session of the Scientific and Technical Subcommittee of COPUOS, Russia in its Working Paper stated, among other things: "The United States vividly demonstrated a connection between diminishing the Committee's role and powers, on the one hand, and manifestations of total disrespect for international law order, on the other, by adopting the commercial space launch competitiveness act on 25

323. Act No. 83, *supra* note 307, art. 7.1.

324. *Id.* art. 7.2.

325. Kawamura, *supra* note 308, at 14.

326. Article 4 of Supplementary Provisions of the Act stipulates that the Government shall conduct reviews including fundamental reconsideration of the perspectives of the legal system related to business activities for the exploration and development of space resources by private businesses, taking into consideration the status of implementation of this Act, of progress in science and technology, and of initiatives to establish the systems prescribed in Article 7.1, and take necessary measures, including the promotion of legislation, based on the results.

327. The Act would come into effect as of the day on which six months have elapsed from the date of its promulgation. However, the provisions on the transitional measures and the review (respectively, Articles 3 and 4 of Supplementary Provisions of the Law) would enter into effect as of the date of their promulgation (23 June 2021). Article 1 of Supplementary Provisions of the Act. On November 4, 2022, ispace, inc., a global lunar exploration company based at Tokyo, Japan, obtained a license from the Cabinet Office for its business activities plan under the Act. For more details, the Cabinet Office's website at https://www8.cao.go.jp/space/english/resource/application.html.

November 2015."[328] Russia further argued that the COPUOS is the sole forum for space law issues and that states cannot legislate unilaterally.[329] This rather politically motivated statement begs the question whether the jurisdiction to regulate the space resources activities is exclusively vested in the COPUOS. Professors Stephen Hobe and Philipe de Man raise the issue of the limitations of the non-appropriation principle on the prescriptive or legislative jurisdiction to legislate on issues that may be deemed unresolved by international space law.[330] Generally speaking, jurisdiction concerns the power of the state to affect persons, property, and events. Prescriptive jurisdiction is the capacity to make law and is distinguished from enforcement jurisdiction (the capacity to ensure compliance with such law) and judicial jurisdiction (the power of the courts of a particular country to try cases in which a foreign factor is present). These differences are basic to an understanding of the legal competence of a state. Jurisdiction, although primarily territorial, may be based on other grounds, for example nationality, while enforcement is restricted by territorial factors.[331] Professors Hobe and de Man focus on the concept of extra-territorial jurisdiction on the base of active personality[332] because Article 2 of the OST proscribes territorial sovereignty in outer space, including celestial bodies. The only jurisdiction that the OST affirmatively recognizes is that of a state over an "object launched into outer space . . . and over any personnel thereof, while in outer space or on a celestial body, but the OST does not comment on jurisdiction outside space objects or personnel.[333] The jurisdiction pursuant to Article 8 of the OST with respect to persons and objects in outer space neither imply nor entail jurisdiction over outer space, as the regulation of the status of outer space remains firmly within the prescriptive domain of the international community.[334] They further argue that Article 6 of the OST supports the

328. *Reviewing Opportunities for Achieving the Vienna Consensus on Space Security Encompassing Several Regulatory Domains*, Russian Federation, Working Paper, U.N. Doc. A /AC.105/C.1/2016/CRP.15 (Feb. 16, 2016), ¶ 7 at 5.

329. Tnaja Masson-Zwaan & Neta Palkovitz, *Regulation of space resource rights: Meeting the needs of States and private parties*, 35 QIL 5, 14 (2017).

330. Stephen Hobe & Philip de Man, *National Appropriation of Outer Space and State Jurisdiction to Regulate the Exploitation, Exploration and Utilization of Space Resources*, 66 ZLW 66, 460.

331. MALCOLM N. SHAW, INTERNATIONAL LAW 572 (5th ed. 2003); MALANCZUK, *supra* note 161, at 109.

332. Hobe & de Man, *supra* note 330, at 466. One has to draw the line between active jurisdiction over acts undertaken by nationals and passive jurisdiction over acts of which nationals are victims. MALANCZUK, supra note 161, at 111.

333. P.J. Blount, *Jurisdiction in Outer Space: Challenges of Private Individuals in Space*, 33 J. SPACE. L. No. 2, 299, 311 (2007).

334. Hobe & de Man, *supra* note 330, at 468.

reading that the prescriptive jurisdiction concerning the status of outer space (i.e., the determination of legality of all actions by all actors therein) lies first of all with the international community.[335] And they finally conclude:

> With Art. II of the Outer Space Treaty, as well as with the provisions on the distribution of the benefits derived from resources, the international community has taken a very important decision: outer space and celestial bodies, including their resources, are global commons under the (sole) jurisdiction of the international community of States and do not fall under any national jurisdiction.[336]

This conclusion, however, seems to be a jump in logic. While it is true any state cannot claim to the prescriptive jurisdiction to the status of outer space including celestial bodies as such, by deducing from Articles 6 and 2 of the OST, as well as from the provisions on the distribution of the benefits, it is rather difficult to establish the presence of the (sole) jurisdiction of the international community for the following reason.

The implication of the authorization and continuous supervision falls through the cracks in the explanation by Professors Hobe and de Man in relation to Article 6 of the OST which provides corroboration for the jurisdiction of the international community. As is well-known, Article 6 provides that states are internationally responsible for national activities in outer space, so that their national activities may be carried out in conformity with the provisions set forth in the OST. In so doing, states have to authorize and continuously supervise activities undertaken by non-governmental entities. Without authorization and continuing supervision being forms of the exercise of jurisdiction, how would states effectuate their international responsibilities for private space activities best?[337] Indeed, U.N.G.A. Resolution adopted on December 11, 2013 recommends that a state "should ascertain national jurisdiction over space activities carried out from territory under its jurisdiction and/or control[338]; likewise, it should issue authorizations for and ensure supervision over space activities carried out elsewhere by its

335. *Id.* at 469.

336. *Id.* at 475.

337. Frans G. von der Dunk, *Sovereignty Versus Space - Public Law and Private Launch in the Asian Context*, 5 SING. INT'L & COMPAR. L. 22, 36 (2001).

338. G.A. Res. 68/74, at 2 (Dec. 16, 2013).

citizens and/or legal persons established, registered or seated in territory under its jurisdiction and/or control."[339] Although there is no generally accepted interpretation of the term "national activities," states are allowed to treat space resources activities undertaken by their nationals and/or by using their spacecraft or control facility as their national activities and extend their prescriptive jurisdiction to such activities as well.[340] That does not mean certain areas or land on celestial bodies including their natural resources in place would fall under state jurisdiction. Jurisdiction under consideration is strictly limited to national activities including removal or extraction of space resources. It is basically left to the discretion of each state in what manner and to what extent to implement the requirement of the authorization and supervision.

Apart from the jurisdictional issue above, a legitimate concern over unlimited discretionary authority by states, however, has been voiced in the context of subsequent practice as a treaty interpretation tool, particularly under Article 31, subparagraph (3)(b), of the Vienna Convention on the Law of Treaties.[341] The concern is that when national legislation is being pursued at the same time that proceedings at the intergovernmental level are losing their teeth, the danger for informal modification through state conduct becomes real.[342] To alleviate this concern, the discretionary authority by states should not be free from constraints. This boils down to the exigencies of substantial reasonableness of consequence that space resources activities might bring about. Arguably, space resources activities are not absolutely free, just as the freedom of fishing on high seas (laissez-faire) has been diminished as shown by the conservation and management of particular fish stocks.[343] It would be needless to reiterate that they must be subject to the restraints as provided by the OST, particularly the provisions concerning the benefits of all mankind, peaceful use of outer space and environmental considerations as suggested by the IISL background

339. *Id.*

340. *Id.* at 1.

341. Vienna Convention on the Law of Treaties art. 31(3)(b), May 23, 1969, 1155 U.N.T.S. 331.

342. Philip De Man, *State Practice, Domestic Legislation, and the Interpretation of Fundamental Principles of International Space Law*, 42 SPACE POL'Y 92, 101 (2017).

343. *See, e.g.*, The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, Aug. 4, 1995, 2167 U.N.T.S. 3.

paper of 2016.[344] Even with this caveat in consideration, the presented national laws do not stand in contradiction with international law, and are not a hurdle to its development; it is clear that they interplay with international law.[345] Ultimately, it is up to the states concerned to create the state practice and *opinio juris* which could lead to authoritative interpretations thereof.[346]

B. *Progress Made at the Legal Sub-Committee of COPUOS*

1. Classification of Member States' Views: 2017 to 2019

Following its statement at the 55th session of the COPUOS-LSC in 2016 on recent and upcoming Member States' initiatives taken at national level aiming at establishing legal and regulatory frameworks that would authorize private operations to perform extraction of mineral resources from outer space, the Belgium delegation stated the reason for a proposal to address the issue of legal models for activities in exploration, exploitation and utilization of space resources as an item on the agenda at the 56th session of LSC in 2017.[347] The primary reason is the Belgium's particular concern about the risk of seeing multiple interpretations of the U.N. space treaties at those national initiatives, thereby undermining the cooperative efforts that have been made at LSC so far.[348] First of all, Belgium stresses the need to take into account all sides of the problem, in particular, economic and political aspects thereof, in order to work out a comprehensive and workable legal model for space resources activities, instead of focusing on purely legal aspects surrounding Articles 1 and 2 of OST.[349] For example, how could any right to use celestial bodies' mineral resources be granted to a national entity without allowing that entity to claim exclusive access to a dedicated area of the celestial body surface and underground? How can the limitations in terms of size and duration of activities associated with such right of use be determined in a manner that would respect

344. *See generally* Hobe et al., *supra* note 165.

345. Tanja Masson-Zwaan & Neta Palkovitz, *Regulation of Space Resource Rights: Meeting the Needs of States and Private Parties*, 35 QUESTIONS OF INT'L L. 5, 17 (2017).

346. Frans G. von der Dunk, *The Origins of Authorisation: Article VI of the Outer Space Treaty and International Space Law*, 6 STUD. SPACE L. 3, 20 (2011).

347. Comm. on the Peaceful Uses of Outer Space, *Contribution from Belgium to the discussion under UNCOPUOS Legal Subcommittee on item "General exchange of views on potential legal models for activities in exploration, exploitation and utilization of space resources*, Legal Subcomm. on Its Fifty-Sixth Session at 1, U.N. Doc. A/AC.105/C.2/2017/CRP.19 (2017).

348. *Id.*

349. *Id.* at 2.

the freedoms of others? Belgium argues that the answer to these questions should be guided by fundamental considerations of equity in order to give due consideration to the interests and efforts of all countries, with particular regard for pioneers and non-spacefaring nations.[350] Second, Belgium also argues that since the supply of any particular type of space resources is limited by many factors, in addition to the two criteria used for the categorization of goods in an international setting, i.e. "(non-) rivalry" and "(non-) excludability," an additional criterion of "accessibility" should be taken into consideration.[351] Third, what is more important but controversial is that Belgium does not see any point in differentiating celestial bodies from their natural resources for the purpose of their regulation: it calls into question the purpose of prohibiting national appropriation of celestial bodies while allowing the same nations to exclusively determine the use of their resources, surely the most valuable and, hence contentious, part of celestial bodies.[352] And finally, Belgium believes that the Moon Agreement provides a good point of departure for establishing a dedicated regime for space resource activities and considers COPUOS to be the competent body in which discussions among all interested states should take place.[353]

Following the statement above by Belgium, Member States have expressed their views under the agenda item "general exchange of views on potential legal models for activities in exploration, exploitation and utilization of space resources" between 2017 and 2019.[354] Their views expressed at the 56th session of LSC, albeit with small differences, may be largely classified into two groups: one group argues for a new multilateral framework, and the other takes the position that space resources activities can be dealt with within the existing international space law. If we look at the two groups in terms of their rationales and purposes, for example, the former group is primarily based on "legal security,"[355] the "concern about the possible exclusion of developing countries from the space benefits,"[356] the "adherence to the principles of equality of access and the benefits enjoyed by all humanity as

350. *Id.* at 2–3.

351. *Id.* at 3.

352. *Id.*

353. *Id.* at 4.

354. In 2016, this item was officially on the agenda of the COPUOS. *See* U.N. Doc. A/71/20, *supra* note 30.

355. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Sixth Session, U.N. Doc. A/AC.105/1122, at 30 (2017), ¶ 228 at 30.

