TITLE OF THE SUBMISSION: The Intersection of Space Laws and Intellectual Property Rights: A Narrative for Space Sustainability

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LIST OF ABBREVIATIONS

Cited As	Full Form
ADR	Alternative Dispute Resolution
Art.	Article
ASAT	Anti-Satellite Weapons
COP21	21st Conference of the Parties to the 1992 United Nations Framework Convention on Climate Change
ESA	European Space Agency
FCC	The Federal Communications Commission
IGA	Inter-Governmental Agreement
IISL	International Institute of Space Law
IP	Intellectual Property
IPR	Intellectual Property Rights
ISS	International Space Station
ITU	International Telecommunication Union
JSA	Japanese Space Agency
LTS Guidelines	Guidelines for the Long-Term Sustainability of Outer Space, 2010
NASA	National Aeronautics and Space Administration
OST, 1967	Outer Space Treaty, 1967
PCT	Patent Cooperation Treaty
PIL	Public International Law
SDGs	Sustainable Development Goals
SGAC	The Space Generation Advisory Council
TRIPS Agreement	The Agreement on Trade- Related Aspects of Intellectual Property
UAE	United Arab Emirates
UN	United Nations
UNCLOS	United Nations Convention on Law of the Sea

UNOOSA	United Nations Office for Outer Space Affairs
USA	United States of America
viz.	which is
WEF	World Economic Forum
WIPO	World Intellectual Property Organisation

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The Intersection of Space Laws and Intellectual Property Rights: A Narrative for Space Sustainability

Abstract[*]

The past decades have been crucial; climate scientists have warned various agencies about the ill effects of global warming on the Earth, referring to our house being on fire. As multiple facets of the economy work to tackle this problem, there has been a search for a new home similar to the Earth and can sustain life. With developed space organisations, governments across the globe have taken up the task of exploration, space being a possible solution. Nevertheless, such activities have stirred debates and discussions regarding the sustainability of these missions and preserving outer space for the future. Moreover, it has led to the generation of enormous amounts of space junk. As nations invest in commercialisation, sustainable development in space is forgotten. It can act as a barricade for future growth, eliminating access to Outer Space. These challenges can be mitigated by using certain IP oriented solutions and strengthening space and IP regimes to ensure a greener, sustainable and developed technology. The essay has relied on secondary data, with close readings and a literature review. The author has limited the scope of this essay towards achieving sustainability in space through sustainable IP development.

Keywords: Conventions, Technology, Intellectual Property, Space Debris, Space Sustainability.

[*]This essay is based on an ongoing research (being conducted by the author of this essay along with the research supervisor) that investigates the challenges of space sustainability.

1. Introduction to Space Sustainability

Space exploration has given humankind a lot- from the primary images of the Earth and evidence that Earth is the only plant that can sustain life. Through explorations, we have also contributed towards orbital debris. As more than 25,000 objects revolve around the Earth's orbit, concerns over planetary sustainability[1] have emerged.[2] Sustainability is the process of preserving and developing surroundings to provide opportunities for the development of future generations.[3] Space Sustainability would ensure the continued access of humankind to Outer Space for explorations and peaceful uses, but Outer Space is often side-lined.[4]

