หลักนิติธรรมในโลกสมัยใหม่

The Rule of Law in the New Worlds

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บทคัดย่อ

หลายประเทศได้ประกาศความตั้งใจของตนเองที่จะริเริ่มทำเหมืองบนดาวเคราะห์และบนดวงจันทร์ ตลอดจนการไปตั้งถิ่นฐานของมนุษยชาติบนดวงจันทร์และดาวอังคาร นักลงทุนและผู้ประกอบการคาดหมายว่าการทำเหมืองอวกาศจะมีมูลค่าหลายพันล้านดอลลาร์สหรัฐ ดังนั้นการแสวงหาผลประโยชน์จากอวกาศจึงมีการขยายขนาดเพิ่มขึ้นเรื่อยๆ คำถามก็คือทรัพยากรที่มีค่าเหล่านี้จะเป็นประโยชน์ต่อบางประเทศหรือบางบริษัทเป็นการเฉพาะตัวหรือเป็นไปเพื่อประโยชน์ของประชากรทั้งปวงบนโลก ประเทศหรือบริษัทต่าง ๆ ซึ่งมีความสนใจในการใช้ทรัพยากรเหมืองภายใต้กรอบการเมือง กฎหมาย และหลักการทางเศรษฐกิจที่แตกต่างกัน ทำให้มีแนวความคิดที่แตกต่างกันในการใช้ทรัพยากรจากอวกาศ

บทความนี้ได้วิเคราะห์ถึงการแปลความที่หลากหลายในปัจจุบันเกี่ยวกับกฎหมายอวกาศสากล แนวทางต่าง ๆ ในเรื่องการริเริ่มและจุดประสงค์ในการสำรวจอวกาศ ความท้าทายในการสำรวจ และโอกาสเพื่อให้สอดคล้องกับผลประโยชน์ของนานาชาติด้วยสนธิสัญญาเกี่ยวกับอวกาศ ซึ่งมีผลผูกพันทุกประเทศ ซึ่งพยายามแสวงหาและจัดตั้งพรมแดนของมนุษยชาติแหล่งใหม่ เราจะได้มีการทบทวนแบบค้นพบหลักการเกี่ยวกับกฎหมายอวกาศ ซึ่งเกิดจากการขยายตัวของเทคโนโลยีและกฎระเบียบของ

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บรรดาชาติต่างๆ ที่เกี่ยวข้อง ในบทความนี้จะได้พูดถึงความจำเป็นที่จะต้องทำให้กรอบความร่วมมือในเรื่องของอวกาศและมีความทันสมัยอยู่เสมอในช่วงเวลาแห่งความตึงเครียดที่เกิดขึ้นทั่วทั้งโลกและความไม่แน่นอนของสถานการณ์ของโรคระบาดที่เกิดขึ้น คือจะมีความร่วมมือเกิดขึ้นได้จากผู้มีส่วนได้เสียหลายๆ ฝ่ายในเรื่องของอวกาศที่จะพยายามร่วมกันทำให้เกิดระบบการควบคุมที่ดีมีความยั่งยืน ไม่ทิ้งใครไว้เบื้องหลัง และมีความปลอดภัยเพื่อที่จะนำมาซึ่งประโยชน์ต่อมวลมนุษยชาติ ซึ่งในเรื่องนี้ MSO สามารถที่จะหาข้อสรุปร่วมกันประกอบการในการพัฒนาไปสู่โลกใหม่

คำสำคัญ: กฎหมายอวกาศนานาชาติ, หลักนิติธรรม, คณะกรรมการการใช้ห้วงอวกาศอย่างสันติห่งองค์การสหประชาชติ (the United Nations Committee on the Peaceful Uses of Outer Space) (COPUOS)

Abstract

Several countries have announced their intentions to mine the riches of asteroids and the Moon, and to start human settlements on the Moon and Mars. Investors and entrepreneurs anticipate that space mining will be worth trillions of dollars. Thus, the interest is growing on harvesting these riches in outer space. The question is: Will these valuable resources benefit individual countries and companies, or all peoples on Earth? Countries and firms interested in the mining adhere to different ideologies regarding the use of space resources, and are guided by diverse political, legal, and economic principles applied to the use of space resources on Earth. This article analyzes the varying interpretations of current international outer space law, the differing goals of national space initiatives, and their diverging trends on regulations. Among the challenges of pending exploration and settlement projects in outer space is the compatibility of national interests with outer space treaties, which are legally binding on all nations and peoples exploring or settling in Humanity's new frontier. After reviewing the founding principles of Outer Space Law *vis, a vis,* the spread of new technologies and relating national legislations, this paper notes a pressing need for the international community to update frameworks of cooperation in outer space. In a time of rising global tensions and the uncertainties of the pandemic crisis, it is up to the space multi-stakeholders to join efforts to create a more sustainable, inclusive, safe and

resilient governance system for the new worlds, bringing benefits to humanity. Toward this end, a trusted global Multi Stakeholders Organization (MSO) can find common ground for entrepreneurial development of the New World.

Keywords: International Outer Space law, Rule of Law, the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)

1. International Outer Space Law

The need for international space law was first recognized when the two then spacefaring powers, the USSR and USA, decided it was in their common interest to find a common ground despite their different political regimes (communism and capitalism, respectively). They managed in the 1960s to agree on the main principles that should regulate outer space.

The first document to be drafted was *The Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space* in 1963.[1] It states that:

1. The exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind.

[1] The Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, RES 1962 (XVIII), General Assembly 18th session, December 13, 1963, is the second important text concerning Space Law. It is a resolution that was adopted by the General Assembly in 1963. The first important decision concerning Space Law dates from December 20, 1961. It is the General Assembly Resolution 1721 (XVI) on the International Co-operation in the Peaceful Uses of Outer Space. The latter Declaration reaffirms and expands the scope of the earlier one. The principles contained in it represent the consensus and maximum agreement attainable by the Committee on Peaceful Uses of Outer-Space established by the Assembly to deal with technical co-operation of states and the legal regulation of outer space. https://www.spacelegalissues.com/space-law-declaration-of-legal-principles-governing-the-activities-of-states-in-the-exploration-and-use-of-outer-space/

2. Outer space and celestial bodies are free for exploration and use by all States on a basis of equality and in accordance with international law.

3. Outer space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

4. The activities of States in the exploration and use of outer space shall be carried on in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding.