356. *Id.* ¶ 229 at 30.

well as the facilitation of greater understanding of the principles of OST,"[357] the "need to discuss a possible mechanism for the coordination and the sharing of space resources,"[358] the "concern about a risk of international disputes and compromising the sustainability of outer space by developing conflicting national legislations,"[359] the "concern that the protection of property rights to space resources would amount to claim of sovereignty to or appropriation of celestial bodies,"[360] the "need to address how to grant the right to resources to a national entity without allowing that entity to claim exclusive access to an area on celestial bodies or to limit such right in terms of the size of the area to be exploited and the duration in a manner the freedoms of others are respected,"[361] and the "desirability to develop a single approach to outer space law as well as the unacceptability of the unilateral action of individual states to promote their national private commercial interests or to allow a 'flag of convenience' approach for corporate structure to exploit space resources."[362]

The latter group includes the outright view that "the exploitation of space resources would be in conflict with the non-appropriation principle in Article 2 of OST."[363] The majority opinion in this group, however, argued for exploitation of space resources, with or without reservation. For example, it "advocated for the right of a private entity to conduct space resources activities under the principle of free use of outer space in Article 1 of OST, [provided that] such right should be exercised in accordance with the existing legal framework and relevant principles governing outer space activities and for the benefit of all states, in an effort to safeguard peace and security, and to protect space environment for current and future generations."[364] As to national legislation regarding the extraction of space resources by a private entity, the view was expressed that "it was in conformity with that state's international obligations under the U.N. space treaties when such legislation would provide for the absence of a will or intention to claim sovereignty over all or any part of any celestial body, [provided that] the activities of the private entity were carried out under an authorization and a supervision regime of that state and that authorized use of the

357. *Id.* ¶ 230 at 31.
358. *Id.* ¶ 231 at 31.
359. *Id.* ¶ 253 at 31.
360. *Id.* ¶ 241 at 32.
361. *Id.* ¶ 243 at 32.
362. *Id.* ¶ 250 at 33.
363. *Id.* ¶ 247 at 32.
364. *Id.* ¶ 232 at 31. (emphasis added)

space resources would be purely for peaceful purposes."[365] There was also a delegation simply stating that "the regulation of private sector actors in outer space was consistent with a state's international obligations under OST and with half a century of practice under the Treaty."[366] Furthermore, the views were also expressed that "the non-appropriation principle would only apply to the natural resources 'in place' but not to those once removed from the place and ownership rights over the extracted resources could be thereafter exercised by states or private entities,"[367] or that "by extension of Article 8 of OST entities engaging in space resources activities retain ownership interests in their equipment, whether landed or constructed on a celestial body, including whatever non-interference rights that flowed from those ownership interests, even though they would not acquire ownership or exclusive access interest in the ground beneath their equipment."[368] The latter view could be considered as permitting space resources activities by extension of jurisdiction and control over space object and personnel thereof but prohibiting ownership interests in the ground as such beneath the ground.

At the 57th session in 2018, Belgium submitted a working paper for the purpose of sorting out the issues to be discussed. The issues proposed are as follows:

> Question 1: Do Exploitation Activities require an international legal framework?;
>
> Question 2: Do Exploitation Activities qualify as "exploration" or "use" of outer space in the meaning of Article I of the Outer Space Treaty?;
>
> Question 2a: What is the international legal basis for such type of activities? How would such activities comply with the United Nations outer space treaties?
>
> If Exploitation Activities are considered as a form of exploration and use of outer space addressed by the United Nations outer space treaties, the following sub-question could apply:

365. *Id.* ¶ 239 at 31–32. (emphasis added)

366. *Id.* ¶ 245 at 32.

367. *Id.* ¶ 248 at 32–33.

368. *Id.* ¶ 249 at 33.

> Question 2b: How could such activities justify any appropriation under national law with respect to Art. II of the 1967 United Nations Outer Space Treaty (which explicitly prohibits national appropriation by means of use)?;
>
> Question 3: Would Exploitation Activities require the recognition of exclusive rights on, authority, control over, and/or access to certain areas of celestial bodies, asteroids or other natural bodies in outer space?;
>
> If the answer to question 3 is affirmative, the following subquestion applies:
>
> Question 3b: How would Exploitation Activities in that case be carried out under national jurisdiction in compliance with Article I (2nd para.) of OST?;
>
> Question 4: In the case of infrastructure erected and/or equipment placed on celestial bodies, by governmental or non-governmental entities, for the purpose of exploitation activities, will they be subject to Art. 12 of OST, which requires that they be "open to representatives of other States Parties to the Treaty on a basis of reciprocity"?
>
> Question 5: Is there a legal basis or practice in your State to submit space infrastructure (e.g., stations) and equipment to national jurisdiction, for instance by assimilating them to space objects to be registered?[369]

As shown in CRP 19 produced at 56th session by Belgium, it seems to us that emphasis is particularly placed upon the issue of exclusiveness in Question 3 above. According to Belgium's explanation, the rationale behind Question 3 is that natural resources such as minerals are likely to be considered as scarce resources, implying economic rivalry for their exploitation, and as a result, legal and physical protection of the resources in situ should be permitted and enforced.[370]

At this session, the views were expressed that in the absence of a mandate from states for a formal mechanism to ensure their representation, initiatives aimed at providing substantive ideas on a future international regime for the exploitation of space resources should not be

369. *Questions and observations by Belgium on the establishment of national legal frameworks for the exploitation of space resources* 2–3 (Belgium, Working Paper, 2018).

370. *Id.* at 3.

acknowledged as providing a forum for negotiation on an international framework,[371] that the Hague Building Blocks could provide a starting point for negotiations on an international framework[372] or that was negative about taking the Hague Building Blocks as a starting point for a number of reasons.[373] The view was also expressed that definitions regarding space resource utilization activities, and the consequent purposes for which the resources would be used, including whether the resources were to be used in situ or transported to Earth, were not applicable to the determination of the lawfulness of that space resource activity because such distinctions were not found.[374] This view shows that the lawfulness of space resources activities does not depend on whether the space resources are to be limited to in-situ resource utilization ("ISRU") necessary for humans to live, work, and go farther in deep space or transported to Earth for commercial purposes. Moreover, at this stage of discussions, some delegations suggested that an ad hoc working group should be established with the mandate to develop and propose to the LSC alternative legal solutions capable of providing the legal certainty.[375] Viewed as a whole, however, the discrepancy between the two groups of views remained intact.

2. The Pathway to the Establishment of a Working Group

Although there was no sea change to be seen in the overall tone of discussions at the 58th session in 2019, a working paper to set up a working group at LSC was cosponsored by Belgium and Greece ("joint proposal").[376] The delegation of Greece, who had proposed the idea of creating an ad hoc working group during the discussions at the previous session, expressed the view that consideration of potential legal models for space resources activities should be included in the work of

371. *Report of the Legal Subcommittee on its fifty-seventh session*, U.N.Doc. A/AC.105/1177 (April 30, 2018), ¶ 233 at 30.

372. *Id.* ¶¶ 234, 256 at 30–32.

373. The reasons were that fundamental principles of interest to all states had been discussed by a limited group of individuals; the Group had made assumptions about the interpretation of international space treaties; and the output of the Group, namely its study, contained language that was strikingly similar to recent provisions of national laws on space resources, while at the same time lacking the practical considerations contained in the work of the Scientific and Technical Subcommittee (e.g., references to the long-term sustainability of outer space activities). *Id.* ¶ 251 at 31.

374. *Id.* ¶ 262 at 33.

375. *Id.* ¶ 265 at 33.

376. *Proposal for the establishment of a working group for the development of an international regime for the utilization and exploitation of space resources*, U.N. Doc. A/AC.105/C.2/L.311 (2019).

the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space, in order to stimulate a focused debate. This proposal was supported by Belgium, Brazil, China, and other states.[377] Following a proposal by Brazil, those states expressed their intention to hold consultations during the intersessional period, with a view to presenting to the LSC at this session, a proposal for its consideration containing objectives and modalities for the inclusion of that item on the agenda of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space.[378] The joint proposal constitutes a first effort by Belgium and Greece to initiate the relevant discussion in the context of the aforementioned informal consultations.[379]

The joint proposal, while indicating that the debate must take into account the existence of relevant ambitions, the attraction of significant investment, and the development of the necessary technology, so that planned, public or private activities of such a character in outer space have a promising future, listed relevant four principles of international space law in force on which such activities should rely: (a) exploration and use of outer space as the province of all humankind, (b) outer space is a common space regulated by international law, (c) global governance of such activities is international in character, and (d) the space-related treaties impose enhanced international cooperation on the exploration and use of outer space.[380] In its explanation of principle (b), the joint proposal indicates that states may authorize the space activities of their nationals, but this personal basis for the exercise of national jurisdiction does not provide any basis for legislative jurisdiction in terms of regulating the legal status of outer space itself and therefrom it follows that the legal aspects of space resource exploitation must be regulated by international law.[381] As shown in subsection IV. A.5 of this Article, however, the author is of the opinion that it is allowable for states to extend their prescriptive jurisdiction to space resources activities, instead of celestial bodies as such, undertaken by their nationals and/or by using their spacecraft or control facility. In principle (c), the term "global governance" is defined as the way that outer space is managed at the highest level and the systems for doing so and given the nature of outer space as a global commons, the space

377. *Id.* ¶ 4 at 1.
378. *Id.* ¶¶ 3–4 at 1.
379. *Id.* ¶ 5 at 1.
380. *Id.* at 2–4.
381. *Id.* ¶ 11 at 2.

activities, public or private in nature, are governed by international law.[382] And, for such governance to be effective, the establishment of an international institutional framework is required in the medium or long term.[383] What is more, the need for an international legal framework also comes from the concern about the resulting conflicts between competing players, if national approaches to space resources exploitation is left to evolve on their own. In order for such a framework to be effective, Article 11, paragraph 7, of the Moon Agreement is referred to as an example.[384] As for principle (d), once again, it is indicated that the Moon Agreement can provide a useful starting point for future discussion.[385]

The joint proposal also listed ten items that could be considered as deserving priority treatment by any future working group on space resources.[386] It is one of the most intriguing points that the joint proposal interprets current developments as meeting the condition for the activation of the obligations of state parties to the Moon Agreement to undertake to establish an international regime as such exploitation is about to become feasible and claims that any future working group must incorporate international mechanism to properly align its discussions with possible parallel discussions among states parties to the Moon Agreement.[387] Even if it is like throwing the baby out with the bath water to neglect the Agreement altogether, in what form will this request come to fruition? In other words, will it take the form of a protocol to the Moon Agreement[388] or the 1994 Implementing Agreement

382. *Id.* ¶¶ 13–14 at 3.

383. *Id.* ¶ 15 at 3.

384. *Id.* ¶ 16 at 3.

385. *Id.* ¶ 20 at 4.

386. Those items are including, but not limited to, relationship with other international legal regime on spade resources activities (e.g., the orbit and frequency regime of ITU and the deep seabed regime), exclusive nature of future rights on space resources, temporal and geographical delimitation of claims over areas, scientific collection of data and information-sharing obligations, benefit-sharing of space resources activities, coordination of claims and dispute settlement, institutional framework for space resource management and appropriate means to ensure the sustainability and environmental compatibility of space resources activities. *Id.* ¶ 29 at 6.

387. *Id.* ¶ 33 at 6–7.

388. P.P.C. Haanappel, Commentary, *Outer space resources on the Moon, Mars and other celestial bodies: adequacy of the current international legal regime: A (point form) commentary upon the paper of Professor S. Hobe*, McGill U. 226 (2007); Professor von der Dunk suggests some changes to the Moon Agreement, particularly deleting the CHM principle altogether from the Agreement. He argues that by doing so, the agreement might be back in business again. Frans G. von der Dunk, *The Moon Agreement, Private Actors and Possible Commercial Exploitation of the Moon and Its Natural Resources*, *McGill U.*256, 266–69 (2006), https://www.mcgill.ca/iasl/files/iasl/Moon-Proceedings-Part_5_2006.pdf; Professor Jonathan F. Galloway reluctantly agrees with von der Dunk's radical

of Part XI of the UNCLOS?[389] Or short of that, it might end up with a new resolution without legally binding force. The situation is not as simple as it seems to be.

Although the view was expressed that the LSC should not move too quickly in establishing a working group because "space resources activities [are] in their technological infancy" and "regulation might stifle innovation,"[390] the views in favor of its establishment were gaining ground.[391] The LSC agreed to cancel the 59th session scheduled in 2020 owing to the COVID-19 pandemic and also reschedule the

approach, because, otherwise, the Agreement will become the orphan of ideological diatribes. Jonathan F. Galloway, Commentary, *Comments on Frans von der Dunk's paper "The Acceptability of the Moon Agreement and the Road Ahead"*, *McGill U.* 309 (2006).