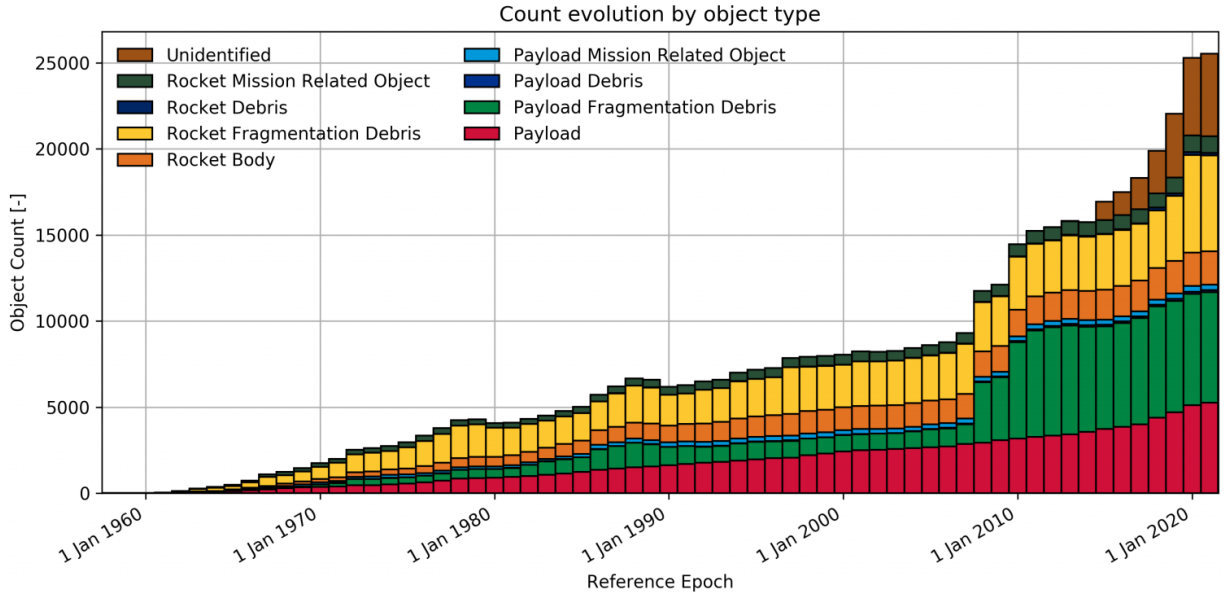

Fig.1: Graphical Representation of the Rise in Space Debris from 1960-2020.

If space is not safe, secure and accessible, it can deny access to humankind. It would impact other aspects of human life such as telecom, navigation, national security, Earth observatories, or remote sensing. It shall create an environment that shall disallow commercialisation and exploration, ending (aero)space flights. The development of space technology shall be integral for achieving the SDGs developed by the UN through technologies such as remote sensing and the ability to map the Earth.[5] If sustainability is disregarded, it could end the ordeal of space exploration for emerging space nations.

[1] It includes concerns about the Earth and the impact of space missions and explorations on other celestial bodies.
[2] A Space Law and Orbital Debris, Orbital Debris: A Technical Assessment, The National Academics of Sciences Engineering and Medicines
[3] Sustainability was first coined at the Brundtland Commission, 1983. What is Sustainability? McGill University, p.2
[4] Secure World Foundation, Space Sustainability: A Practical Guide, 2018.
[5] id.

Additionally, space is an unregulated area with disputing claims about ownership. It lacks sovereignty and embodies the principle of common heritage. The UNCLOS principles have acted as guiding principles leading to the evolution of space law through various space treaties that refer to it as "common for all mankind".[6] The global community must protect and preserve Outer Space.

Sustainability has a fragmented approach in space law. Certain principles under the OST, 1967, address the necessity to preserve specific sites on a celestial body, such as protecting Neil Armstrong's footprint site.[7] On the other hand, Art. IX of the OST, 1967 has a clause that space activities must be carried out without interfering with another State's exploration and research. If this is to be done, it shall be with the permission of that State. It highlights the disconnect in the legislative position. Treaties have undertaken the responsibility to preserve a nation's efforts rather than the holistic preservation and sustainability of Outer Space.

The current literature does not focus on the causes that prevent the achievement of space sustainability; instead, it focuses on the idea of sustainability. It is inclined on assessing the cause-and-effect relationship rather than providing a solution. Several organisations such as the WEF, ESA have tried to provide solutions; they are under-developed and far from implementation.

This essay explores whether *de facto* sustainability in space can be achieved through better IP and legal frameworks. This study is imperative due to space technology's aggrandisement, coupled with destroying outer space through human activities. **This essay delves into the proposition that space sustainability can be achieved through the sustainable development of IP standards, complemented by global sustainability efforts.** Following the short introduction, the essay is divided into Space Sustainability: A Common Goal **[2]**; Challenges towards the Achievement of Space Sustainability **[3]**; The Way Forward- Shaping Space Sustainability through Intellectual Property **[4]**; followed by concluding remarks **[5]**.

2. Space Sustainability: A Common Goal

[6] Professor Henry Hertzfeld, *Current and Future Issues in International Space Law*, ILSA Journal of International and Comparative Law, Vol. 15,2, Pg. 325-335.

[7] Volume 8, Kopal V. et al., Outer Space — A Legal Issue. 220 (2011 Brünner C., Soucek A.) Outer Space in Society, Politics and Law. Studies in Space Policy, Springer, Vienna. https://doi.org/10.1007/978-3-7091-0664-8_3