Based on these principles, the Outer Space Treaty (formally the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies) was opened for signature in the United States, the United Kingdom, and the Soviet Union on 27 January 1967, and entered into force on 10 October 1967. As of June 2019, 109 countries are parties to this Treaty, while another 23 have signed the treaty but have not completed ratification.

The Outer Space Treaty established the principles for activities in the realm of outer space, stating that:

- *the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind.*
- *outer space shall be free for exploration and use by all States.*
- *outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.*
- *States shall not place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space in any other manner.*
- *the Moon and other celestial bodies shall be used exclusively for peaceful purposes.*
- *astronauts shall be regarded as the envoys of mankind.*
- *States shall be responsible for national space activities whether carried out by governmental or non-governmental entities.*
- *States shall be liable for damage caused by their space objects; and*

- *States shall avoid harmful contamination of space and celestial bodies.*[2]

The treaty was drafted in the early years of space activities, it does not offer clear policies regarding newer space activities such mining in the asteroids and in the moon, as well as human settlements in Mars, the Moon and other celestial bodies.

Three other treaties – including the Rescue Agreement (1968), the Space Liability Convention (1972), and the Registration Convention (1976)– have been adopted since 1967. The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, known as the Moon Treaty, was adopted by the General Assembly in 1979 in resolution 34/68. It was not until June 1984, however, that the fifth country, Austria, ratified the Agreement, allowing it to enter into force in July 1984. The Moon Treaty is not considered binding international law since the United States, the Russian Federation, and the People's Republic of China (PRC), considered the major space powers have neither signed, acceded to, nor ratified the Moon Treaty. The only countries with space programs to sign the agreement are France and India.[3]

The Moon Treaty closes a loophole in the Outer Space Treaty by banning any ownership of any extraterrestrial property by any organization or private person unless that organization is international and governmental. [4]The Agreement reaffirms and elaborates on many of the provisions of the Outer Space Treaty as applied to the Moon and other celestial bodies, providing that those bodies should be used exclusively for peaceful purposes, that their environments should not be disrupted, that the United Nations should be informed of the location and purpose of any station established on those bodies. In addition, the Agreement provides that the Moon and its natural resources are the common heritage of mankind and that an international regime should

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[2] https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html

[3] Michael Listner, The Moon Treaty: failed international law or waiting in the shadows? *October 24, 2011,* https://www.thespacereview.com/article/1954/1.

[4] Ibid, 4

be established to govern the exploitation of such resources when such exploitation is about to become feasible.[5]

2. Global Commons

Even if the Moon Treaty is not recognized by the current space powers, it is relevant to indicate that under international law, outer space is considered one of the four global commons, that is, resource domains or areas that lie outside of political reach of any nation state. The four global commons are: The High Seas, the Atmosphere, Antarctica, and Outer Space.

The regime proposed for the Moon is similar to the regime in existence for the High Seas, which established the Seabed Authority and has enacted a Seabed Mining Code to regulate the exploration of the seabed area. The United Nations Convention on the Law of the Sea (UNCLOS) came in force in 1984. The convention has been ratified by 168 parties, which includes 167 states (164 United Nations member states plus the UN Observer state Palestine, as well as the Cook Islands and Niue) and the European Union. An additional 14 UN member states have signed, but not ratified the convention. It defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for the use of marine natural resources.[6] The United States of America (USA) did not ratify the convention and it is not a member of the Seabed Authority. Even if the USA proposed the Convention during the Nixon Presidency, and later an Agreement to modify the deep seabed provisions and accepted the provisions of the Convention relating to traditional uses of the ocean, such as navigation and overflight, the US Senate up to today did not vote to join the Convention.[7] It is speculated that the US did not want to accept this Convention, as technology for mining the seabed had not been developed at the time of the proposal. However, companies

[5] https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/intromoon-agreement.html

[6] www.ISA.org.jm

[7] https://www.state.gov/law-of-the-sea-convention/

from Japan, Russia, China, and other member countries have already been granted concessions to explore minerals in the Clarion Clipperton Zone (CCZ) about 5,000 meters beneath the Pacific Ocean.[8]

Antarctica is another global common, and the Antarctic Treaty[9] was a result of efforts to provide some sort of international regime during the Cold War period. The treaty was signed in 1959, when the USA and the Soviet Union agreed to put their differences aside for a common cause. The Treaty had 12 original signatories - Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, the United Kingdom, the United States of America, and the Soviet Union. It entered into force in 1961 and has since been acceded to by many other nations. The total number of Parties to the Treaty is now 54. Antarctica is open to any member of the United Nations with substantial research programs. Current protocols to the treaty aim to: Protect the Environment, the Fauna and Flora, the Antarctic Seals and the Marine Living Resources. The Madrid Protocol signed by members in Madrid in 1991 places an indefinite ban on mining or mineral resource activity in Antarctica,[10] designating Antarctic as a natural reserve devoted to peace and science – it establishes environmental principles for the conduct of all activities and provides guidelines for the conservation of Antarctic flora and fauna, managing and disposing of waste and preventing marine pollution.

Thus, even if the Moon Treaty is not in force, there seems to be international consensus that outer space is a global common and its exploration must take into consideration the interests of humanity and not just individual countries or enterprises. Both the Seabed and Antarctica are examples of how nations can work together and explore the commons accounting for interests of humanity and future generations.

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[8] https://www.economist.com/technology-quarterly/2018/03/19/race-to-the-bottom

[9] https://www.ats.aq/e/antarctictreaty.html

[10] http://www.antarctica.gov.au/law-and-treaty/history

3. International Cooperation in Outer Space

Since the signing of the Space Treaty many developments have taken place in the frontier, including satellite communications, remote sensing, and landings on the Moon.

Here is a chronological summary[11] of the highlights in the exploration of the Moon:

1957: Soviet Sputnik, first artificial Earth satellite

1966: Soviet Luna 9

1968: Soviet Zond 5

1968: USA Apollo 8, first to orbit the Moon with humans

1969: USA Apollo 11, first human landing on the Moon

1970: Soviet Luna 17 and 17 (robotic mission)

1976: Soviet, Luna 24, last mission to the Moon during Cold War

1990: Japan reach the Moon with Hiten that orbited the Moon

1994: USA, Clementine, partnership with NASA and Pentagon

2003: European Space Agency (ESA), launched the Moon explorer

2007: Japan, Selene, orbiter the Moon

2007: China, Chang'e entered lunar orbit

2008: India, Chandrayaan-1, placed into a mission specific polar orbit

2013: China, Chang'e 3, first Chinese robotic landing on the Moon

2018: China, Chang'e 4, first landing in the dark side of the Moon

2019: Israel private enterprise failed to land in the Moon

2019: India's Chandrayaan2, launched successfully, reached the Moon orbit, but lost contact with Earth.