389. 1994 Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, July 28, 1994, 1836 U.N.T.S. 3. For the reason that the provisions on the decision making of the International Seabed Authority (ISA) operate in favor of developing states and commercial development of polymetallic nodules on the deep seabed becomes unlikely in the foreseeable future against the initial forecast during the Third U.N. Conference on the Law of the Sea, the Implementing Agreement substantially amends the provisions relating to the decision making, compulsory transfer of technology, revenue sharing, production policy, the Enterprise as an organ of the ISA that is capable of directly undertaking mining activities in the Area, and the financial terms of contracts. *Id.* Amendments must otherwise go through the amendment procedure as specified by the UNCLOS, but due to the strong opposition to change the CHM principle, the unprecedented approach was taken that amendments were made in the form of an "implementing agreement" of the Convention once adopted and directly at the U.N. General Assembly, instead of holding the Review Conference under the UNCLOS. It is interesting to note that the information note dated 8 April 1993 contained the following four alternative approaches to amendment.

> (i) A contractual instrument such as a protocol amending the Convention;
>
> (ii) An interpretative agreement consisting of understandings on the interpretation and application of the Convention;
>
> (iii) An interpretative agreement on the establishment of an initial Authority and an initial Enterprise during an interim regime accompanied by a procedural arrangement for the convening of a conference to establish the definitive regime for the commercial production of deep seabed minerals when such production became feasible;
>
> (iv) An agreement additional to the Convention providing for the transition between the initial phase and the definitive regime, in particular, the Authority would be mandated to develop solutions for issues still outstanding on the entry into force of the Convention

U.N. Secretary-General, *Consultations of the Secretary-General on outstanding issues relating to the deep seabed mining provisions of the United Nations Convention on the Law of the Sea*, 3–4, U.N. Doc. A/48/950 (June 9, 1994).

390. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Eighth Session, U.N. Doc. A/AC.105/1203 (2019), ¶ 262 at 35.

391. *Id.* ¶¶ 260, 264, 265, 267 at 35–36.

mandated, scheduled informal consultations for the 60th session in 2021.[392] Prior to the convening of the 60th session, the co-Moderators of the scheduled informal consultations prepared the Draft Plan for Scheduled Informal Consultations on the issue of Exploration, exploitation and Utilization of Space Resources (hereafter "Draft Plan"), presented it to the LSC and invited the state members to provide their comments.[393] The Draft Plan contained the two topics: procedural and proposed substantive. The procedural topics are: clarification of the "mandate" for the discussions; summary of inputs received from Member States during the intersessional period; summary of additional communications circulated by the co-Moderators during the intersessional period; and modalities/conduct of discussions. The rationale for procedural topics is that "the LSC has rarely utilized the tool of scheduled informal consultations in the past, so the discussion will begin by clarifying the process for carrying out the work."[394] In this way, it is hoped that this discussion, preceded by general wrap-up of the results of preparatory work during the intersessional period, should bring greater clarity to the methods of work. In order to achieve a common understanding of problems to be dealt with at a later stage, it is necessary to identify the major fields of possible agreement and major issues regarding which delegations continue to fundamentally disagree. For this reason, the proposed substantive topics picked up the following seven items: (1) formulation of substantive issues/topics to be addressed; (2) additional indications by states members of the Committee as to the issues to be addressed (further synthesis of these inputs); (3) relevant legal issues under applicable international law (the principles contained in the OST and their interpretation, other relevant international space law regimes/treaty arrangements, relevant "Soft Law" guidelines/principles, relevant principles of general international law); (4) the role of domestic legislation; (5) relevance of work by experts, other entities, universities, space agencies and industry stakeholders; (6) input from other groups including from the Hague

392. Comm. on the Peaceful Uses of Outer Space, Decisions and Actions by the Committee on the Peaceful Uses of Outer Space and its Legal Subcommittee Taken by Written Procedure, U.N. Doc. A/75/20, ¶¶ 1, 6 (2020).

393. U.N. Office for Outer Space Affairs, Draft Plan for Scheduled Informal Consultations on the Issue of Exploration, Exploitation and Utilization of Space Resources (3rd. Revised, June 9, 2021), https://www.unoosa.org/documents/doc/copuos/space-resources/Draft-Plan-for-Informal-Consultations.docx. The nomination by Belgium and Greece of Andrzej Misztal (Poland) as Moderator and Steven Freeland (Australia) as Vice-Moderator to lead the scheduled informal consultations and endorsed by the COPUOS.

394. *Id.* Section I at 2.

Building Blocks; and (7) other relevant policy issues. And the Draft Plan states that discussions will be guided with a view toward arriving at legal certainty and predictability for all public and private actors intending to explore, exploit and/or utilize space resources, and to ensure the consistency thereof with applicable international law.[395]

On 31 January 2020, the co-Moderators received replies regarding the Draft Plan from many states.[396] Their replies had no objection to the procedural topics at all, but some stated what they see would be desirable or simply provided their own information. For example, Australia, referring to the inclusion of the sentence in the "Rationale" that expresses that "discussions will be guided with a view toward arriving at legal certainty and predictability . . .," suggested that the aim of the informal consultations should focus on an exchange of views to reach an understanding of the issues because the sentence was an inappropriate aim for the informal consultations.[397] Australia also preferred to include the importance of norms of behavior in relation to planetary protection, transparency, safety, responsibility, and sustainability of space operations, in the discussion on soft law guidelines/principles.[398] Others were proposing their own substantive topics (Austria),[399] emphasizing the risk of illegal commercialization and seeking firm regulations (Bahrain),[400] stressing the need to distinguish "exploitation" from "utilization" as a form of use in compliance with Articles 1 and 2 of the OST (Belgium),[401] acknowledging that the proposed substantive topics would only assist the discussion of the core issue of possible establishment of a working group rather than serve as the core issue per se (China),[402] proposing to include the issues of space debris and equity in utilization of space resources as a common agenda (Ethiopia),[403] providing information on the country's space policy and current

395. *Id.* Section II.

396. Comm. on the Peaceful Uses of Outer Space, Responses to the Set of Questions Provided by the Moderator and Vice-Moderator of the Scheduled Informal Consultations on Space Resources, at 1–2, U.N. Doc. A/AC.105/C.2/2021/CRP.8 (May 27, 2021) [hereinafter Informal Consultations on Space Resources].

397. *Id.* at 2.

398. *Id.*

399. *Id.* at 3.

400. *Id.* at 5.

401. *Id.* at 5. According to the example that Belgium took, "using water ice to supply a permanent station on the Moon would qualify as "utilization" (instead of "exploitation") as long as the station is used for scientific research, accessible to other States' scientists for peaceful purposes research." *Id.*

402. *Id.* at 6.

403. *Id.* at 7.

situation with regard to space resources activities and/or underscoring the relevance of input from some other groups such as expert groups, universities and private entities, including the Hague Building Blocks (Finland),[404] offering the country's own preliminary work plan, mandate and terms of reference of a working group (Germany, Netherlands),[405] stressing the importance of including as the substantive topics the ones described in the Hague Building Blocks such as priority rights between different countries, coordination mechanisms, respect of safety zones and ownership/use rights of resources and wanting non-governmental stakeholders to weigh in as more active participants (Luxembourg),[406] proposing to add a new item on "Capacity Building and Support to developing countries from well-established State members in the Space industry on Space Law and Space Policies" under the substantive topics (Mauritius),[407] proposing to integrate a parallel analysis of the Moon Agreement with the UNCLOS (Mexico),[408] just mentioning the urgent necessity to establish a national regulatory framework which the country was working on for its part and agreeing on the importance of introducing relevant work undertaken by various stakeholders (Saudi Arabia),[409] and advocating for adequacy of the proposed substantive topics and simply stating that the issue must be addressed at the multilateral level (Switzerland).[410]

3. The Establishment of a Working Group and Its Mandate, Terms of Reference and Work Plan and Methods of Work

At the 60th session, the co-Moderators held eight rounds of scheduled informal consultations during the plenary meetings of the LSC with the aim of reaching consensus on the establishment of a working

404. *Id.* at 9–10.

405. *Id.* at 11, 25–26.

406. *Id.* at 12. Luxembourg informed that the country had started consultations on its side and would come back with more detailed input in early 2020. *Id.* Indeed, during the intercession, Luxembourg and the Netherlands jointly submitted the working paper detailing the Hague Building Blocks for consideration and use in the discussions pending the adoption and the operationalization of the international framework. See Comm. on the Peaceful Uses of Outer Space, Bldg. Blocks for the Dev. of an Int'l Framework on Space Res. Activities: Working Paper Submitted by Lux. and the Neth., at 1, U.N. Doc. A/AC.105/C.2/L.315 (Feb. 3, 2020) [hereinafter Working Paper of Lux. and the Neth.].

407. Informal Consultations on Space Resources, *supra* note 396, at 13.

408. *Id.* at 13.

409. *Id.* at 27.

410. *Id.* at 28.

group.[411] Several specific proposals on this subject were submitted, jointly or individually, by a group of eleven states (Austria, Belgium, Czech Republic, Finland, Germany, Greece, Poland, Portugal, Romania, Slovakia and Spain),[412] Russia,[413] and China,[414] and all supported the creation of a working group. "States also made oral statements demonstrating widespread support for the establishment of a working group on space resources, but with differing levels of enthusiasm, and differences of opinion on its aims and outcomes."[415] For example, the statement delivered by Gabriel Swiney, head of the U.S. Delegation, was also on board with its creation, but stated that, "at this stage, the United States sees neither a need nor a practical basis to create [a comprehensive international] regime," and, stressing the early stage of space resource use, indicated that "the time is right for such a group, so long as we can reach consensus on a pragmatic work plan that reflects the early stage of these efforts."[416] Another example is Canada's response to the Austrian proposal, indicating that "the scope is too ambitious for the 5-year mandate" and that "it would be more manageable to focus on achieving consensus on a set of principles within its 5-year term."[417] In addition, Professor Oosterveld observes

411. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixtieth Session, ¶ 254 at 33, U.N. Doc. A/AC.105/1243 (June 24, 2021) [hereinafter Rep. of the Legal Subcomm.].

412. Comm. on the Peaceful Uses of Outer Space, The Establishment of a Working Grp. on Potential Legal Models for Activities in Expl., Exploitation and Utilization of Space Res., Proposal submitted by Austria, Belg., Czech, Fin., Ger., Greece, Pol., Port., Rom., Slovk. and Spain, U.N. Doc. A/AC.105/C.2/2021/CRP.22 (June 8, 2021) [hereinafter Eleven State Proposal].

413. Comm. on the Peaceful Uses of Outer Space, The Establishment of a Working Grp. on Potential Legal Models for Activities in Expl., Exploitation and Utilization of Space Res., Proposal submitted by Russ., U.N. Doc. A/AC.105/C.2/2021/CRP.26 (June 7, 2021).

414. Comm. on the Peaceful Uses of Outer Space, The Establishment of a Working Grp. on Potential Legal Models for Activities in Expl., Exploitation and Utilization of Space Res., Proposal submitted by China, U.N. Doc. A/AC.105/C.2/2021/CRP.18 (May 31, 2021).

415. Valerie Oosterveld, *Space Resource Discussions in the UN Committee on the Peaceful Uses of Outer Space*, OPINIOJURIS (July 11, 2021), http://opiniojuris.org/2021/07/11/space-resource-discussions-in-the-un-committee-on-the-peaceful-uses-of-outer-space/.

416. Gabriel Swiney, U.S. Head of Delegation, U.S. Mission to Int'l Org. in Vienna, 60th Session of the COPUOS Legal Subcommittee - Agenda Item 14: Potential Legal Models for Activities in Exploration, Exploitation and Utilization of Space Resources (June 1, 2021), https://vienna.usmission.gov/2021-copuos-lsc-u-s-on-the-exploration-exploitation-and-utilization-of-space-resources/.

417. Canada's Statement, Agenda Item 14: General exchange of views on potential legal models for activities in exploration, exploitation, and utilization of space resources (June 11, 2020), https://www.unoosa.org/documents/pdf/copuos/lsc/2021/statements/item_14_Canada_ver.1_1_June_AM.pdf.

that there emerged four themes from the statements made during the informal consultations: a call for equitable access to space resources from G77+China and Indonesia; space environment from Ukraine, France and New Zealand; statements from the United States and Canada that the "use of space resources is already legal and future exploration, exploitation and utilization of space resources was both required to advance humanity's space knowledge, and inevitable"; and the statements from a number of countries including Thailand that the discussions on the "use of space resources were not only legal in nature, they were also scientific and technical, and part of the larger context of human activities in space".[418]

Thus, the third revised proposal (final) was presented to the LSC by the co-Moderators.[419] The third revised proposal sets forth a period of five years and the following mandate for the work of a working group to be done: to collect relevant information concerning activities in the exploration, exploitation, and utilization of space resources, including with respect to scientific and technological developments and best practices, taking into account their innovative and evolving nature, as a first step; to study the existing legal and normative framework for such activities, in particular the Outer Space Treaty and other applicable United Nations treaties; to identify areas where further development of the framework might be helpful and assess the benefits of doing so; to recommend an initial set of principles and practical measures for such activities to ensure that they are carried out in a safe, sustainable and peaceful manner and in accordance with international law for adoption by the LSC and possibly then by the U.N.G.A. *as a dedicated resolution*; and to identify areas for further work of the Committee and recommend next steps, which may include the development of potential models, rules and norms, for such activities.[420] The terms of conference contain the requirements that the working group shall be open to all states members, encouraging participation of developing and emerging countries and also take into consideration submissions from States members and permanent observers of the LSC, as well as from non-

418. Oosterveld, *supra* note 415.

419. *See* Scheduled Informal Consultations on Space Resources, U.N. Off. Outer Space Aff., https://www.unoosa.org/oosa/en/ourwork/copuos/lsc/space-resources/scheduled-informal-consultations.html.