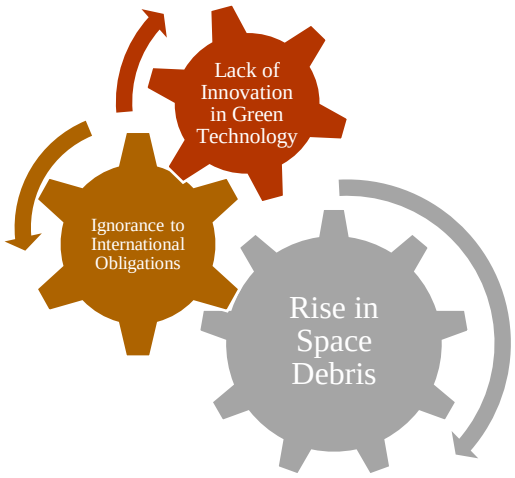

Fig. 2: Reasons for Space Sustainability as a Common Goal

As aforementioned, space sustainability is integral and must become a common goal. Space activities[8] generate a large amount of waste which is termed debris. Debris is floating parts of satellites or space shuttles. It is also known as burnout parts and instead floats in space, sometimes damaging satellites and rovers. However, stakeholders have been ignorant of the problem. The addition of satellites under Project Kuiper and Project Starlink creates a risky environment due to the lack of sustainability regimes, and it includes the launch of innumerable satellites.[9] These satellites have led to congestion in the Earth's orbit and often crash into each other due to inadequate space. It has catalysed the creation of debris. Additionally, various jurisdictions destroy their satellites to establish themselves as a space power and test their Anti-Satellite Capabilities as it is unregulated.[10]

The rise in space junk can lead to the Kessler Syndrome.[11] The rise in such immaterial objects is a threat to space missions as they need to navigate, affecting prospects of Outer Space due to the increasing width of this belt. It is a threat to other geostationary lower orbits of other celestial orbits due to the widening of this belt, creating a situation similar to the asteroid belt.[12] Since space law is based on *res communis*, it creates a disadvantage for developing countries. They do not have

[8]This includes space exploration, space studies, space missions, International Space Station and various satellites orbiting the planet.

[9] Launch 40,000 satellites, out of which 1000 satellites have been launched.

[10] Ashley J. Tellis, *India's ASAT Test: An Incomplete Success*, CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE BLOG (04/06/2021 8:49PM) https://carnegieendowment.org/2019/04/15/india-s-asat-test-incomplete-success-pub-78884.

[11] Donald J. Kessler and Burton G. Cour-Palais, Collision Frequency of Artificial Satellites: The creation of Debris Belt, American Journal of Geophysical Research Space Physics, June 1 1978. It was coined by a NASA Scientist named Donald J. Kessler in 1978. It has been defined as Collisional cascading, or ablation cascade is a scenario in which the density of objects in Low Earth Orbit (LEO) is high enough that collisions between objects could cause a cascade, where each collision generates space debris that increases the likelihood of further collisions.

[12] Jennifer A Manner, *Op-ed: Building on the Artemis Accords to build Space Sustainability*, December 22 2020. https://spacenews.com/op-ed-building-on-the-artemis-accords-to-address-space-sustainability/

the resources; subsequently, the rise in debris can affect their chances to conduct space explorations or studies as the Earth's atmosphere would be engulfed by such objects.

The formulation of the UN SDGs is an eye-opener for the mitigation of environmental hazards. For instance, the 13th goal, viz. the Climate Change and Action Goal, highlights the increase in human activities, leading to habitat destructions and climate deterioration. As these activities continue, the Earth shall become unliveable creating, an undulation on other celestial bodies. Further, the pollutants released through human activities shall affect the Earth's orbit, which can counter accessibility to outer space due to changes in the atmospheric compositions, hampering space flights and explorations.

Further, space agencies such as NASA are trying to invest a part of their space exploration budget towards exploring and understanding the climatic conditions on Earth[13] to control these effects.[14] The UNOOSA has studied the impact of space technology and information[15] to identify the fundamental forces that led to the destruction of various planets, such as Mars, which was once considered habitable.[16] The UNOOSA has paired with various space and governmental organisations to track satellite navigation systems and remote sensing to lessen pollutants through their framework.[17] The COP21 has proposed the launch of a space observatory with the help of satellites to monitor climate change and its effects on the Moon and other celestial bodies.[18] The Space2030 Agenda has been formed on similar lines, paving the way to technical developments towards preserving space.

Countries such as the USA have proposed indemnification and safety guidelines to be adhered to by the FCC to ensure safe orbits and a stringent procedure for de-orbiting satellites without debris creation. However, these efforts do not pan out well due to the lack of enforcement and checks and balances. However, there is a lack of legislation on the subject at the national level, binding on governments and private space agencies.[19] Lastly, implementation has been complex because of the lack of global cooperation and the dominance of the space nations.