Many international and regional organizations were established to explore outer space under the principles of the Space Treaty. Highlights of examples of nations working together to explore and develop outer space include:

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[11] Salvador Nogueira, Exploração Lunar evoluiu e ficou mais sofisticada, acessivel e cientifica, Folha de São Paulo, July17,2019.

- ESA, the European Space Agency, traces its origins on March 20, 1964, by an agreement signed on June 14, 1962. The ESA convention was entered in 1975 with ten founding members: Belgium, Germany, Denmark, France, United Kingdom, Italy, the Netherlands, Sweden, Switzerland, and Spain. Ireland joined later in the year. Nowadays, ESA has 22 members: 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. Slovenia is an Associate Member. Canada takes part in some projects under a cooperation agreement. Bulgaria, Croatia, Cyprus, Malta, Latvia, Lithuania, and Slovakia have cooperation agreements with ESA.[12]

- China and India members of BRICS have plans to include Brazil and South Africa in its Space Programs, to build space science cooperation as the bloc seeks a bigger share of the $300 billion global space industry. Both China and India have ambitious space programs in place, while Russia continues to run the world's only reliable "space taxi" after the US retired its space shuttle in 2011.[13]

- The International Space Station -ISS- is a multi-nation construction, being the largest single structure in space. It was completed between 1998 and 2011 and has been occupied since November 2000. It is a partnership of national space agencies. The ISS is a modular space station in low Earth orbit: it flies around the world every 90 minutes. As of January 2018, 230 individuals from 18 countries have visited the ISS. Major partners are NASA (USA), Roscosmos (Russia) and the European Space Agency (ESA), the Japanese Exploration Agency and the Canadian Space Agency. The ISS astronauts conduct scientific experiments to find more about life in space. The ISS should return to Earth in 2028.[14]

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[12] http://www.esa.int/About_Us/Corporate_news/ESA_facts

[13] https://spacewatch.global/2017/04/brics-space-science-cooperation/ Brics to further space science cooperation

[14] https://www.space.com/16748-international-space-station.html International Space Station: Facts, History and Tracking, by Elizabeth Howell, February 08, 2018.

- The International Telecommunications Union - ITU is an organization based on public-private partnership since its inception. Headquartered in Geneva, Switzerland, it currently consists of 193 member countries and 700 private sector entities and academic institutions and has 12 regional and area offices around the world. ITU was established in 1865 to regulate trans-national communications. It has moved from telegraphy and analog telephony to the digital world of satellites, mobile phones and the internet issues. The ITU's Forum in 2013 considered internet related public policy matters. [15]Since ITU has been successful for over a century in coordinating deployment and interconnection of technologies that have a global reach.

- INTELSAT, International Telecommunications Satellite Organization, operator of the world's largest satellite fleet and connectivity infrastructure. Its origin dates from a speech of John Kennedy at the United Nations in September 1961. He signed the Communications Satellite Act of 1962. From August 1964 it operated as an intergovernmental consortium owning and managing a constellation of communication satellites[16]. In 2001the satellite market was fully commercialized and privatized, Intelsat opened a subsidiary corporation in Luxembourg[17]. As of 2018, Intelsat provides service to over 600 Earth stations in more than 149 countries, territories, and dependencies[18]

- ARIANESPACE S.A. is another example of an existing public-private partnership, operating Europe's spaceport in French Guiana. Arianespace is a for profit launch company, with twenty-four private and public sector shareholders from ten European countries. Since its creation in 1980, Arianespace has launched nearly two-thirds of the satellites in orbit today.[19]

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[15] http:itu.intl/go/OverviewITUHistoryArticle,

[16] Leive, David M (1981). "Essential Features of INTEL SAT: Applications for the Future". *Journal of Space Law*. **9** (45): 45–52. Archived from the original on 2012-06-01.

[17] http://www.intelsat.com/about-us/history/

[18] http://www.intelsat.com/global-network/satellites/fleet/

[19] https://www.arianespace.com/

All these organizations are examples of existing cooperation for the exploration, use and development of outer space. Lessons from their experience inform the new frameworks to apply technological innovations for mining and for new settlements in outer space, which will need a legal structure to operate in accord with the Outer Space Law principles.

4. Asteroid and Moon mining: National and International Laws

In recent decades, the potential revenues from mining the asteroids and the moon received increasing interest from state agencies and private entrepreneurs, [20] and a need to regulate the proposed operations arose. In the past, multiple blanket claims to celestial bodies have been attempted, but have not been recognized by law. In 2012, James Dunstan and Berin Szoka wrote:

"*The only court case we have in this respect arose when Greg Nemitz, a space activist, filed a claim for the asteroid Eros with an online database known as the Archimedes Institute, and then sent NASA a bill for parking fees when NASA landed the NEAR-Shoemaker probe on Eros in 2001. The U.S. 9th Circuit Court of Appeals dismissed the suit because Nemitz was unable to prove actual ownership rights for Eros.*"[21]

Thus, the need to enact national regulations on mining the asteroids and the moon resources has emerged in recent years.

a) National plans and regulations for mining outer space resources

National legislations are evolving to encourage commercial resource extraction from asteroids[22]. The United States, Luxembourg, and the United Arab

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[20] https://www.cnbc.com/2018/05/15/mining-asteroids-could-be-worth-trillions-of-dollars.html, May 15, 2018

[21] Berin Szoka and James Dunstan, Space Law: Is Asteroid Mining Legal? O5.01.12 https://www.wired.com/2012/05/opinion-asteroid-mining/

[22] https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1103&context=spacelaw Frans G. von der Dunk, Asteroid Mining: International and National Legal Aspects, University of Nebraska, Lincoln, 2018.