420. *See* Comm. on Peaceful Uses of Outer Space, Proposal on the mandate, terms of reference and method of work of the working group established under the Legal Subcommittee agenda item entitled "General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources," Working paper submitted by the Chair and Vice-Chair of the working group, U.N. Doc. A/AC.105/L.326, at 2–3 (2021).

governmental stakeholders, including academia, civil society, technical experts, institutional, and private actors. [421] The working group shall, in 2022, agree on its detailed work plan and methods of work, and this shall include appropriate means to include the expertise and views of academia, civil society, technical experts, institutional and private actors as well as means of coordination with the Scientific and Technical Subcommittee.[422] The working group shall also in its work avail itself of electronic means of communication as the case may be. "At its 1010th meeting, on 9 June, the Subcommittee decided, on the basis of the reports provided by the Moderator and Vice-Moderator of the scheduled informal consultations on the progress made in those consultations, to establish, under a five-year work plan, a working group, with Misztal as Chair and Freeland as Vice-Chair of the working group."[423] The LSC also requested the newly elected Chair and Vice-Chair of the Working Group to continue consultations, in the intersessional period.[424] More recently, at the just concluded plenary session of COPUOS, the Working Group held four meetings, and Member States agreed the specifics of the Mandate, Terms of Reference and Work Plan/Methods of Work for the Working Group.[425] Those details are almost the same as the third revised proposal above, except that the phrase "for the consideration and consensus agreement by the Committee" is added in the paragraph 3(d) of mandate and the sentence "which may include through one or more dedicated international conferences convened under the auspices of the United Nations, and open to Governments, invited academic and other stakeholders, subject to the availability of budgetary resources" is inserted in the last paragraph 4(f) of the terms of reference.[426] The latter sentence can be considered as having taken into account the input from the Austria et al. proposal.[427]

421. *Id.* at 3.

422. *Id.*

423. Rep. of the Legal Subcomm., *supra* note 411, ¶ 255 at 33.

424. *Id.* ¶ 257 at 33.

425. Rep. of the Comm. on the Peaceful Uses of Outer Space, U.N.Doc. A/76/20, ¶ 221 at 26 (2021).

426. Comm. on the Peaceful Uses of Outer Space, Draft Rep., Annex III, Proposal on the Mandate, Terms of Reference, and Workplan and Methods of Work for the Working Grp. Established Under the Legal Subcomm. Agenda Item Entitled "General Exchange of Views on Potential Legal Models for Activities in the Expl., Exploitation and Utilization of Space Res.", at 2, U.N. Doc. A/AC.105/L.322/Add.6 (Sept. 1, 2021) [hereinafter Draft Report Annex III].

427. *See* Eleven State Proposal, *supra* note 412, ¶ 12.

The Chair and Vice-Chair of the Working Group replies to the interview by the SpaceWatchGL on the successful establishment of the Working Group as follows:

> Given the increasingly strong interest by Members States in the issue, and its sensitivities and different perspectives, achieving consensus and thus enabling the Working Group to move towards starting the substantive work in earnest, was an excellent outcome and, seen in a broader context of today's complex geopolitical climate, a quite significant 'success'. It demonstrates the importance of the multilateral process through UNCOPUOS and is indicative of the good faith and widespread flexibility and willingness of Member States to find a common path forward in relation to the 'big' issues regarding the peaceful exploration and use of outer space.[428]

At the risk of oversimplification, it can be also said that in the preceding five years, the discussions on space resources within the LSC were spurred by the national legislations of several states with technological and industrial developments and led to the creation of the Working Group as it looks feasible that space resources activities will take place as shown by the Artemis Accords or the MOU on the international lunar research station between China and Russia. What is more, it seems to us that the likelihood that a set of principles and practical measures would be adopted in the form of "a dedicated U.N. resolution" also contributed to accelerating to reach consensus.[429] The Working Group may present a substantive proposal or revised one moving forward, over which individual delegations will continue to express their pros and cons, and hopefully their opinions will converge over time. The road ahead, however, is likely to be bumpy to achieve consensus.

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428. Antonino Salmeri, #*SpaceWatchGL Interviews: Ambassador Misztal and Professor Freeland on UNCOPUOS Working Group on Space Resources*, SPACEWATCH.GLOB (Sept. 2021), https://spacewatch.global/2021/09/spacewatchgl-interviews-ambassador-misztal-and-professor-freeland-on-uncopuos-working-group-on-space-resources/.

429. *See, e.g.*, Draft Report Annex III, *supr*a note 426, ¶ 3(d); Eleven State Proposal, *supra* note 412, ¶ 10; Swiney, *supra* note 416.

C. *Inputs from Non-State Actors*

1. The Hague Building Blocks

The Building Blocks were prepared in order to form the basis for the negotiations on an international agreement or non-legally binding instrument.[430] The Hague Space Resources Governance Working Group "considered it neither necessary nor feasible to attempt to comprehensively address space resource activities in the building blocks."[431] For this reason, the Building Blocks are guided by the principle "adaptive governance," which envisions that space resource activities should be incrementally regulated at the appropriate time. We will examine below the hallmarks of the Building Blocks, focusing on objective, definition of key terms, principles, the attribution of priority rights to an operator, resource rights, due regard to the interests of all countries and humankind, avoidance of harmful impacts, a safety zone, and benefit-sharing which a vigorous debate revolved around in the Working Group.

The first Building Block identifies the main objective to be pursued by the international framework to "create an enabling environment for space resource activities that takes into account all interests and benefits all countries and humankind."[432] According to the Commentary, an enabling environment is to be understood as "including a set of rules, regulations, procedures and/or conditions capable of producing optimal results, as far as space resource activities are concerned, while minimizing and managing risks, in accordance with a comprehensive and inclusive outlook."[433] In this regard, an enabling environment "relies upon the consideration of different perspectives emerging from the actors involved in space resource activities, as well as the interests and benefits of all countries and humankind."[434] By "referring not only to countries, but also to humankind as a whole, Building Block 1 illustrates the inclusiveness, instrumental for attaining international legitimacy, which permeates the entire document."[435] To achieve this objective, the Building Block 1.2 sets out the initiatives to: identify and define the relationship of space resource activities with existing

430. Tanja Masson-Zwaan et al., *The Hague Space Resources Governance Working Group: A Progress Report*, 59TH IISL COLLOQUIUM ON THE LAW OF OUTER SPACE, SESSION 2, LEGAL PERSPECTIVES ON SPACE RESOURCES AND OFF-EARTH MINING 163, 165 (2016).

431. Working Paper of Lux. and the Neth., *supra* note 406, at 1.

432. Building Blocks, *supra* note 31, at 7.

433. *Id.*

434. *Id.* at 17–18.

435. *Id.* at 17.

international space law; propose recommendations for the consideration of states or international organizations for the application or development of domestic or internal frameworks; and to promote the identification of best practices by states, international organizations and non-governmental entities.[436]

Space resources are defined as "extractable and/or recoverable abiotic resource[s] in situ in outer space."[437] The definition lays its focus, therefore, on resources that can be obtained from celestial bodies, irrespective of the means of attainment. According to the understanding of the Working Group, "this includes mineral and volatile materials, including water, but excludes (a) satellite orbits; (b) radio spectrum; and (c) energy from the sun except when collected from unique and scarce locations."[438] This is because that (a) and (b) above are neither extractable nor recoverable and already subject to the ITU regulations, and (c) falls into the "peaks of eternal lights, which refers to places on the surface of a celestial body where sunlight is almost continuously present."[439] The definition is almost the same as that of space resources as provided in the national legislations of the United States, Luxembourg, the U.A.E. and Japan.[440] The second key term defined is "utilization of space resources," described in the Building Block 2.2 as meaning "the recovery of space resources, as well as the extraction of raw mineral and volatile material therefrom."[441] Space resources can be used for scientific purposes in addition to commercial and marketing purposes. It should be noted that secondary utilization of space resources is nevertheless understood as being excluded from this definition. Both the utilization of raw materials derived from space resources and the marketing and distribution of space resources are understood as secondary utilization.[442] This exclusion was adopted by the Working Group, "following the principle of adaptive governance, in order to establish a necessary cut-off point for applicability, considering the Building Blocks' characteristics."[443] And then, "space resource activity" is defined as "an activity conducted in outer space for the purpose of

436. *Id.*

437. *Id.* at 22.

438. *Id.*

439. *Id.* at 23.

440. *See* U.S. Commercial Space Launch Competitiveness Act § 51301; The Explanatory Statement, *supra* note 253, at 1; U.A.E. Federal Law, *supra* note 29, art. 1; Act No. 83, *supra* note 305, art. 2.1.

441. Building Blocks, *supra* note 31, at 22.

442. *Id.* note (ii) at 23.

443. *Id.* at 24.

searching for space resources, the recovery of those resources, and the extraction of raw mineral or volatile materials therefrom, including the construction and operation of associated extraction, processing and transportation systems."[444] Moreover, the term "space-made product" refers to "a product made in outer space wholly or partially from spacer sources,"[445] and the term "operator" is defined as "a governmental, international or non-governmental entity conducting space resource activities."[446]

The Building Blocks 4.1 and 4.2 set forth eleven principles so that the international framework may be designed to ensure the compatibility with international law.[447] Most of these principles are based on the existing space-related treaties, including the ITU Convention, and in themselves offer nothing new other than the aforementioned principle of adaptive governance. However, the principle of promoting compatibility and predictability of domestic frameworks of states and internal frameworks of international organizations warrants some explanation. The Commentary explains that "while recognizing the sovereign prerogative of States to legislate in accordance with their national interests, a fundamental tenet of international law, as well as the self-regulatory autonomy of international organizations, this subparagraph 4.2(b) promotes initiatives toward avoidance of unnecessary conflicts of law."[448] Besides, the principle of promoting legal certainty and predictability for operators in the subparagraph 4.2(h) is of the "utmost importance for the industry, given that legal uncertainty as to requirements for mining licenses will influence not only their business models, but also R&D plans."[449]

The Building Block 7 provides that "the international framework should enable the attribution of priority rights to an operator to search

444. *Id.* at 22.

445. *Id.* Raw mineral volatile materials, such as water, irrespective of form, are not covered by the definition of space-made product. The definition is also not applicable to any space debris resulting from, or related to, space objects. *Id.* at 24. The Building Block 6 sets forth that the international framework should provide that States have jurisdiction and control over any space-made products used in the space resource activities for which they are responsible. *Id.* at 43. The Commentary explains Building Block 6 provides a mechanism for jurisdiction and control in relation to space-made products, ensuring the identification of the internationally responsible State in accordance with Building Block 5, and therefore enables the liability regime considered by Building Block 15. *Id.* at 44.

446. *Id.* at 22. This definition does not preclude natural persons to be considered as "operators."

447. *Id.* at 31.

448. *Id.* at 32.

449. *Id.*

for and/or recover space resources for a maximum period of time and a maximum area upon registration in an international registry, and provide for the international recognition of such priority rights. The attribution, duration, and the area of the priority right will be determined on the basis of the specific circumstances of a proposed space resource activity."[450] The international registry should be made publicly available, and the establishment and maintenance of an international database be in place for that matter.[451] The attribution of priority rights is designed to enable an operator to engage in space resource activities on celestial bodies to which the non-appropriation principle applies, to ensure open access to natural resources by other countries by limiting the areas and duration of space resource activities, "to protect the effort and investment of the operator in locating space resources and developing corresponding activities, as well as to coordinate access to resources, so as to avoid harmful interference with the activities of other operators."[452] The concepts of priority rights and their international recognition follow the ITU's system of the radio frequencies allocation, under which the radio administration of one country lodges an application for the radio frequency it plans to use to the Radio Frequencies Board of the ITU, and then, unless challenged by that of other country after the coordination procedure, such radio frequency is preferentially registered in the Master International Frequency Register and given international protection. Once granted international protection, the other country cannot use one and the same frequency.[453]

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450. *Id.* at 46.