In 2020, the enactment of the Artemis Accord[20] had raised concerns about space sustainability. It is an Accord that allows technology transfer and advanced space explorations between space powers through bilateral agreements. The Accord upholds the general principles established under the OST, 1967; it allows for exploration of celestial bodies, comets and asteroids, and mining on the Moon, which contradicts the idea of sustainability. Mining on Moon can potentially over-

[13] What NASA got to do with Climate Change? NASA Global Climate Change, https://climate.nasa.gov/faq/18/whats-nasa-got-to-do-with-climate-change/

[14] Johannes Wallachen, Stefan Einsiedel, Andreas Gösele, *Sustainable development: in space as on Earth?* Cambridge University Press, 13th August 2019.

[15] UNOOSA and World Meteorological Organisation, *Space and Climate Change: Use of Space-Based technologies in the United Nations System*, WMO No. 1101, p. 4-6 (2011).

[16] id.

[17] Sendai Framework for Disaster Risk Management 2015-2030 is a management system created to bridge climate change between outer space and the Earth.

[18] The discussion was conducted as a part of the One Planet Summit in 2021. It was a way to procure data about climate change through satellite navigation. These results shall be assessed at the Space2030 Agenda.

[19] Refer to UNSDG 11, which is on the Development of Sustainable Cities and Communities.

[20] USA, UK, Australia, Japan, UAE, Luxembourg, Canada and Italy are a part of this Accord.

exploit, affect the composition and atmosphere of the body detrimentally. It is another form of generating debris and deteriorating it through commercialisation.

A possible solution for ensuring sustainable development in space is through sustainable or green IP.[21] Green IP can be defined as the technology patented by an individual or a nation towards creating a sustainable environment.[22] Many developing or under-developed nations often cannot use such sustainable means to explore space because of economic, political or social constraints.[23] These factors play an essential role in producing the end-product, affecting how their technology is developed.[24] Even though the space community is unlimited, it is limited in spirit, dominated by a few who do not prefer technology transfer as it may not become a viable investment, creating an imbalance. The next section of this essay shall address the various challenges that have hindered space sustainability in detail.

3. Challenges towards the Achievement Space Sustainability

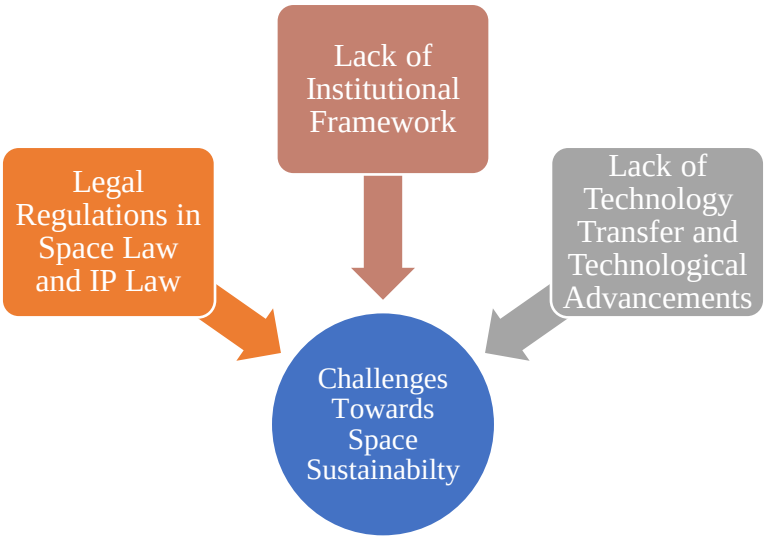

Fig. 3: Overview of the Challenges in Space Sustainability

The previous section of the essay has highlighted the need and the reasons for space sustainability. Considering the 196 countries, there has been an ongoing tiff between developed and developing nations about implementing such sustainability. Further, sustainability attempts have not been effective as the acceptance of PIL has been fragmented. The operation of *jus cogens*, *erga omnes*

[21] Refer to NASA's Perseverance Rover to understand how NASA used green IP to mitigate debris generation.
[22] Refer to Art. 7 of the TRIPS Agreement, "the protection and enforcement of IPR should contribute to the promotion of technological innovation and the transfer and dissemination of technology to the mutual advantage of producers and users of technological knowledge."
[23] *See generally*, World Economic Forum, *Six ways space technologies benefit life on Earth*, Briefing Papers September 2020, Global Future Council on Space Technologies 2019-2020.
[24] supra 20.

obligations and customary law is based on States' enforcement, but there is a lack of enforcement mechanisms.[25] However, the problems of sustainability stem from the ambiguity in space legislations.