Emirates (UAE), for example, have adopted policies to encourage economic activities in space and accelerate space exploration

Luxembourg, a small country, is a gateway to the European Union and the headquarters of Europe's first privately-owned satellite operator, the *Société Europeéenne des Satellites* (SES). Luxemburg enacted the Space Resources Act in 2017, [23] to position itself in the center of the next Section in the commercial development of outer space mining. Luxembourg hopes to attract start-up companies that want to be space mining companies by establishing a 200 million Space Fund.[24]

The United Arab Emirates (UAE) have equally planned to develop a regulatory regime conducive to such activities, provided that those activities are duly authorized and supervised. The Saudi Space Agency was established by Royal Decree on December 27, 2018. On March 27, 2019, the Saudi Arabia joined 10 other countries: Morocco, Algeria, Egypt, Sudan, Oman, UAE, Bahrain, Kuwait, Jordan, and Lebanon, to sign the first regional Pan-Arab agreement on coordinating space exploration. The regional Agency will be led by UAE, hoping to organize and energize the regional space sector – to share knowledge and expertise to further contribute to Humanity's quest to understand the Universe we live in.[25]

In the USA, the *Asteroids Act* was introduced by Representatives Bill Posey (R-FL) and Derek Kilmer (D-WA) in July 2014. That act was supported by lobbying efforts by Planetary Resources, by Deep Space Industries and Bigelow Resources, companies with commercial interests in space. The Asteroids Act was later rolled into legislation signed by President Obama. The law was approved on 25 November 2015, the US Commercial Space Launch Competitiveness Act of 2015 -Space Act of 2015. [26] Title IV

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[23] https://fcilsis.wordpress.com/2018/12/12/the-luxembourg-space-resources-act-and-international-law/

[24] https://spacenews.com/luxembourg-expands-its-space-resources-vision

[25] https://www.arabnews.com/node/1473116/saudi-arabia; Saudi Arabia Joins Arab partners to collaborate on space exploration, Arab News, May 13, 2020.

[26] US Space Launch Competitiveness Act, PL 114-90, 129 Stat.704

of the Space Act addresses asteroid mining in a domestic United States context.[27] The Act declares that any resource obtained in outer space is the property of the entity obtaining the resource and grants U. S. companies "all property rights" to resources extracted from celestial bodies.[28] Additionally, the United States granted a license to Moon Express to undertake a mission to the Moon for the mining and removal of materials from the Moon's surface, opening up new space regulatory and governance issues.

In December 2017, President Trump signed Space Policy Directive-1, which laid the groundwork for the Artemis program[29], to explore and land astronauts in the Moon by 2024.

The Space Policy Directive-4, was signed in February 2019, calling for the creation of the Space Force, the first new U.S. military branch since the Air Force was stood up in 1947[30]. The Space Force will focus on preserving the satellite and vehicles that are dedicated to international communications and observation. Following this Directive-4 the Pentagon decided to create a space development agency to test new capabilities in space, a space operations task force to select space experts and the US Space Command.

The Executive order "*Encouraging International Support for the Recovery and Use of Space Resources*" [31] was signed on April 6, 2020. The policy views to support

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[27] Title IV is entitled "Space Resource Exploration and Utilization." Id. §§ 401–02 (codified at 51 U.S.C §§ 51301–03).

[28] Section 51303 of the SREUA

[29] The Artemis program is a crewed spaceflight program carried out predominantly by NASA, U.S. commercial spaceflight companies contracted by NASA, and international partners s

[30] https://www.space.com/42089-space-force.html, Jeremy Rehm, October 10, 2018

[31] https://www.whitehouse.gov/presidential-actions/executive-order-encouraging-international-support-recovery-use-space-resources; *By the authority vested in the President by the Constitution and the laws of the United States of*

moon mining and tap asteroid resources, establishing U.S. policy on the exploitation of off-Earth resources. This Executive order stresses that the current international regulatory regime based on the 1967 Outer Space Treaty allows the use of such resources and seeks international support for these activities.

The main provisions of Executive Order of April 6, 2020[32] are:

Section 1. *Americans should have the right to engage in commercial exploration, recovery, and use of resources in outer space, consistent with applicable law. Outer space is a legally and physically unique domain of human activity, and the United States does not view it as a global common. Accordingly, it shall be the policy of the United States to encourage international support for the public and private recovery and use of resources in outer space, consistent with applicable law*.[33]

Sec. 2. The Moon Agreement. 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.

Sec. 3. Encouraging International Support for the Recovery and Use of Space Resources. The Secretary of State, in consultation with the Secretary of Commerce, the Secretary of Transportation, the Administrator of the National Aeronautics and Space Administration, and the head of any other executive department or agency the

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America, including title IV of the U.S. Commercial Space Launch Competitiveness Act (Public Law 114-90).

[32] https://www.whitehouse.gov/presidential-actions/executive-order-encouraging-international-support-recovery-use-space-resources/

[33] https://www.space.com/trump-moon-mining-space-resources-executive-order.html - Mike Wall, April6, 2020, Trump signs executive order to support moon mining, tap asteroid resources.

Secretary of State determines to be appropriate, shall take all appropriate actions to encourage international support for the public and private recovery and use of resources in outer space, consistent with the policy set forth in section 1 of this order. In carrying out this section, the Secretary of State shall seek to negotiate joint statements and bilateral and multilateral arrangements with foreign states regarding safe and sustainable operations for the public and private recovery and use of space resources.

Sec. 4. Report on Efforts to Encourage International Support for the Recovery and Use of Space Resources. No later than 180 days after the date of this order, the Secretary of State shall report to the President, through the Chair of the National Space Council and the Assistant to the President for National Security Affairs, regarding activities carried out under section 3 of this order.

In carrying out this section, (International Support for the Recovery and Use of Space Resources) the Secretary of State shall seek to negotiate joint statements and bilateral and multilateral arrangements with foreign states regarding safe and sustainable operations for the public and private recovery and use of space resources. Some provisions of this Executive Order have received comments and criticisms from experts in space law and policies:

- On the general goals of the Executive Order, Ian A. Christensen and Christopher D. Johnson understand that: *" The United States clearly views space resources utilization as both a key part of achieving the long-term goals of the Artemis program and future human space exploration, and as a foundational element of a robust future commercial space economy... The order's support for commercial space resources utilization is consistent with US law under the Commercial Space Launch Competitiveness Act of 2015, which passed the Congress with bipartisan support and was signed into law by President Obama."* [34]

[34] https://www.thespacereview.com/article/3932/1

[34] http://outerspaceinstitute.ca/documents.html

- Experts from Canada in space policy and law have urged the Canadian Government not to endorse the U.S. approach in this Executive Order. The opinion supported by seven Canadian international space policy and law experts was that Canada should back instead the development of a multilateral treaty among as many countries as possible to set uniform rules. The Canadian experts recommend that*:" space must be regulated internationally – similarly to Antarctica or the world's seabed – and all countries, include non-space-faring ones, get a say in decision-making. The alternative, they warn, could be a splintered approach where companies conduct flag-of-convenience resource extraction in space under whichever country has the least onerous rules."*[35]