451. *Id.* at 93. For the items of the international database, see *id.* ¶¶ i–vi at 94.

452. *Id.* at 46.

453. In this respect, the system of frequency allotment is typically based on the "first comes, first served" procedure. Article 44, paragraph 2, of the ITU Constitution, however, provides that "radio frequencies and the geostationary-satellite orbit are *limited natural resources* and that they must be used. . .so that countries or groups of countries may have *equitable access* to both, taking into account the special needs of the developing countries. . .." Constitution and Convention of the International Telecommunication Union art. 44, Oct. 1, 1994, 1825 U.N.T.S. 31251 (emphasis added). Pursuant to this Article, the 1985 ITU's World Administrative Radio Conference modified the procedure and set aside the frequencies and orbital slots of geostationary satellites for future use by developing countries (so-called "planning scheme of channels"). *See*, ITU, *World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It First session, Geneva, 1985,* Report To The Second Session Of The Conference , 29 (1985); *Contra* Siegfried Wiessner, *The Public Order of the Geostationary Orbit: Blueprints for the Future*, 9 Yale J. World Pub. Ord. No. 2, 241 (1983), (observing that a priori allotment of frequencies and has been perceived by the major users as preventing optimum use of the orbit and would produce congestion).

The Building Block 8.1 acknowledges the acquisition of legal rights over the materials extracted and the products derived therefrom.[454] Such rights may be granted by virtue of domestic legislation, bilateral or multilateral agreement.[455] The issue of what kind of rights should be granted was considerably debated within the Working Group. In the initial text of the Working Group, the term "internationally recognized property rights" was employed, but it has been changed with the current terminology which refers to "resource rights," as it was agreed that it was not for the Working Group to decide what legal content shall be assigned to the rights eventually granted over space resource.[456] Whereas the paragraph 8.2 provides that the international framework should enable the mutual recognition between states of such resource rights, a previous version of the term "mutual" was the term "international."[457] The rationale behind the change is that the term of international recognition seemed too dogmatic when compared to the effect of "mutual" recognition, which allows states to recognize foreign resource rights on a basis of reciprocity, rather than because of an absolute obligation to do so.[458] In order to ensure the lawful utilization of space resources, paragraph 8.3 reiterates the importance of consistency with the principle of non-appropriation under Article 2 of OST.[459] It should be noted that in this paragraph "the statement advocating for the legality of the full utilization of a celestial body has been abandoned in favor of a direct reference to the non-appropriation principle of Article 2 of OST."[460] In light of this debate in the Working Group, one of the legal effects of this paragraph can be considered as preventing the event that utilization of space resources may amount to appropriation of a celestial body.

The obligation of due regard to the corresponding interests of all countries and humankind as described by the Building Block 9 is primarily based on Article 9 of OST. The term "due regard" is also referred to in the 2019 M/V Norstar Case of the International Tribunal for the Law of the Sea (ITLOS),[461] "where the term appears for the first

454. Building Blocks, *supra* note 31, at 50.

455. *Id.* at 54.

456. *Id.* at 53.

457. *Id.*

458. *Id.*

459. *Id.* at 50.

460. *Id.* at 53.

461. The decision concerned the case where it was disputed whether the application of Italian law to the M/V NORSTAR violated the freedom of navigation on high seas as provided by Art. 87, ¶ 1, of the UNCLOS, when the Italian authority had arrested and detained the Panamanian-

time in a Court's decision and is defined by one of the parties as the obligation of States, when exercising their freedoms, to consider the interests of other States and refrain from interfering with other States exercising the same freedoms."[462] Furthermore, criticism was raised against the reference to humankind alongside all countries, but the term was maintained in order to "reflect the contemporary architecture of the global society, which is no longer composed solely of sovereign States but also of governmental and non-governmental entities representing the many facets of humankind."[463]

The Building Block 10 contemplates proactive measures to be adopted by states and international organizations to avoid and mitigate any potentially harmful impacts emerging from space resource activities.[464] An explanatory and non-exhaustive list of potentially harmful impacts to be considered for proper avoidance and mitigation is presented in the following subparagraphs: (a) risk to the safety of persons, the environment or property; (b) damage to persons, the environment or property; (c) adverse changes to the environment of the Earth; (d) harmful contamination of celestial bodies, taking into account internationally agreed planetary protection policies; (e) harmful contamination of outer space; (f) harmful effects of the creation of space debris; (g) harmful interference with other on-going space activities, including other space resource activities; (h) changes to designated and internationally endorsed outer space natural or cultural heritage sites; (i) adverse changes to designated and internationally endorsed outer space sites of scientific interest.[465] "According to the Technical Panel (in Annex II), the most likely harmful interference between space resource activities would be of a technical character."[466] In an effort to facilitate the implementation of Building Block 10, "the Socio-Economic Panel prepared recommendations in a white paper titled

flagged large oil tanker for illegal bunkering to mega yachts on high seas off the coasts of Italy, France, and Spain (i.e., for alleged violation of Italian customs law and suspected tax fraud). The Tribunal accepted the Panamanian contention regarding alleged violation of Ar. 87, ¶.1, of the UNCLOS, but dismissed its contention that Italy allegedly breached the obligation of due regard, finding that "the present dispute [was] concerned with Panama's exercise of the freedom of navigation with respect to its vessel, the M/V "Norstar" [and] there [was] no dispute related to Italy's exercise of the freedom of navigation." M/V "Norstar" (Panama v. Italy), Case No. 25, Judgment of Apr. 10, 2019, ITLOS Rep. 7, ¶¶ 230–31. Thus, the obligation of due regard comes into question only when it concerns the corresponding interests of other countries only.

462. Building Blocks, *supra* note 31, at 57.

463. *Id.* at 58.

464. *Id.*

465. *Id.* at 58–59.

466. *Id.* at 60.

Developing Responsible Investing Principles for Space Resources (as described in Annex III)."[467] "The Panel calls for consideration of consensus principles to guide responsible investing, banking, and financing of space resource activities. Such principles would help to integrate sustainability and ethics concepts into the management of the space resources sector."[468] It is noteworthy that "until November 2018, the Building Block required [adoption of a precautionary approach with the aim of avoiding harmful impacts], but, during the final stage of the drafting process, reference to the precautionary approach was removed."[469]

Like the principle of deconfliction of space activities as provided by the Artemis Accords, Building Block 11.3 also permits the establishment of safety zones by states and international organizations to ensure safety for a space resource activity and to avoid possible harmful interference.[470] While such safety measures shall not impede the free access to any area of outer space by personnel, vehicles and equipment of another operator, "a state or international organization may restrict access for a limited period of time, provided that timely public notice has been given setting out the reasons for such restriction."[471] In this regard, "any decision to establish a safety zone should cautiously balance the need to ensure safety and the principle of non-appropriation, as well as the freedom of access to all areas of celestial bodies."[472] In case of overlap of safety zones or conflicts involving freedom of access, paragraph 11.4 suggests appropriate international consultations to be implemented.[473] The Technical Panel, recognizing the importance of additional coordination to avoid harmful interference, proposed additional five principles.[474] In the Working Group, there were many discussions as to the compatibility of safety zones with the principles of international space law, particularly the non-appropriation principle and the freedom of access to all areas of celestial bodies. In the end, the discussions settled down by inserting the phrase "taking into account the principle of non-appropriation under article II OST" into the final

467. *Id.*

468. *Id.*

469. *Id.* at 64. (emphasis added)

470. *Id.* at 65.

471. *Id.*

472. *Id.* at 66.

473. *Id.* at 65.

474. For example, safety zones should be established by determining the area in which nominal operations of the relevant activity or an anomalous event could reasonably cause harmful interference with other parties' personnel, equipment, or operations. *See id.* at 67, 126.

Text. Therefore, the legal status of safety zones remains to be seen as with the case with the relevant provisions in the Artemis Accords and is a matter for future deliberations.

Finally, regarding the sensitive issue of benefit-sharing which is not addressed at all in the Artemis Accords, Building Block 13.1 provides a non-exhaustive list of proposed means of benefit-sharing that do not threaten the commercial aspect of space resource activities: (a) the development of space science and technology and of their applications; (b) the development of relevant and appropriate capabilities in interested states; (c) cooperation and contribution in education and training; (d) access to and exchange of information; (e) incentivization of joint ventures; (f) the exchange of expertise and technology among states on a mutually acceptable basis; and (g) the establishment of an international fund.[475] Almost all of these examples show that the focus is on the enhancement of participation in space resource activities as well as on the capacity building of developing countries. Indeed, compulsory monetary benefit-sharing is not required.[476] The reason is that space resource activities are still in the very initial phase and that "in the short and medium term, the space resource activities of the operators are not expected to return sufficient or significant profit."[477] Rather, the idea of an international fund, expressed subparagraph (g), is embraced.[478] However, the Building Block does not link the international fund to any specific goal or funding source, because "both these aspects could be better assessed once space resource activities have matured."[479]

2. The Vancouver Recommendations

The Recommendations, published by two dozen experts group almost concurrently with the Hague Building Blocks, are "intended to augment other existing recommendations and guidelines, most notably the Building Blocks, and the group's ultimate goal is to help ensure that Space mining, wherever and whenever it takes place, does so in a safe and sustainable manner."[480] The partial participants in the workshop which deliberated the Recommendations revealed that they sent a letter with the Recommendations attached to Canada's Foreign

475. *Id.* at 74.
476. *Id.* at 75.
477. *Id.* at 79.
478. *Id.*
479. *Id.*
480. Vancouver Recommendations, *supra* note 32, at 2.

Minister François-Philippe Champagne, which stated that "at the heart of the Recommendations was a rejection of any unilateral approach based on the adoption of national legislation."[481] Notwithstanding the Recommendations adopted as a consensus document by the experts, it does not necessarily, in every respect, reflect the views of each individual participant.[482]

As compared with both the Artemis Accords and the Hague Building Blocks, the most characteristic is that the experts group does not take a position on the legal debate over Article 2 of the OST, "apart from noting that contested interpretations of international law cannot become binding unless accepted by a significant majority of states,"[483] and that "the group considers the unilateral adoption of national legislation to be an inadequate response to the need to ensure that space mining is carried out in a safe and sustainable manner."[484] Accordingly, the group recommends multilateral negotiations on an international regime for space mining and the negotiations open to all states, including non-space faring states and developing states, as well as the seeking of input from non-governmental stakeholders.[485] And some options for initiating those negotiations are indicated for example: "a U.N.G.A. resolution, a meeting of states parties to the OST, the activation of Article 18 of the Moon Agreement (a review conference) by states parties to that treaty or ad hoc process initiated by one or more states (similar to the processes leading to the Landmines Convention and the Convention on Cluster Munitions)."[486]

The Recommendations also suggest twenty-five points to the negotiating states.[487] The points other than those excessively overlapping with the Hague Building Blocks are shown below:

> Point 1: Consider the creation of international governance mechanisms, taking into account models or analogies from other areas such as deep seabed mining;

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481. Marc Boucher, *White House Space Resources Order Gets Mixed Response*, SPACEQ (Apr. 24, 2020) (providing the full letter and text of the Recommendations), https://spaceq.ca/white-house-space-resources-order-gets-mixed-response/.

482. Vancouver Recommendations, *supra* note 32, at 2.

483. *Id.* Recommendation II.

484. *Id.* Recommendation III.

485. *Id.* at 3.

486. *Id.* Recommendation VI at 3. NGOs played a central role in reaching out to individual governments for both Conventions. Only states agreeing with the NGOs' cause adopted the treaties at the U.N.G.A instead of at the Geneva Conference on Disarmament.

487. *Id.* at 3–5.

Point 2: Consider the establishment of an international body to provide oversight and ensure accountability with regard to space mining;

Point 3: Be guided by the precautionary principle;

Point 7: Recognize that some forms of space mining could fully consume or destroy some celestial bodies and develop international standards for such cases;

Point 9: Ensure that Space mining does not lead to an increased impact risk between the mined body, Earth, or other celestial bodies;

Point 10: Ensure that space mining does not create potentially hazardous orbital changes to other celestial bodies;

Point 11: Ensure that the risks posed to Earth and the space environment by potentially ejected or retrieved material, including the generation of new meteoroid populations, are minimized;

Point 12: Consider how space mining could be used to advance "planetary defense" by protecting Earth from impact events;

Point 18: Ensure the recognition of intellectual property rights in a manner compatible with effective national and international oversight;

Point 19: Investigate whether and how the concept of "planetary boundaries" can be extended into the Space domain;[488]

Point 20: Encourage the establishment of a mandatory benefits sharing mechanism that includes, but is not limited to, sharing of monetary benefits, for example through an international fund;

488. This concept refers to the quantitative limits of earth within which humankind can survive and thrive over future generations and beyond which the risk increases that large-scale, rapid and irrevocable environmental changes will arise. More specifically, the concept picks up as a target a set of nine planetary systems that represent environmental carrying capacity and is designed to measure their boundaries by the Stockholm Resilience Centre. The nine planetary systems refer to climate change, ocean acidification, ozone depletion, biogeochemical flows of nitrogen and phosphorus, freshwater use, land-system change, biodiversity integrity, atmospheric aerosol pollution and release of novel chemicals. Environmental Innovation Information Organization [EIVO], *Environmental Glossary*, EIC NET (July 19, 2017), https://www.eic.or.jp/ecoterm/?act=view&serial=4484 (in Japanese only).