a) Legal Regulations in Space Law and IP

Since the 1950s, various treaties have been enacted, but none have attempted to define the atmosphere, edge of outer space and orbit that is the crux of space law. Instead, treaties regulate the behavioural aspects in space, such as peaceful means and the conduct of space explorations. The distinction of the terms is imperative as that can hamper the understanding of legal implications.[26]

Convinced researchers have based their arguments on science to define these terms. If the principles of aerodynamics do not subsist in the atmosphere, it is considered space. This problem was fairly solved in the 1900s through the Karman Line, which defined 100 km above sea level of any State as Outer Space. However, even today, specific space organisations such as the NASA and US Air Force consider the Karman Line to extend up to 80 km above sea level, exposing the dichotomy in space law. Further, the US believed that such boundaries were not necessary and must be accessible for all.[27] These issues have crept in due to the non-recognition of such definitions and boundaries by legal frameworks, creating a conflict in the treatment of areas between 80-100 km above sea level.

Legal implications of sustainability have been through the 2010 LTS Guidelines to ensure sustainable space development. Even though they are non-binding, the space community has accepted them.[28] Despite such guidelines, in 2019, India showcased its ASAT powers destroying an existing orbiting satellite of India, leading to the creation of space debris, ignoring the premise of the LTS.[29] Such guidelines question the truth about international enforcement and non-cooperation of various countries that are inclined towards showcasing their strength. Lastly, customary international law has played an essential role by laying down foundational norms of space treaties such as liability norms, common heritage and peaceful means.

Space is regulated chiefly through the OST, 1967. However, certain enactments such as the Commercial Space Launch Competitiveness Act, 2015,[30] permits commercial use, the right to participate in space exploration, and research activities exclusively by the USA and ensures unrestricted mining and extraction of minerals from celestial bodies, protecting the natural environment.

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[25] Paul Henry Richards, *Some Current Problems of International Space Law*, Liverpool Polytechnic, pp. 15,20 (1985).
[26] IISL and UNOOSA, Proceedings of the Workshop on Space Law in the 20th Century, (2000), https://iislweb.org/docs/st_space_02E.pdf
[27] Nadia Drake, *Where, exactly, is the edge of the space? It depends on whom you ask*, (20 April 2021, 08:09PM) https://www.nationalgeographic.com/science/article/where-is-the-edge-of-space-and-what-is-the-karman-line
[28] Larry F. Martinez, *Legal Regime Sustainability in Outer Space: Theory and Practice*, Cambridge University Press, 2019.
[29] id.
[30] It is also known as the SPACE Act, 2015.

Since it is an exclusive right to the USA researchers, state that if such rights are given to a nation for their use, it is an extension of the right of sovereignty and violative of the OST, 1967, providing an advantage by way of a statutory right, as the act partially provides US citizens with the right to own, transport, use and sell space resources.[31] Until 2025, it also seeks to protect third-party if an accident results in a calamity and converges the aviation and space industry to establish minimum standards. This has also been criticised as it does not allow a beneficial environment for the development of the industry.

To ensure the sustainable development of space through IP, a persistent problem is the non-recognition of space technology in International and Domestic IP laws. The formulation of the Berne and Paris Unions has been in the 1900s when space activities were unheard of. Subsequently, the introduction of the TRIPS Agreement in 1995 has failed to recognise patenting and copyright issues that challenge the space community, even though it was drafted almost after a century.[32] The PCT Treaty applicability is territorial and does not mention the effect of the treaty in space. Certain aspects of a spacecraft can be subject to copyright, such as a computer database under the WIPO Copyright Treaty, the protection is insufficient.

Additionally, making matter complicated, the Paris Convention on Industrial Property poses an interpretative hurdle concerning Art. 5ter. The Art. elucidates on the limitations of granting a patent. One such limitation is the doctrine of temporary presence, which is an exception to Patent infringement. It allows a foreign vessel or an aircraft to use a protected patent on board the vehicle as a necessity. However, the issue arose about the applicability in space at the ISS as there has been no explicit amendment to include space launches or space objects. Art. 21(6) of the IGA states that this doctrine does apply to spacecraft. However, the extent of protection is ambiguous.

There is no explicit legal institute or instrument which can deal with this aspect. As a practice in this sector, most nations, during the registration of space objects, register the IP associated with it in the relevant jurisdiction. However, the validity of such IPs is questionable due to the lack of an enforcement mechanism in space. Assuming this solves the problem of IP, the applicability of IP is still not defined. Certain scholars suggest a *sui generis* mechanism, but challenging to implement. The aspect of patenting is territorial, and bringing discoveries back to Earth changes the jurisdiction, affecting patent registrations.