- According to Professor Dr. Kai-Uwe Schrogl: *"In the past decades, international law of the "global commons" has maintained the understanding that a "first-come-first served" should be avoided in view of a responsible and sustainable use open for all, including the late comers. Space exploration and use has so far been governed by these principles and the rule of law in general. This should be conserved for the benefit of all, today and in the future."* [36]

- Russia's space agency Roscosmos has also condemned U.S. President Donald Trump's order saying that it allows US citizens to mine the moon and other celestial bodies linking it to colonialism. [37] Deputy Director of Roscosmos, Sergey Saveliev,

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[35] Open Letter to the Canadian Government Concerning Space Resources http://outerspaceinstitute.ca/documents.html

[36] https://spacewatch.global/2020/04/spacewatchgl-perspective-john-sheldon-on-the-us-executive-order-1-2-2-2-2 SpaceWatch GL Perspective on US Space Resources Executive Order: Kai-Uwe Schrogl, On the Clarity Of Existing Space Law

[37] https://www.mining.com/russia-slams-trumps-order-to-spur-mining-the-moon-asteroid Cecilia Jasmine, April 9, 2020

declared that "*There have already been examples in history when one country decided to start seizing territories in its interest — everyone remembers what came of it*."[38]

Again, the need of international regulation is apparent, and the Executive Order *encourages international support for the public and private recovery and use of resources in outer space, consistent with applicable law*."

The applicable law referred in the Order would be the International Space Law and its principles. Article II of the Outer Space Treaty states that: *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. This provision applies to citizens and corporations, and equally prevents nations from asserting sovereign claims to property on celestial bodies.*

Regarding asteroid mining, the treaty makes clear that both the exploration and use of outer space shall be free of restraint and discrimination, and that there will be free access to all parts of space. It also allows private use of equipment and facilities as needed for peaceful activities. Dwellings or vehicles launched into (or built in) space may legitimately be the private property of its owner. Not even the term commercial exploitation can be found in the treaty, although most experts would agree that the reference to the freedom of use in Article 1 would include commercial exploitation.[39]

Customary law in the English-speaking world differs from European-based systems of Civil Law. Customary law considers that the mining should start first and later be regulated. Since mining operations on the Moon have not started yet, it could make sense, in the view of Customary Law, that once the technology is available and the mining in asteroids and moon have taken place, it would be feasible then to find a model of international cooperation that included the interests of all mankind. Several international organizations exploring outer space resources have also included commercial activities, such as ITU, Intelsat, and Arianespace - as analyzed in the previous

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[38] https://www.mining.com/russia-slams-trumps-order-to-spur-mining-the-moon-asteroid Cecilia Jasmine, April 9, 2020

[39] Frans G. von der Dunk, Asteroid Mining: International and National legal Aspects, University of Nebraska, 2018,

Section 3. Such examples could be considered when studying the best model for international cooperation in mining resources of asteroids and the moon. It is true that none of the major space powers, USA, Russia and China are signatories of the Moon Treaty. The Moon Treaty establishes regulations to mine the lunar resources, similar to the provisions established by the International Seabed Authority as we have explained in our section 2. Although the regime is not based on the Moon Treaty, in line with the wishes of the U.S.A., it should take into consideration mankind, that is, mining resources in outer space should include the interests of all peoples of the Earth.

Professor Scott Schackelford, in a recent article on "*US seeks to change the rules for mining the Moon"* states that: "*For the immediate future, other countries may or may not follow the U.S. lead, and its influence, toward privatizing space. Japan seems interested, as does Luxembourg, but China and Russia are concerned about their national security, and the European Space Agency is more inclined toward working collectively. Without better coordination, it seems likely that eventually peaceful, sustainable development of off-world resources will give way to competing claims, despite readily available examples of how to avoid conflict."*[40]

Broad international discussions on these recent US policies are top priority among the now 95 member states of the United Nations Committee on the Peaceful Uses of Outer Space- COPUOS. These discussions were due to continue in the Summer 2020 but were postponed because of the COVID-19 pandemic. [41]

COPUOS is the international body in charge of proposing international multilateral arrangements for outer space activities. It was established 1959 by the United Nations General Assembly and is presently one of the largest standing Committees in the United Nations. In addition to States, its membership includes several

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[40] https://theconversation.com/us-seeks-to-change-the-rules-for-mining-the-moon-136665

[41] https://theconversation.com/giant-leap-for-corporations-the-trump-administration-wants-to-mine-resources-in-space-but-is-it-legal-136395 Article by Steven Freeland and Annie Handmer, April 20, 2020.

international bodies. Both intergovernmental and non-governmental organizations hold observer status with COPUOS and its Subcommittees. [42]

Open questions that COPUOS is considering regarding the mining of asteroids and the moon include:

1- How the ownership of extracted resources will be defined?
2- How companies decide on which asteroid to mine?
3- Should a registry of space mining be created?
4- How to determine the scope of claims on asteroids or the moon?
5- How will companies prevent competition?

COPUOS has been the official channel for the multilateral agreements applying to outer space. Many experts of different nationalities have been engaged in studying the appropriate rules for the exploration of resources in asteroids and in the Moon. The Hague Space Resources Governance Working Group[43] has been preparing a study on the building blocks for the development of an International Framework on Space Resources.

The Working group proposed a draft international framework consistent with international law, giving due regard for interests of all countries and humankind, with the following objectives:

The international framework should create an enabling environment for space resource activities that takes into account all interests and benefits all countries and

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[42] Leister, Valnora, *"The Committee on Peaceful Uses of Outer Space (COPUOS) of the Organization of the United Nations" (original title in Portuguese: 'Comite para os Usos Pacificos do Espaco Exterior da Organizacao das Nacoes Unidas [ONU]')* – Section in Reflections on 60 years of the United Nations (Reflexoes sobre os 60 anos da ONU), Mercadante, Araminta and Magalhaes, Jose Carlos, Editora, Unijui-Ijui, São Paulo, Brazil, 2005.