> Point 22: Consider how to protect sites where scientific studies are underway, including from possible secondary effects of Space mining such as unintentional seismic activity; and,
>
> Point 23: Ensure that operators and autonomous robotic mining equipment are trained, qualified or programmed to recognize biosignatures, to the extent this is feasible, and that all space mining activities stop immediately if biosignatures are encountered.[489]

As shown by the list of Points above, all points other than points 1, 2, 18 and 20 concern the safety and the sustainability of outer space. In particular, regarding the precautionary principle in Point 3,[490] Professor Paul B. Larsen advocates for introduction of the principle into the domestic legal system, arguing that the principle is basically different from Environmental Impact Assessment, but its application to the Moon will have practical effect of bringing about more thorough planning of space programs, including the short and long-term impacts of lunar activities.[491]

On February 15, 2013, a near-Earth object (NEO) exploded over Chelyabinsk, Russia. This dramatic incident attracted the world's attention, which triggered the issue of planetary defense in Point 12. In the aftermath, the COPUOS-STSC considered the agenda item 12, "NEOs." The STSC noted as follows:

> Activities in protecting the Earth from an asteroid impact involved diverse and complex scenarios that could be best addressed through international cooperation, and consisted of early detection and tracking of an NEO, determining the risk of impact and deciding on a course of action in cases where the risk was relatively high and if a deflection was necessary.[492]

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489. Vancouver Recommendations, *supra* note 32, at 5.

490. The precautionary approach means that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." U.N. Conf. on Env't and Dev., Rio Declaration on Env't and Dev., Principle 15, annex I, U.N. Doc. A/CONF.151/26 (Vol. I) (Aug. 12, 1992).

491. Paul B. Larsen, *Application of the Precautionary Principle to the Moon*, 71 J. OF AIR L. & COM. 295, 303 (2006). The principle is based on Article 9 of the OST, as well as Articles 7(1) and (3) of the Moon Agreement. In particular, the obligation of due regard is common to both instruments. *Id.* at 299–303.

492. Comm. on the Peaceful Uses of Outer Space, Rep. of the Sci. and Techn. Subcomm. on Its Fiftieth Session, ¶ 186, U.N. Doc. A/AC.105/1038 (Mar. 7, 2013). The International Asteroid

As such, the STSC is "... exploring possible joint activities mainly focused on linking national asteroid observation facilities in order to coordinate a count of, and to monitor, threatening NEOs."[493] "To divert NEOs from colliding with the Earth, such action would involve control and diversion from the orbit of NEOs by impacting it with an Earth-launched object, and possibly a nuclear explosion."[494] NASA's Asteroid Redirection Mission aimed at the seizure of capturing an asteroid, deflecting it from a solar orbit and thereby moving it to a stable lunar orbit, but ended under the White House Space Policy Directive 1, issued December 11, 2017.[495] In this case, the hypothetical question arises whether the capturing of an asteroid would equate with an appropriation of a celestial body banned by the OST or in the case of a deflection by a nuclear explosion it would conflict with Article I of the 1963 Partial Nuclear Test Ban Treaty.[496] With regard to the legal question revolving around an asteroid, Professor Larsen expresses his view as follows:

> Are asteroids outside international space law? Or, are asteroids subject to existing international space law for all but issues relating to extraction of resources? The obvious implication to be drawn from the previous discussion is that asteroids do not fit well under existing space law, but they also [do] not exist in a legal vacuum.[497]

Warning Network (IAWN) and the Space Mission Planning Advisory Group (SMPAG) were "...established in 2014 as a result of the United Nations-endorsed recommendations, and represent important mechanisms at the global level for strengthening coordination in the area of planetary defence." The United Nations Office for Outer Space Affairs (UNOOSA) works with IAWN and acts as secretariat to SMPAG. U.N. Off. for Outer Space Aff., Near-Earth Objects and Planetary Defence, at 12–13, U.N. Doc. ST/SPACE/73 (2018).

493. Paul B. Larsen, *Asteroid Legal Regime: Time for a Change?*, 39 J. SPACE L. 275, 276 (2014).

494. *Id.*

495. However, many of the central technologies in development for that mission will continue. NASA, *What Is NASA's Asteroid Redirect Mission?*, https://www.nasa.gov/content/what-is-nasa-s-asteroid-redirect-mission (last updated Aug. 13, 2018). Indeed, more recently, NASA's Double Asteroid Redirection Test (DART) successfully impacted the asteroid Dimorphos (160 meters in diameter), which was the Agency's first attempt to move an asteroid in space. *NASA's DART Mission Hits Asteroid in First-Ever Planetary Defense Test*, NASA release 22-100, Sep. 27, 2022, https://www.nasa.gov/press-release/nasa-s-dart-mission-hits-asteroid-in-first-ever-planetary-defense-test

496. Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water art. 1, Aug. 5, 1963, 14.2 U.S.T. 1313, 480 U.N.T.S. 43 [hereinafter PTBT] (prohibiting nuclear weapon test explosions, or any other nuclear explosions, in outer space).

497. Larsen, *supra* note 493, at 296.

Finally, with regard to the issue of benefit-sharing, it should be noted that "the Recommendations encourage the establishment of a mandatory benefit-sharing mechanism (Point 20), for example, sharing of monetary benefits through an international fund.[498] Most visibly, there is an appreciable difference between the Recommendations with a proposed mandatory benefits-sharing and the Building Blocks requiring neither compulsory monetary benefit-sharing nor predetermined funding source.[499] One commentator from National Space Society, a nonprofit organization, sees this mechanism in an negative light, stating that "this is precisely the sort of tax arrangement-a tax, not just of money, but potentially of intellectual property-that makes the Moon Treaty so oppressive, and has the principle effect of scaring off those who might consider an investment in space mining."[500] In addition, no one from industry was listed in the partial list provided by the Vancouver Workshop, despite the fact it is the attached recommendations to the letter that states that industry was represented.[501] For this reason, it seems unlikely that the mechanism would be acceptable to the space mining industry.

3. Space Civil Society: MVA, SGAC, SWF and For All Moonkind

The term "governance" has been used in many ways by people. The reason that this Article chose this term as its title is that one of its purposes is to focus on the diversity in the rule-making process where different stakeholders such as governments, intergovernmental organizations, private entities, academia, and civil society have open communication with one another, within the context of space commercialization and democratization.

Unlike states and intergovernmental organizations (IGOs), non-intergovernmental organizations (NGOs) do not have international personality under international law and capacity to enter into treaties, but are capable of participating in U.N. agencies as observers. At its thirty-third session in 1990, COPUOS-LSC considered "guidelines for granting observer status with the Committee to IGOs and NGO."[502] Of

498. Vancouver Recommendations, *supra* note 32, at 4.

499. *Id.*; s*ee* also, Building Blocks, *supra* note 31, at 74.

500. Dale Skran, *How Not to Mine the Cosmos*, NATIONAL SPACE SOCIETY (May 8, 2020), https://space.nss.org/how-not-to-mine-the-cosmos/.

501. *See* Vancouver Recommendations, *supra* note 32, at 5–6.

502. Comm. on the Peaceful Uses of Outer Space, Request for Observer Status with the Comm. on the Peaceful Uses of Outer Space: Application of the Int'l Org. for Standardization (ISO), ¶ 1, U.N. Doc. A/AC.105/C.2/2018/CRP.7 (Mar. 29, 2018).

all the possible criteria suggested by the Outer Space Affairs Division to the Committee, the important criteria that NGOs must particularly satisfy are to be granted consultative status with the United Nations Economic and Social Council (ECOSOC) and to be non-profit organizations.[503] At its fifty-third session in 2010, the Committee agreed that observer status would be granted to NGOs "on a provisional basis, for a period of three years, pending information on the status of their application for consultative status with the ECOSOC."[504] While the Committee did not specifically include the elements of nonprofit, "it has been the practice of the Committee, since its decision in 1990, to have before it the constitution or statutes of the organization or entity requesting observer status."[505] As long as having observer status does not prevent governments from making the final decision in intergovernmental decision-making process, what relevance does a Civil Society Organization (CSO) have in directly participating in the process? Jean-François Mayence, legal advisor for Belgium Federal Office for Science Policy (BELSPO), adduces the following three reasons: first, non-state actors are represented by themselves, while Governments, although they might represent their citizens' concerns or interests, advocate their own position and nothing more: second, the transnational activities of CSO enable participants to develop common positions and to affirm them with more weight than through national governments; and third, achieving consensus among states involved quite often takes time and drafting efforts until the negotiating text is finalized by compromise. [506] In this context, he further argues that "consultation with non-state actors through national channels could not guarantee faithful reporting of their respective positions."[507] Nowadays, the direct involvement by non-state actors in negotiation becomes an integral part of multilateral decision-making process in order for governments to leverage their expertise.[508]

503. *Id.* ¶¶ 1(c), 2.

504. *Id.* ¶ 3.

505. *Id.* ¶ 4.

506. Jean-François Mayence, *The Role of UNCOPUOS in the International Regulation of Non-Governmental Space Activities*, *in* COMMERCIAL USE OF OUTER SPACE AND SPACE TOURISM 254 (Jean Wouters, Philip De Man & Risk Hansen eds. 2017).

507. *Id.* at 261–62.

508. *Id.* at 262.

The COPUOS has accredited permanent observer status to 42 international organizations between 1962 and 2019,[509] but among all we will take up here in this subsection only MVA, SGAC, SWF and For All Moonkind as representing civil society and explore their roles in relation to the issue of space resources activities. The Moon Village Association (MVA) has been recently created as an NGO based in Vienna.[510] "Its goal is the creation of a permanent global informal forum for stakeholders like governments, industry, academia, and the public interested in the development of the Moon Village. The MVA fosters cooperation for existing or planned global moon exploration programs, be they public or private initiatives. It comprises more than 600 participants to MVA activities from more than 50 countries and 33 institutional members around the globe, representing a diverse array of technical, scientific, cultural, and interdisciplinary fields."[511] The MVA presented a Report on the Global Expert Group on Sustainable Lunar Activities (GESLA) at the COPUOS-LSC in its 60th session.[512] The Report, with a multitude of prospective lunar missions through the efforts of both space agencies and commercial stakeholders moving forward, indicates that the absence of coordination mechanisms for lunar activities poses a challenge to future missions and could generate unintentional harmful interference, especially given the lunar south pole of more commercial or scientific interest.[513] Recognizing the need to define a number of relevant issues in detail to ensure sustainable lunar

509. *See Committee on the Peaceful Uses of Outer Space: Observer Organizations*, U.N. OFF. FOR OUTER SPACE AFF., https://www.unoosa.org/oosa/en/ourwork/copuos/members/copuos-observers.html (last visited Oct. 5, 2022).

510. *Welcome to the MVA*, MOON VILL. ASS'N, https://moonvillageassociation.org/ (last visited Oct. 17, 2022).

511. *Id.*

512. Rep. of the Moon Vill. Ass'n on the Global Expert Grp. on Sustainable Lunar Activities Transmitted to Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixtieth Session, U.N. Doc. A/AC.105/C.2/2021/CRP.12 (May 27, 2021). "The GESLA intends to (i) leverage contributions from major stakeholders of the space community, including space agencies, private companies, academia, and international organizations, (ii) involve the public by promoting outreach efforts regarding the activities of the Group through the involvement of the participants, (iii) serve as a platform to exchange information and views within the space community on key issues for the peaceful and sustainable conduct of lunar activities, and (iv) support the COPUOS or other international fora for the development of an international framework regulating a sustainable lunar activity. The Group is composed of members and observers. They are stakeholders in lunar activities, including representatives from space agencies/government, industry, international organizations, academia, and civil society. The Group is chaired by Dr. Dumitru-Dorin Prunariu (Romania). Its members, at the moment, include 38 experts from 23 countries." *Id.* ¶¶ 7–8, 12 at 2.