Space nations have adopted the first-to-invent system, and some others have the first-to-file, creating a dilemma at the international level.[33] In the former, registration of the discovery is linked to the territory. Additionally, complete disclosures in the form of the prior art are the essence of IP, which is impossible in space. When joint missions are carried out, it makes matters complicated. Further, providing a single or joint registration can be considered as anti-competitive as the nation(s) will have a monopoly over the IP.

[31] Jonathan Koch, Institutional Framework for the Province of all Mankind: Lessons from the International Seabed Authority for the Governance of Commercial Space Mining, Int'l J. Space and Pol, 4.
[32] KD Raju, Issues in Protection of Intellectual Property created in Outer Space: An Indian Outlook, National Law University, Delhi 227,229 (2012).
[33] id.

b) Lack of Institutional Framework

The Artemis Accord has been controversial because of the lack of space sustainability.[34] Researchers have agreed with a position paper presented at the IISL, which stated that since the OST,1967 was silent on the use of resources and the aspect that the USA has legislated upon, it does not render the legislation invalid.[35] Nations such as Luxembourg and UAE have drafted their space initiatives to ensure mining and sovereignty rights on the lines of the Accord. Scholars in the field have suggested the ISS, and the ITU oversee such statements based on the same contract model as that entered into by space agencies for the functioning of the ISS, known as the IGA, to provide uniformity in the space exploration activities that the legislators have failed to achieve. In furthering the space allocation problems across the Earth's orbit, the ITU has proposed to designate a block above the Earth's atmosphere for interested countries.[36] However, the author believes that this must be substantiated with the ability to mitigate debris.

The SGAC has attempted to propose detailed inclusions to mitigate debris. Such as determining sovereignty over space junk and fixing liability in case of its fall out from the sky. The ESA has undertaken the task to declutter the Earth's orbit through the e.Deorbit mission which shall be operational in 2023, ensures that uncontrolled ESA junk is brought into the lower orbit, not affecting other satellites and missions.[37]

Additionally, the JSA is developing a device to ensure that uncontrolled debris is destroyed by capturing it in nets similar to fishing. In order to solve this problem, the WEF has suggested the sustainability rating to assess the impact of debris and the harm that it will cause to Outer Space. However, this is still in the developmental stages of the idea.

Further, there is a lack of data, including accidents, space debris and accountability issues. Such data will be essential for developing technology in this field that is sustainable. The developed countries are updating their roles and making it difficult for newer members to enter due to their established dominion in this area. Initially, this industry was understood to mitigate such gaps and widened the space industry's economic, social and political gap.[38]

On the IP front, WIPO has been ignorant. The author would like to clarify that this issue does not arise in satellites as they are not considered outer space due to their functioning. IP is vital in infringement disputes. If there is an infringement in outer space, it shall be treated as if it has happened on Earth. Nevertheless, the development has been uneven, such as trademark has not

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[34] See, Ferreira-Snyman A, Challenges to the Prohibition on Sovereignty in Outer Space - A New Frontier for Space Governance. Potchefstroom Elec. L. J., 24, 1-50 (2021).

[35] See, Statement by the Board of Directors of the International Institute of Space Law (IISL) on Claims to Property Rights Regarding the Moon and Other Celestial Bodies, Working Group Paper, (2021) http://iislwebo.wwwnlss1.a2hosted.com/wp-content/uploads/2015/03/IISL_Outer_Space_Treaty_Statement.pdf

[36] Gary Jordan, NASA opens ISS to New Commercial Activities, Private Astronauts, NASA Press Release, (01 June 2021 11:42AM) https://www.nasa.gov/press-release/nasa-opens-international-space-station-to-new-commercial-opportunities-private.

[37] Kathe Hunt, Mission to clean up space junk with magnets set for launch, CNN Business, (31 May 2021, 10:00AM) https://edition.cnn.com/2021/03/19/business/space-junk-mission-astroscale-scn/index.html.

[38] Refer UNGA, Fourth Committee, 69th Session, 10th Meeting of 2014.

been considered. In cross-border IP conflicts, jurisdiction is vital. In Europe, through Brussels- I,[39] there has been an attempt to determine the jurisdiction of the dispute. If the dispute is related to the registration or the duration of the IP, it will be under the Member's jurisdiction. It shall apply the general jurisdiction based on the respondent's nationality in case of other IP suits. Under contractual disputes, it shall be the place of business, and the same applies in tort cases; otherwise, a special jurisdiction is determined.