[43] Final report, Leiden, 18 December 2017, reference number HSRGWG/FR/1 /15122017

https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht--en-ruimterecht/space-resources/final-report_the-hague-space-resources-governance-working-group-7-6-18.pdf

humankind. To achieve this objective, the international framework should: a) Identify and define the relationship of space resource activities with existing international space law, including the provisions of the United Nations treaties on outer space; b) Propose recommendations for the consideration of States for the application or development of domestic frameworks; c) Propose recommendations for the consideration of intergovernmental organizations for the application or development of internal frameworks; d) Promote the identification of best practices by States, intergovernmental organizations and non-governmental entities such as: registration and sharing of information; registering priority rights of an operator to search and recover space resources in situ; avoidance of harmful impacts resulting from space resource activities and follow the rules to register space objects (article XI of the Space Treaty). Furthermore, it stresses that the proposed international framework should ensure that the utilization of space resources does not contravene the principle of non-appropriation under Article II of the Space Treaty. It also reinforces the need for technical standards for, prior review of, and safety zones around space resource activities, liability in case of damage, peaceful settlement of disputes, monitoring and review.[44]

5. Human Settlements in Outer Space

Many countries have plans for humans' settlements in Outer Space. Since the 2010's, space agencies in the US, Europe (ESA) and Asia, (China, India, Japan) as well as public and private entities, have begun to explore options for space settlement. In the realm of state-sponsored space programs, China recently announced its plans to send "taikonauts" or human space navigators, to the Moon and create a settlement there in the early 2030s. In Europe, 2003 Mars Express orbiter and its lander, Beagle 2,

[44] A statement on the Working Group was delivered by the Dutch representative at the 55th session of the UNCOPUOS Legal Subcommittee, held in Vienna from 4-15 April 2016. A Progress Report was delivered on 27

September 2017 during the session on the Legal Perspectives on Space Resources and Off-Earth Mining.

represented the first fully European mission to any planet, and it is a key component of the European international exploration program planned for the next two decades. In 2005 the ESA Huygens probe lands on the surface of Titan, Saturn's largest moon - the first ever to land on a world in the outer Solar System.[45]NASA is currently developing the Artemis mission to return American astronauts to the Moon which had been planned for 2024 but halted its work on its Moon and Mars spacecraft due to coronavirus pandemic.[46] The Artemis program is carried out by NASA, U.S. commercial spaceflight companies, and international partners such as ESA, the Japan Aerospace Agency, Canadian Space Agency and the Australian space Agency. NASA sees Artemis as the next step towards long term presence on the Moon, laying the foundation for private companies to build a lunar economy and eventually sending human to Mars.[47]

The USA also has plans to send to astronauts to Mars in the 2030s and, although its budget sways in accordance with the will of the U.S. Congress, it seems to be on track to reaching its goal. US legislative moves relating to space settlements go back to 1988, with the Space Settlement Act.[48] Its language declared that the extension of human life into space leading to space settlement fulfills the purpose of science, exploration and commercial development, and will enhance the general welfare. President Trump's administration enacted the America First national Space Strategy on March 23, 2018 to ensure US leadership in Space in close partnership with the private sector.[49] Bezos and Musk that have plans for settlements in the Moon and Mars stated that: "Clear goals in legislative policy are vital, but they must be accompanied by specific

[45] https://www.esa.int/About_Us/ESA_history/History_of_Europe_in_space

[46] https://techcrunch.com/2020/03/20/nasa-suspends-work-on-its-moon-and-mars-spacecraft-due-to-coronavirus-pandemic/

[47] https://www.space.com/nasa-plans-artemis-moon-base-beyond-2024.html

[48] P.L. 100-685 Sec. 217

[49] https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-unveiling-america-first-national-space-strategy/

enforceable actions or they will have little effect." [50] Space Exploration Technologies Corp. (Space X), headed by entrepreneur Elon Musk, has entered into a $135 million contract with NASA, part of an estimated $1 billion program to return astronauts to the Moon by 2024.[51] Elon Musk, owner of SpaceX, has projected that a viable Mars settlement would perhaps need at least one million inhabitants to have a fully sustainable society. To this end, his firm has been developing its next-generation engines and rockets as well as its crew capsules to send humans on one-way journeys to Mars.[52] Blue Origin is another private spaceflight company, owned by Amazon Inc. Jeff Bezos, founder of the company, wants to build the infrastructure for humans to live in space.[53] Both endeavors demonstrate the intentions to move off Earth and establish permanent settlements in outer space.

a) Future Human Settlements in Space and International Space Law

There is an open question as to whether international space law is flexible enough to permit an entity, or consortium of entities, to construct a space settlement at will. An evaluation of any barriers that might exist or arise, and consideration of policy solutions must be explored and crafted.[54] Since the inception of the space age, the former USSR, now Russia and the USA, managed to cooperate and have been working together in the International Space Station, with the European Space Agency, another player in the new realm. Recently major players from emergent economies,

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[50] *Achieving Bezos' bold vision of space settlement requires bold policy direction by* Wolfe, May *20, 2019*

https://spacenews.com/achieving-bezos-bold-vision-of-space-settlement-requires-bold-policy-direction/

[51] Coco Huang, Los Angeles Times, May 4, 2020.

[52] https://www.space.com/37200-read-elon-musk-spacex-mars-colony-plan.html

[53] https://www.businessinsider.com/jeff-bezos-reveals-blue-origin-future-space-plans-2019-5

[54] Ibid, note 45, https://spacenews.com/achieving-bezos-bold-vision-of-space-settlement-requires-bold-policy-direction/

China and India, are joining the "Space Club." The early spacefaring powers – the USA, ESA and Russia – are facing a growing challenge of fostering international cooperation.

According to space entrepreneur Bezos: *"establishing guidelines and a permitting criterion would spur consideration and interest among prospective space settlement stakeholders. Serious investors and colonists will, at a minimum, appreciate and more likely insist that a government sanctioning regime be in place to add a high-level of confidence to any proposed settlement initiative."*[55]

Many authors and experts in Space law have explored the concept of governance of human space settlements in outer space. George Robinson who was awarded the first doctorate in space law at McGill University, co-authored a book about the governance of space societies. The book written in 1986, talks about the conflicting instincts for combat and cooperation. With the two world wars in the 20th century and the dangers of nuclear confrontation the need to guard against hostile nations has been transferred to the 21st. century, as well as the need for cooperation, on many fronts.[56]

Authors Ram Jakhu and Pelton [57] explore the parallel situation of the International Space Station (ISS) to the Human settlements. In the ISS there are largely systems engineers and ground control personnel who are responsible for the operation of the ISS. The authors consider that settlements would have a different structure, as they should be more independent, autonomous, and sustainable. Life on Mars would require a different structure than the one established by the ISS.