513. *Id.* ¶ 2 at 1.

exploration and settlement,[514] "the MVA will seek to present the various GESLA deliverables at the COPUOS, including guidelines for lunar activity implementation and operations addressing lunar debris mitigation, benefits-sharing, sharing of information, registration of activities, regulating access to natural resources, etc."[515] The final set of deliverables is expected to be provided by the end of 2022 once the GEGSLA completes all its activities.[516] The MVA has informed the 58th Session of the STSC in the form of conference room paper. This information has been incorporated in the Subcommittee report and "several delegations have mentioned the document and stressed the importance of GESLA."[517]

The Space Generation Advisory Council (SGAC) also submitted a Report on Effective and Adaptive Governance for a Lunar Ecosystem Lunar Governance (hereafter cited as, "EAGLE Report") at the 60th session of the LSC.[518] In December 1997, the UNOOSA invited "the International Space University to organize a forum for young adults as part of the Committee on the Peaceful Uses of Outer Space."[519] "In parallel with other UNISPACE III activities, the Space Generation Forum was organized in 1999 and attended by 160 participants from 60 States."[520] "One of the 10 recommendations of the Forum was to create a council to support the Committee, by raising awareness and providing a forum for young people to exchange ideas. That directive established the Space Generation Advisory Council (SGAC) in support of the United Nations Program on Space Applications."[521] "The goal of SGAC is to be a global network for university students and young professionals in the space sector, providing a forum for members to share their thoughts, views and opinions on the direction of international space policy."[522] "SGAC comprises over 4,000 members between the ages of

514. *Id.* ¶ 3 at 1.

515. *Id.* ¶ 14(ii).

516. *Id.* ¶ 19.

517. *Id.* ¶ 15.

518. Rep. on Effective and Adaptive Governance for a Lunar Ecosystem Lunar Governance, submitted by Letter dated 27 May 2021 from the Space Generation Advisory Council to the Comm. on the Peaceful Uses of Outer Space, Legal Subcomm., U.N. Doc. A/AC.105/C.2/2021/CRP.13 (May 10, 2021) [hereinafter Eagle Report].

519. *History of SGAC*, SPACE GENERATION ADVISORY COUNCIL, https://spacegeneration.org/about/history-2/page/2 (last visited Oct. 5, 2022).

520. *Id.*

521. Comm. on the Peaceful Uses of Outer Space, Information on the Activities of Int'l Intergovernmental and Non-Governmental Org. Relating to Space L., at 9, U.N. Doc. A/AC.105/C.2/110 (Jan. 12, 2017).

522. *Id.*

18 and 35 in 90 States. Members represent all fields of space, including science, engineering, technology, policy, law, ethics, art, literature, anthropology and architecture."[523] "SGAC provides an outlet for the voice of the next generation of space leaders."[524] SGAC has several online accounts to open its activities, delegates its members to a "multitude of international and domestic space law related conferences and congresses," awards them many scholarships,[525] and within it 11 Project Groups are formed.[526]

The EAGLE Report analyzes the recently accelerated lunar policy developments, including the Artemis Accords and other documents produced by groups like the Hague Working Group, the MVA, the Open Luna Foundation and Space Treaty Project and identifies shared ground and contentious issues. From this analysis, the Report figured the three overarching topics out both as shared ground and contentious issues: multilateralism, registration and space resources.[527] While praising the importance of multilateralism, not all actors necessarily agreed on what it should be to pursue it. Widely regarding the registration of lunar objects as a must under the Registration Convention, "parties were divided as to the creation of a dedicated registry for lunar activities, the kind of activities that should be included in it, and what entity should maintain it."[528] Finally, "although it is generally recognized that sustainable space exploration inevitably relies on in situ resources utilization, there is debate as to how exactly this endeavor should be regulated, especially in view of its commercialization."[529] The Report also revealed that "proposed policies tend more to agree than disagree, and where there is disagreement, this seems to be primarily caused by a lack of clear understanding of the 'adversary' positions."[530] And the EAGLE Report suggests a Lunar Governance Charter "as a shared narrative that could frame the global debate on lunar

523. *Id.*

524. *Id.*

525. *Id.* at 10.

526. They are the Commercial Space Project Group, NEOs Project Group, Space Exploration Project Group, Space Law & Policy Project Group, Space Safety and Sustainability Project Group, Small Satellites Project Group, Space Medicine and Life Sciences Project Group, Space Technology for Earth Applications Project Group, Ethics & Human Rights Project Group, Space & Cyber Security Project Group, and the Diversity and Gender Equality Project Group. *Project Groups*, SPACE GENERATION ADVISORY COUNCIL, https://spacegeneration.org/projects (last visited Nov. 28, 2022).

527. Eagle Report, *supra* note 518, at 5.

528. *Id.*

529. *Id.*

530. *Id.*

governance within pragmatic but also idealistic terms."[531] The Charter consists of 14 recommendations on, inter alia, fundamental principles of space law, guiding principles, inclusiveness, interoperability, human life protection, heritage preservation, science/business balance, use of lunar resources, safety zone and multi-stakeholder dialogue.[532]

The Secure World Foundation (SWF) was established in 2002 as an endowed, private, operating family foundation.[533] The mission of this U.S.-based foundation is "to work with governments, industry, international organizations, and civil society to develop and promote ideas and actions to achieve the secure, sustainable, and peaceful uses of outer space benefiting Earth and all its peoples."[534] SWF has engaged in various activities through its programs focusing on space sustainability, space law and policy, and human & environmental security. Even if we only look at the focus area of space law and policy, SWF has participated regularly in the COPUOS and its two subcommittees since it enjoyed special observer status with the U.N. ECOSOC.[535] At the COPUOS, SWF makes statements and technical presentations on various agenda items, as well as respond to requests for information and comments from COPUOS Working Groups. Its staff also participated in expert groups convened by the Working Group on the Long-term Sustainability (LTS) of Outer Space Activities. SWF also partakes in in space security discussions in Geneva, Switzerland, home of the Conference on Disarmament and the United Nations Institute for Disarmament Research (UNIDIR). SWF has also provided inputs to and participated as an observer in the U.N. Group of Governmental Experts (GGE) on the Prevention of an Arms Race in Outer Space (PAROS).[536] Its publication entitled "Handbook for New Actors in Space," which is concise and readable for educational and informational purposes, contains only the most fundamental principles and topics, but gives us some insight into the considerations to be addressed in relation to the space resources activities. It reads:

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531. *Id.* at 12. The term "Charter" refers to "a legal document enacted to define the essential features and boundaries of a legal framework through the solemn commitment of its signatories" like the Magna Carta Libertatum or the U.N. Charter. *Id.* at 7.

532. *Id.* at 8–12.

533. *Our Board*, SECURE WORLD FOUND., https://swfound.org/about-us/our-board/ (last visited Oct. 15, 2022).

534. *Who We Are*, SECURE WORLD FOUND., https://swfound.org/about-us/who-we-are/ (last visited Oct. 15, 2022).

535. Annual Report, SECURE WORLD FOUND. 10 (2020), https://swfound.org/about-us/annual-report/.

536. *Id.*

> [T]he purposes of the Outer Space Treaty would seem counter to overly drastic prohibitions that would limit the next generation of space activities. As long as the use of space resources conforms to the purposes of the treaty, advances the aims of the treaty, and otherwise conforms to international law, it is permissible.[537]

Unlike SGAC, SWF does not submit its own specific proposal at the COPUOS-LSC. However, in its statement of general exchange of views at the 59th session in 2019, SFW advocated for the Hague Building Blocks, stressing that "the Building Blocks developed by the Hague Working Group offer suggestions and discussion on most of the issues raised in Paragraph 29 of the Belgium and Greek proposal as deserving of priority treatment."[538] In addition, at the 60th session in 2021, SWF welcomes that "the international conversation has moved past stark disagreements regarding the legality or illegality of using space resources," stating that "this is because space resource utilization is not just a factor for space commercialization," but rather "a fundamental component of space exploration in general, and critical for any long-term human presence in space and on celestial bodies."[539] This view is corroborated by the In-Situ Resource Utilization Gap Assessment Report made public in April 2021 by the International Space Exploration Coordination Group (ISECG).[540] Furthermore, given the fact the licensing and

537. SECURE WORLD FOUNDATION, HANDBOOK FOR NEW ACTORS IN SPACE 46 (Christopher D. Johnson ed., 2020).

538. *Agenda Item 15, General Exchange of Views on Potential Legal Models for Activities in Exploration, Exploitation and Utilization of Space Resources United Nations Committee on the Peaceful Uses of Outer Space Legal Subcommittee*, Secure World Found. (Apr. 2019), https://swfound.org/about-us/secure-world-foundation-statements/. SWF served as a Consortium Partner in the operations and activities of the Hague International Space Resources Governance Working Group.

539. *Agenda Item 14., General Exchange of Views on Potential Legal Models for Activities in Exploration, Exploitation and Utilization of Space Resources*, SECURE WORLD FOUND. (June 1, 2021) [hereinafter SWF GEV 2021], https://swfound.org/media/207212/secure-world-foundation-lsc-2021-space-resources-statement-june-1-2021.pdf.

540. *Id.* Created in 2007, the ISECG is a non-binding forum set up by 26 space agencies in which participating space agencies share information about their space exploration plans, objectives, and interests with the goal of strengthening individual agency exploration programs and the collective effort. In 2019, the Technology Working Group (TWG) of the ISECG established a Gap Assessment Team (GAT) for the topic of ISRU. The Report is the product by the GAT and intended to identify technology needs and inform the ISECG members on technology gaps that must be addressed in order to implement foreseen missions to help ensure that plans for human exploration of the Moon and deep space would be successful. INT'L SPACE EXPL. COORDINATION GRP., IN-SITU RESOURCE UTILIZATION GAP ASSESSMENT REPORT 6, 13 (2021), https://www.globalspaceexploration.org/wordpress/wp-content/uploads/2021/04/ISECG-ISRU-Technology-Gap-Assessment-Report-Apr-2021.pdf.

enforcement of those standards established by international bodies is undertaken at the national level, SWF believes governance of space resource utilization is likely to follow other governance models like the ITU or the International Civil Aviation Organization.[541] And it claims that given the nascent nature of space resource access and utilization, a binding treaty is likely inappropriate before the actual activity begins, and may not even be appropriate thereafter and once again suggests that the Hague Building Blocks are a good starting point for discussion.[542]

Formed in 2017, For All Moonkind, Inc. ("FAM") is an international, non-governmental, not-for-profit and U.S.-based organization and was granted the status of permanent observer to the COPUOS in 2018.[543] FAM consists of nearly 100 volunteers, space lawyers, engineers, scientists, industry stakeholders and communicators from around the world.[544] The organization's mission is to ensure the six Apollo Lunar Landing and similar sites in outer space "are recognized for their outstanding value to humanity and consequently preserved and protected for posterity as part of our common human heritage."[545] FAM "seeks to achieve this objective by promoting the development of protocols and guidelines—and ultimately, a binding Convention—that balances development and resource utilization with the recognition, protection, preservation or memorialization of human heritage in outer space."[546] For the purpose, its Declaration of Objectives and Activities Regarding Cultural Heritage in Outer Space states in Section 2.1 that the participants in this organization agree "to work together and with For All Moonkind, including the legal and archaeological experts that are engaged in an advisory capacity with For All Moonkind, to promote the recognition of Cultural Heritage Sites in Outer Space."[547] Indeed, FAM has succeeded in reminding people, governments and decision makers

541. SWF GEV 2021, *supra* note 539.

542. *Id.*

543. *The Organization*, FOR ALL MOONKIND, https://www.forallmoonkind.org/about/the-organization/ (last visited Oct. 20, 2022).

544. Michelle L.D. Hanlon, United Nations Representative, For All Moonkind, Statement to the 57th Session of the Scientific and Technical Subcommittee, Committee on the Peaceful Use of Outer Space 1 (Feb. 2020), https://www.unoosa.org/documents/pdf/copuos/stsc/2020/statements/2020-02-10-PM-Item04-08-ForAllMoonkindE.pdf.