The WIPO has failed to amend or bridge the legislative gap. Instead, nations have tried to understand the ambit of these rights, affecting the dispute resolution mechanism in this area. Lastly, WIPO Dispute Resolution Rules has not incorporated such aspects, though there exist challenges in fixing responsibility and sovereignty. Nonetheless, if such organisations undertake the task of providing a direction to the stakeholders in the field, it will allow for the development of Outer Space.

c) Lack of Technology Transfer and Technological Advancement

Technology is integral and costly in space missions; space agencies are reminiscent that technology can be reused. Certain technologies used in spacecraft is still the same as those developed in the Sputnik era, which may not be eco-friendly today. Such propulsion systems have changed the material of the propulsion device, design techniques, and the ability to work on computer programs is an undeniable feat. But the performance of the propellants has remained constant over the decades. The propellants are integral to a propulsion system as they help push the spacecraft off the Earth's surface. Advancement and incorporation of green technology will be beneficial.

New players in the space field, such as the UAE or India, lack the requisite ability, funds or resources to produce a product that can be reused, which is concerning as the space debris belt is on the rise. Even the reusability aspect has been possible only due to government initiatives or budget cuts and not a voluntary effort on the space agency. In many developing nations that are new in this arena, governments' spending for the development of mission is 2-3% of the country's allocated budget, which is not enough. Further, developing nations such as India, Morocco, South Africa, to name a few, are mainly importers of green resources. Space agencies in these countries need to develop their ways to produce sustainable space vehicles.

Efficient technology shall ensure the dissemination of responsibility for generating space debris to the developing nations, considering the technological developments. Additionally, instruments such as hypersonic air must integrate reusability; when a spacecraft is launched, the heat generated from such missions can be used as green technology even on Earth. It is vital to ensure that the waste generated through such missions is minimal to minimise costs.

In many cases, developed nations are unwilling to transfer their indigenously developed technology for use by the entire community. Since developed nations are not sure if their technology would remain safe in developing nations, they may duplicate the design and manufacturing, affecting key positions that such nations have held for years. Through the most-

[39] Council Regulation 44/2001 on Jurisdiction and the Recognition and Enforcement of Judgements in Civil and Commercial Matters.

favoured nations principle, developing nations can benefit through concessions, privileges and aid developed nations to ensure an equal footing in international trade. But it is a challenge to implement these principles.

These are some of the critical barriers that have plagued the space industry. To mitigate such issues is the need for global cooperation and the ability to ensure a robust and fostering environment in this sector across the globe.

4. The Way Forward- Shaping Space Sustainability through Intellectual Property

In the above section, the author has elucidated the problems and ignorance of IP in space activities. There is a need to concentrate global attention on IP standards and space sustainability standards for the continued use of Outer Space. Through the course of various treaties, such issues have been partly resolved. Further, in space activities, there is a recommended mechanism for dispute resolution as well. Under this background, the author would like to explain how space sustainability can be achieved through IP.

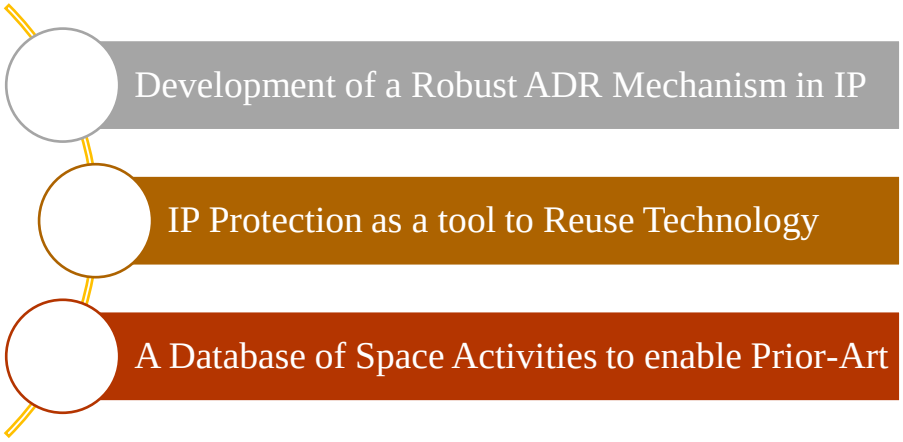

Fig. 4: Summary of the Proposed Solutions

a) Development of a Robust Alternative Dispute Resolution Mechanism in IP

A robust dispute resolution system is crucial in space matters due to multiple registrations and jurisdictions, such as in a launching state that involves many nations, giving rise to a complex dispute. As there are many parties, it creates licensing and other contractual obligations, making it difficult to understand the scope of IP. As the ICJ has never legislated upon such matters and

ensuring a quicker settlement system, ADR is attractive as contractual parties can negotiate and resolve IP issues in a single process.[40]