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[55] Ibid, https://spacenews.com/achieving-bezos-bold-vision-of-space-settlement-requires-bold-policy-direction/

[56] Robinson G and White, Harond, Envoys of Mankinf A Declaration of First Principles for the Governnce of Space Societies, Washington, DC Smithsonian Institution Press, 1986.

[57] Global Space Governance: An International Study, Editors: Jakhu, Ram, Pelton, Joseph (Eds.) 2017, by Springer International Publishing AG

Mark Frazier in his article "Emergence of a New Hanseatic League" states[58] *In the five decades since the Outer Space Treaty was adopted, however, little headway has been made in opening space for the benefit of all of humanity. The 107 ratifying nation states have deadlocked over ways to commercially develop common pool resources of outer space in accord with the treaty provisions.* Frazier proposes a system based on new contractual agreements for non-governmental user associations and a "non-dominium" legal framework based on Elinor Ostrom's insights[59]. These agreements are for stewardship rather than ownership of commercially valued resources, respecting the Treaty's ban on land ownership claims. Space startup entrepreneurs could establish a fund for success- sharing innovations for the benefit of all human beings based on the theory of Trent McConaghy.[60] McConaghy envisages an innovative way to benefit communities from entrepreneurships endeavors, via crypto currency "tokens". Tokens may be in a form of company's equity shares or vouchers to access its products or services. Either form could be used by a multi stake-holders organization (MSO) to ensure that everyone on the planet receives an escrowed share of the benefits of entrepreneurially developed assets from humanity's common heritage in space. In return for ensuring an entrepreneur friendly legal environment, the MSO would oversee a trust for all individuals on Earth to share in the asset gains.

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[58] Frazier, Mark, Emergence of a New Hanseatic League: How Special Economic Zones Will Reshape Global Governance, Chapman Law Review, volume 21, issue 2, article 4, 2018.

[59] Ostrom, Elinor, *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge, UK: Cambridge University Press, 1990.

[60] Trent McConaghy, Tokenize the Enterprise . . . And Melt It into the Community. Rinse, Repeat., BIGCHAIN DB (June 6, 2017), https://blog.bigchaindb.com/tokenize-theenterprise-23d51bafb536 [http://perma.cc/4DJX-7BPJ].

In my article published at the Indian Journal on International Economic Law, I have explored the application of Ostrom's principles of common pool resources (CPR) to outer space.[61]

These principles are:

1. Clearly defined boundaries of CPR must be defined for the use of the resources otherwise "any benefits they produce by their efforts will be reaped by others who have not contributed to these efforts."

2. Sensitivity of rules governing the use of the commons to local needs and conditions of the users.

3. Collective-choice arrangements, which will require making provisions at the start of these arrangements.

4. Monitoring by means of neutral means which could be external monitors to bring transparency.

5. Graduated sanctions for holding parties responsible for damages.

6. Conflict resolution mechanisms, by means of arbitration, such as the proposed outer space advisory group at the Permanent Court of Arbitration[62];

7. Minimal recognition of rights to organize, that means the right of resources users to devise their own institutions, and

8. Establishment of Networks of local associations, or "Nested enterprises", which delegate to solution providers the responsibilities of agreed services.

It seems that these principles could be easily applicable to space entrepreneurs developing mining operations and future settlements in outer space, which could grow into a revenue sharing for all human beings.

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[61] Valnora Leister, Economic Governance and Space Law: Emerging Foundations for Development of "Common Pool Resources" in Outer Space, 3 INDIAN J. INT'L ECON. L., 64, 66–67 (2010)

[62] Gabrynowicz appointed to Space Law Arbitration Advisory Group for the Hague, http://rescommunis.wordpress.com/2010/01/06

Felix Dodds in his book [63] explains how to re-engage the peoples from different regions of the world, moving from representative to participatory democracy, reaching a "Stakeholder Democracy." This concept of multi stakeholder governance was adopted by the United Nations in 1992 with the UN Conference on Environment and Development (Rio Conference). Over the following 17 years, the governments at the UN continued to evolve their understanding of multi stakeholder governance. [64] This multilateral system can be effective with or without the UN umbrella and varies depending on its goals. For example, we have policy-oriented governance multi stake groups such as:

- the Global Partnership for Oceans, whose goal is to restore ocean heath. This group has 150 partners representing governments, international organizations, civil society groups and representatives from the private sector.
- a product oriented multi stakeholder groups such as the Marina Stewardship Council (MSC), which is a non-profit setting a standard for sustainable fishing;
- a process-oriented group such as ICANN, a community of stakeholders that has coordinated the Internet's domain name and addressing systems since their inception, and
- a finance-oriented group such as GAVI, the Vaccine alliance, an international organization created in 2000 to improve access to new and underused vaccines for children living in the world's poorest countries.[65]

A multi stakeholder partnership with governments, non-governmental organizations, civil society, and academia, applying Ostrom's principles and an inclusive cryptocurrency "tokens" systems for the participation of the MSOs and human beings

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[63] Dodds, F. *Stakeholder Democracy: Represented Democracy in a Time of Fear*, London, Routledge, 2019.

[64] United Nations. (2019). Towards global partnerships: a principle-based approach to enhanced cooperation between the United Nations and all relevant partners. General Assembly

[65] https://www.gavi.org

in general, would be a viable model for space entrepreneurs looking for an international framework to work in outer space, while preserving the interests of humankind.

Observing past activities in outer space, one may conclude that the viability of proposed space mining operations and future settlements based on the above indicated principles should be based on widespread global support. The question is: Which international platform would be ideal for these discussions and to agree on a framework for governance in these new areas?