545. *Id.*

546. *Id.*

547. *Declaration of Objectives and Activities Regarding Cultural Heritage in Outer Space*, FOR ALL MOONKIND, https://www.forallmoonkind.org/about/the-declaration/ (last visited Oct. 16, 2022).

how important space heritage is both internationally and nationally.[548] For example, regarding the United States "One Small Step Act," FAM made significant contributions to the development and drafting of this legislation which is the first of its kind by any nation.[549] It remains unclear how and to what degree FAM was involved in the insertion of Section 9.1 (preservation of space heritage) of the Artemis Accords. However, the Act indicates that it is the sense of the U.S. Congress that the U.S. President should work with other space-faring nations to develop best practices to ensure the protection of all historic sites in space.[550] Hence, it is reasonable to posit that FAM indirectly contributed to the creation of Section 9.1 of the Accords through the Act and particularly NASA. The Space.com quotes Jim Bridenstine, former NASA Administrator, as saying:

> As we go forward to the moon with the Artemis Program, NASA has been clear that we must do so sustainably. As part of the Artemis Accords agreements signed with partner nations, NASA has emphasized that protecting historically significant sites is critical, and I applaud the leaders of this legislation for their commitment to ensuring that future lunar science and exploration is done in a safe and transparent manner.[551]

While the COPUOS recognizes that "there is a need to for a fresh approach to the idea of protecting designated areas of such bodies of the solar system, either because of their historical, cultural and environmental significance (such as the Apollo, Surveyors and Lunakhod landing sites on the Moon) or because there are good reasons for wanting to protect certain areas of scientific interest,"[552] FAM has developed a digital Register of human items on the lunar surface (Moon Registry), which catalogs more than 100 sites on the Moon that host evidence of human activity and ingenuity, to make it available to everyone.[553] At the

548. *See* Email from Michelle & Tim Hanlon, Co-Founders, FOR ALL MOONKIND (Nov. 2, 2020), https://mailchi.mp/b86994c32f7e/testyourknowledge-6461458.

549. Email from Michelle and Tim Hanlon, Co-Founders, FOR ALL MOONKIND (Jan. 1, 2021), https://mailchi.mp/3614fb46191f/testyourknowledge-6473526.

550. One Small Step Act, *supra* note 103, at 5.

551. Robert Z. Pearlman, *New Law Is First to Protect Apollo Sites from Future Moon Missions*, SPACE (Jan. 5, 2021), https://www.space.com/one-small-step-space-heritage-act.html.

552. Chairman of Comm. on Peaceful Uses of Outer Space, *Future Role and Activities of the Committee on the Peaceful Uses of Outer Space*, ¶ 33, U.N. Doc. A/AC.105/L.268 (May 10, 2007).

553. *Why Build a Moon Registry?*, FOR ALL MOONKIND, https://moonregistry.forallmoonkind.org/about-us/ (last visited Oct. 16, 2022).

COPUOS, FAM are eager to assist the COPUOS with the development of these ideas and continues to appeal to the delegates for working with FAM and at the same time urges the COPUOS-LSC to encourage collaboration amongst space agencies to deal with plume effect before it becomes a costly and perhaps even fatal issue.[554]

There are some other candidates seeking the status of permanent observer such as the Open Lunar Foundation.[555] The World Economic Forum's Report provides a non-exhaustive list of the roles CSOs play across the board. Among them all, the most pertinent roles for governing space activities are: Watchdog (holding institutions to account, promoting transparency and accountability); Advocate (raising awareness of societal issues and challenges and advocating for change); Service provider (delivering services to meet societal needs such as education, health, food and security); Capacity builder (providing education, training and other capacity building); Incubator (developing solutions that may require a long gestation or payback period); Representative (giving power to the voice of the marginalized or under-represented); Solidarity supporter (promoting fundamental and universal values; and Definer of standards (creating norms that shape market and state activity).[556] It is no exaggeration to say that CSOs have participated in shaping and implementing international space law through their own roles and the networks among them. It is often criticized that CSOs are not primarily held accountable whereas the governments have full accountability for the results from their decision-making process.[557] It cannot be denied there is something negative about CSOs in terms of accountability, but Mehak Sarang, from SGAC, reminisces about the meeting of the COPUOS that she has attended:

554. Hanlon, s*upra* note 544, at 3, 4. FAM's statements made at the COPUOS are distributed on video from time to time. See the FAM's web page at https://www.forallmoonkind.org/moonkind-press-room/video-gallery/.

555. *Open Lunar Statement to the UN COPUOS Legal Subcommittee*, OPEN LUNAR FOUNDATION (June 7, 2021), https://www.openlunar.org/library/open-lunar-statement-to-the-un-copuos-legal-subcommitee.

556. WORLD ECONOMIC FORUM, THE FUTURE ROLE OF CIVIL SOCIETY 9 (2013).

557. Several quite different models of accountability relations have emerged from work in different sectors. The term "accountability" used here refers to representative accountability in government circles. It emphasizes the obligations of representatives to their constituents. This model has roots in political theory and is often applied to public sector actors expected to be democratically accountable to voters or their elected representatives. L. David Brown & Jagadananda, *Civil Society Legitimacy and Accountability: Issues and Challenges* 9 (CIVICUS, Working Paper No. 32, 2007).

> It's humbling sitting in the chamber in that little conference hall with officials from around the world. Perhaps most humbling is that these people, few of which have been elected to the positions they hold, are deciding the rules of human exploration into space. Those decisions are made in that room, through years of deliberations. Many of us don't know what goes on in that room, or in the minds of those people, and yet, they will decide the fate of the asteroids, moons, and planets in our solar system. They will be responsible, to some degree, in ensuring constellations of satellites aren't the only constellations we can see in the night sky.[558]

If that is the case, it is worthwhile for the architecture of better governance of space resources activities as well that CSOs keep a distance from the governments and as the case may be collaborate with them using their networks cross-cutting the boundaries and thereby represent the voiceless on Earth, the Moon and other celestial bodies. As a result of network effects, cooperation based on loosely-structured, peer-to-peer ties is likely to develop through frequent interaction between the government officials and civil society.

V. Conclusion

The Outer Space Treaty has stood the test of time for more than a half century since its adoption, while being complemented by three other treaties (the Rescue and Return Agreement, the Liability Convention, and the Registration Convention). During the intervening years, each time the OST has faced new challenges to be coped with, the OST has been supplemented by legally non-binding instruments (i.e., U.N. resolutions). The OST focuses on governing the use of areas and space of outer space (including the Moon and other celestial bodies) as such (i.e., establishing and maintaining the spatial order). And it lacks explicit provisions relating to the economic or legal conditions for establishing facilities in outer space and operating them for practical purposes. Furthermore, it is devoid of the criteria for utilizing and sharing the outcomes from space activities (including resources) as well as the manners of international cooperation or the organizational modes.[559]

The issue itself of whether or not space resources activities are permissible in interpretation under the relevant provisions of the OST has

558. Mehak Sarang, *Op'Ed: Thoughts on UN COPUOS*, Space Generation Advisory Council (Aug. 4, 2019), https://spacegeneration.org/oped-thoughts-on-un-copuos.

559. Kuribayashi, *supra* note 196, at 219.

receded into the background, but instead the problem of determining whether such activities can satisfy substantial reasonableness of consequence arising from them has surfaced: namely, how to minimize the exclusiveness of the right to space resources and pay due regard to corresponding interests of other countries as well as to ensure the sustainability of outer space. Sustainable development is inherently an intergenerational question as well as an intra-generational question. The issue of environmental degradation such as space debris or possible adverse changes to the environment on the Moon and other celestial bodies caused by space resources activities concerns intergenerational equity and that of benefit-sharing, and access to space resources, relates to intra-generational equity. Emphasizing the need of international cooperation in ensuring equity, both intergenerational and intra-generational, Professor Weiss rightly argues:

> Intergenerational equity may appear to conflict with the goal of achieving intra-generational equity, but in many instances, the actions needed to achieve intra-generational equity are consistent with those advancing intergenerational equity. . .No single country or group of countries has the power to ensure a healthy environment for the future. Thus, even when each country cares only about its own people, all nations must cooperate in order to guarantee a robust planet in the future.[560]

Susumu Itoh, Japanese eminent scholar of law of civil procedure, shortly after the end of the World War II, published an article on the four-staged Equity Law in its historical development. He concluded that "Law would evolve, oscillating infinitely between stability and equity. Novel equity, however, in the same vein would evolve between legislation and interpretation."[561] Assuming that the term "law" or "legislation" as used here can be replaced by "international law" or "international legislation," his conclusion would hold true for international community. With the accumulation of scientific knowledge and the rapid progress in applied space technology, the needs of international community necessarily change. We have to frankly admit that space resources activities which will take place in the coming years contain issue areas that cannot be solved under the existing U.N. space-

560. Edith Brown Weiss, *In Fairness to Future Generations and Sustainable Development*, 8 AM. U. INT'L L. REV. 19, 21–22 (1992).

561. Susumu Itoh, Ekuiti no Yon Dankai [*The Four Stages of Equity*], 21 Hogaku Kenkyu [Keio J. L., Pol. & Socio.] 45 (1948).

related treaties. Through the discussions at the COPUOS-LSC thus far, the Hague Buildings Blocks, the Vancouver Recommendations, the inputs from Civil Society organizations and academia, we already have a lineup of the legal issues to be addressed at hand.

Some may argue that to discuss a legal framework when space resources activities by private entities have yet to begin on a large scale would disincentivize private investment and put the cart before the horse.[562] It must be noted, however, that Professor Wilfred Jenks, one of the early leading scholars of space law, wrote in his well-known book more than sixty years ago as follows:

> While it is healthy that the evolution of the law should follow rather than anticipate that of life, there are circumstances in which the possibility of developing the law on sound principles depends primarily on an initiative being taken in the matter before *de facto* situations have crystalized too far.[563]

By early June 2021, the delegates have been close to agreement to establish the Working Group that is expected to produce the outcome within five years.[564] This heralds the beginning of the next chapter on the subject. Formal and informal proposals will be coming and going between the Working Group and the delegates. Besides, CSOs will also engage in the discussions in one way or another through their networks. As we have mentioned in the previous subsection, cooperation based on loosely structured ties will develop as a result of network effects. The driving forces behind the network are the convincing and information power, and source from very personal qualities such as expertise, integrity, qualification, and ingenuity of each member of the network.[565] The road ahead will be uneven, and what will lie ahead for the COPUOS are many twists and turns until the delegates reach the

562. Michael Weinhoffer, *International Management of Space Resource Extraction: Don't Put the Cart Before the Horse*, 43 J. SPACE L. 171, 171 (2019).

563. C. WILFRED JENKS, THE COMMON LAW OF MANKIND, 384 (Stevens & Sons Ltd., 1958).

564. In April 2022, the Working Group agreed on the detailed five-year work plan and methods of work from 2023 to 2027 and also noted that it would collate and disseminate information received from State members and prepare a summary of such information for discussion at the 62nd session of the LSC in 2023. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixty-First Session, at 38, U.N. Doc. A/AC.105/1260 (Apr. 19, 2022). For the detailed work plan and work methods, see *id.* at 39–40.

565. Yutaka Osada, Kokusai Kokuho no Kouzouteki Hatten ni kansuru Kenkyu [The Study of Structural Development in International Aviation Law] 334 (2011) (Doctoral Thesis, Keio University, 336p.) [unpublished].

final agreement. At this point of time, the view that the agreement will take the form of legally non-binding U.N. resolution is gaining ground at the COPUOS. On the other hand, Professor Freeland has reservations as to whether such "soft law" approach serves us well in the long term, particularly in relation to such important issues in the context of our future uses of outer space and, indeed, in many respects, for the future survival of the human race.[566]

As we have observed in subsection III.C.1 of this Article, the U.S. delegate did not believe the CHM principle of the Moon Agreement would impose any substantial legal burden. Nonetheless, given the U.S. Administration's negative policy attitude to the Agreement and the scarce ratification of the Agreement, there is almost no chance that the Agreement will revive, although there are some possible alternatives to amend the Agreement so as to engage as many states as possible.[567] In favor of Professor Freeland's view above, the present author does not believe such soft law instruments are always the best. From a pragmatic point of view, however, the author is agreeable to such instruments as second best all the more because there still remain not a few unknowns technologically. The Declaration on Legal Principles of 1963 adopted as consensus by the U.N.G.A. harbingered the OST. By the same token, there is hope that a possible multilateral framework without legally binding force will lead to a binding instrument over time by increasing scientific and technological knowledge and advancing common understanding among nations through the hands-on experience of space resources activities by spacefarers. In the final analysis, it depends upon the values and wisdoms the stakeholders hold about outer space per se and the political momentum playing out at the relevant forum whether the Artemis Accords as a bottom-up approach can take hold in international community or the on-going debates at the COPUOS can produce a multilateral framework governing space resources activities. In any event, at the very least, a future possible framework must enable commercial space lunar mining to be safe and stable.[568] The political and legal landscape of outer space in another fifty years will completely change. Will it change for the better or for the worse? The die is cast.

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566. Steven Freeland, *The Limits Of Law: Challenges to the Global Governance of Space Activities*, 153 J. & PROCEEDINGS ROYAL SOC'Y N.S.W 70, 77 (2020).

567. *See* Osada, *supra* note 249.

568. Paul B. Larsen, *Is There a Legal Path to Commercial Mining on the Moon?*, 83 U. PITT. L. REV. 1, 48 (2021).