The WIPO Dispute Resolution Rules, 2020 and the WTO Dispute Resolution System under which the TRIPS Agreement have also failed to include aspects relating to space that is the future of humankind as explorations on commercialisation continue.[41] IP institutions must partner with space institutions to develop a robust dispute resolution mechanism capable of mediating such disputes. Further, it allows parties to have autonomy over the proceedings in choosing the rules and regulations. As these proceedings are usually confidential, disclosures made regarding IP will still be protected by including space-IP aspects in international conventions and treaties. Since space activities involve many nations, ADRs ensure an enforceable award in multiple jurisdictions through the New York Convention, making it an attractive option.

b) IP Protections as a Tool to ensure Reusability of Technology

In normal circumstances, if an individual is granted IP protection, it ranges from 5 to 60 years, depending on the subject matter of IP. The IP conventions and treaties must be amended to include the aspect of reusable technology. *Reusable technology* is the technology capable of being used for multiple missions by programming it to return to the Launch site. If a patent, design, trademark or copyright is granted to a space agency, it would be provided for the same duration. During such time, the agency is free to exploit such rights multiple times, which is possible through reusable technology. It shall be cost-effective and financially viable, with lesser dependence on Central or Federal governments for funding. Instead, the funds can be directed to other activities in space by the agency. However, certain exceptions to the rule of protection can be that the vital parts in a spacecraft will not subject to such protection, such as engines, steering system and communication systems and other service module components. The payload module can be patentable as there is a scope for improvement by every nation.

c) A Database of Space Activities IP Registration to introduce a system of Prior-Art

Currently, the database of space activities is not uniform with inaccurate records in explorations -- the implications and the kind of metals and minerals extracted. However, various nations do not share this information due to IP protection, building tensions between developed and developing nations. Disclosure is a cause of concern on the accuracy of such innovations in developed space jurisdictions. It can be achieved if every country sets up a regulator responsible for collecting such information on the IP used and the space activities conducted. It will be easy to pin the responsibility of the generated debris and act as an essential part of the evidence in space disputes. Such information will act as a log to check and keep pace with the developments. In the future, if the IP regime is developed through international organisations, it will also rectify the problem of prior art search. This will lead to the possibility of licensing and assignments agreements, currently hard to define due to the ambiguity and applicability of this law in space.

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[40] Aceris Law LLC, International Arbitration and Intellectual Property (IP) Disputes, Aceris Law International Arbitration Law Firm (13 June 2021, 5:54PM) https://www.acerislaw.com/international-arbitration-and-intellectual-property-ip-disputes/.

[41] STA Law Firm, Inventions Used or Made in Outer Space, (13 June 2021, 5:58PM) https://www.mondaq.com/patent/896292/inventions-used-or-made-in-outer-space.

5. Conclusion

Sustainability shall be an essential and crucial factor that promulgates an appropriate mechanism to carry out space activities in the coming years. It is vital to develop IP regimes in light of space law to uplift the developing and under-developed nations. It has acted as a limitation for developed nations to ensure an equal footing for all nations, as space is free for all humankind.

Incorporating IP with space sustainability will ensure cost-effectiveness, reduction of space junk and a level-playing field. The author stresses that it is essential to balance space missions and sustainability to preserve the environment. Even though the OST, 1967, encompasses this idea, it has not been implemented due to the nature of the law, i.e., public international law, which requires global cooperation and national recognition for implementation of the law, which has not been achieved. Such treaties have triggered a further divide between developing and developed nations, far from reaching a global consensus, impacting space and IP in the long run.

The IP Conventions are dated, which must undergo amendments to include space-related aspects. Specific issues must be addressed, for instance, the TRIPS Agreement under Art. 27.1, which lists subject matters for patenting, includes the phrase "in all fields of technology" and must include space technology as they can be commercialised through global accords and technology transfer. Space has also seen private players that play a crucial role that can allow for such commercialisation. These inclusions must be made in the PCT to allow multi-jurisdiction protection in space technology. In light of the solutions discussed above, the author proposes an interaction between IP and space technology to enrich space explorations. As space missions become advanced, institutions must understand the true meaning of sustainability and protect it for the future of space explorations. IP can progress faster in conjunction with the advancement of green technology by introducing space sustainability ratings developed by the WEF and developing a new SDG that focuses on sustainable space through greener and reusable IP. It will be a valuable and efficient tool to create accountability as there will be stringent standards to ensure uniformity in the grant of protection

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