COPUOS has been an established platform to invite members and non-members and new private sector organizations into discussions of frameworks for future settlements. COPUOS is working on the revised draft "Space2030" agenda and its implementation plan to be submitted to be later considered by the General Assembly at its 75th session, to start on September 15, 2020.[66]

The agenda addresses long-term sustainable development concerns of humankind, including the future contribution of the Committee to the global governance of outer space activities, consistent with international law. [67] In its paragraph 13, the Agenda commits to address : "*changes in the undertaking of outer space activities at a time when new technologies have emerged and when an increasing number of participants, representing both governmental agencies and non-governmental entities, including industry and the private sector, are becoming involved in ventures to explore and use space and carry out space activities. In that regard, we commit to ensuring that the Committee, and its subcommittees, supported by the Office for Outer Space Affairs, continue, as appropriate, to respond to such changes, in their role as unique platforms for international cooperation in the peaceful uses of outer space."*

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[66] https://www.uhc2030.org/news-events/uhc2030-events/multi-stakeholder-hearing-in-preparation-for-the-united-nations-general-assembly-high-level-meeting-on-uhc-542996/

[67] A/AC.105/C.2/L.316 The "Space2030" Agenda: space as a driver of sustainable development

On a different note, Chris Johnson, space law adviser at the Secure World Foundation, argues that the White House Executive Order of April 6, 2020 indicates that the USA wants to set unilateral precedents on use of space resources, instead of embarking on a long and uncertain process with COPUOS, now with 93 member states, attempting to develop rules.[68]

6. Final Considerations

In the words of Stephen Heintz: "*The nation state, while still an essential locus of governance, is inadequate for managing trans-national challenges like global warming, pandemic disease, or mass migration..... And, increasingly, representative democracy across the globe is neither truly representative nor very democratic. We must jettison anachronistic assumptions, reform obsolete organizational structures, invent new institutions, and systems, and promote a new global ethos of equity and inclusion that accurately reflects both current realities and future needs. The urgent tasks before us require rapid and continuous innovation in the private, public, and nonprofit sectors and much broader and deeper cooperation among them. In fact, this is the only way these goals can be achieved."*[69]

The pandemic crisis now confronting the world reveals how fragile the governance structures on Earth are, and how international cooperation is relevant in overcoming this challenge. As pointed out by Bremmer, "*when walls are built by governments to protect insiders from outsiders and the state from its people, new forms of inclusive governance should be considered."* [70] If a Multilateral Stakeholder Organization agreement could be implemented in the New Worlds, it could inspire Earth to move from a representative to a more inclusive and participatory democracy.

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[68] https://breakingdefense.com/?s=WH+Woos+Potential+allies, by Theresa Hitchens, Abril 2020.

[69] Stephen Heintz, *Reflections on Philanthropy*, Council on Foundations, January 8, 2019, https://www.cof.org/blogs/amplify/2019-01-08/reflections-philanthropy

[70] Ian Bremmer, *Us vs. Them: The Failure of Globalis*m, Portfolio, 2018.

In summary:

1- Outer space law was born out of the confrontation of the USA and the USSR in the 1960's and resulted in the international law and principles regulating this realm today.

2- Outer space, along with Antarctica, the High Seas and the Atmosphere, is defined by international law as the common heritage of mankind.

3- Over the years many developments such as communications satellites and remote sensing of the earth have promoted the creation of international organizations, such as International Telecommunications Union (ITU), Intelsat, Inmarsat.

4- Recent developments in space technologies allowing for mining of asteroids, the Moon and human settlements in outer space, with greater involvement of the private sector, are demanding new international regulations, so that outer space is developed taking into consideration the interests of mankind.

5- At present, the initial major space players, USA and Russia, and its allies, need to recognize the new outer space players from the emergent economies: China and India.

6- A new MSO framework can encourage entrepreneurs' developments in outer space on a basis that benefits all people on Earth.

7- An international platform to discuss establishing of a new MSO should be agreed upon and consider all interests of mankind.

It is our view that the new uses of outer space resources represent an opportunity to gain stakeholders' trust in developing a new multilateral governance regime which would consider the interests of all space stakeholders and of mankind.[71]

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[71] According to Garret Hardin's article "The Tragedy of the Commons"[71], *the reliance on national governments to use and dispose of the common property of humanity would have detrimental results. In his view, "they would manage natural resources to satisfy their electors, without being accountable to future generations." Science,* 13 Dec 1968: Vol. 162, Issue 3859, pp. 1243-1248DOI: 10.1126/science.162. 3859.1243, 13 December 1968.

As we have seen in Section 5, Elinor Ostrom introduced a theory that rules can emerge from the bottom up, to ensure efficient and sustainable shared management of common pool resources. She stresses the importance of clarity of rules based on a democratic decision making, involving the developers and users of the resources. Her Nobel Prize lecture's title: "*Beyond Markets and States: Polycentric Governance of Complex Economic Systems"*[72] gives a clear definition of her theory of shared management of common areas and could be applied to outer space mining and settlements.

In discussing the Multilateral Stakeholder Organization partnership for mining the asteroids and the moon, it is instructive to consider the structure, and experiences of ITU, the oldest public-private partnership applied to outer space resources. ITU allocates satellite orbits, which are not "owned" by the assignee, but can be renewed on a regular basis, and can be leased to other parties. ITU currently consists of 193 member countries and 700 private sector entities and academic institutions and has 12 regional and area offices around the world.[73]

Regarding the future settlements in the Moon, Mars and other celestial bodies, existing UN Programs may also be relevant. Goal 11 of the United Nations 2030 Agenda calls for action by public and private sector organizations to make cities and human settlements "inclusive, safe, resilient and sustainable."[74] The UN "Space30 Agenda" defines space as a driver of sustainable development on Earth[75]. Thus, goal 11 of the UN Agenda can be achieved on cities on Earth, with the use of new technologies in outer space such as communications, remote sensing satellites, and the new resources to be explored in space, as indicated in the Space30 agenda. The same model for "inclusive, safe, resilient and sustainable" cities on Earth could be mirrored in the New Worlds as well.

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[72] Ostrom, Elinor. 2010. "Beyond Markets and States: Polycentric Governance of Complex Economic Systems." *American Economic Review*, 100 (3): 641-72.

[73] http:itu.intl/go/OverviewITUHistoryArticle

[74] https://www.un.org/sustainabledevelopment/cities/- Goal 11: Make cities inclusive, safe, resilient and sustainable.

[75] A/AC.105/C.2/L.316. The "Space2030 Agenda".

Global focus, commitment, innovation, and resolve – combined with backing from private and public spacefaring partners aligned with this vision– can ensure that these Sustainable Development Goals are reached by 2030 on Earth and in the New Worlds settlements. The world will soon enter a decade that will be decisive for both current and future generations and for all Human life on this planet and in other celestial bodies. It is in our hands to make it a decade of action and delivery for sustainable development for the Old and New Worlds alike.

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