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'Houston, we have a problem': legal lacunae created by the lack of creativity

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Abstract

Creativity's importance in addressing legal problems is clearly apparent from the resolution of the Cold War's significant geopolitical tensions through space exploration. This paper will consider the importance of creativity as a means of addressing legal lacunae within space law, since the relative youth of space exploration and its accelerating technological progress means that traditional legal and regulatory solutions are not always appropriate. Spaceflight participants may encounter various situations that general human experience and law provides little guidance for. The initial creativity within the legal and regulatory aspects of space activity that saw the signing of major international treaties has since been stifled in favour of relying upon the established legal order. Increasingly awkward legal contortionism is occurring because of strict adherence to historical agreements.

Furthermore, precedents of wider international law are also ill-fitting options because they were never intended to apply to such instances. This lack of viable solutions has generated legal lacunae. Increased diversity of actors and activity within the space industry means that employing such measures does not reflect modern space exploration's reality and as explorative efforts move further away from Earth, attempts to apply law and policy written in different geopolitical climates becomes increasingly strained. This article will highlight these key issues, advocating that creativity be considered more directly by the law to help advance society in a way that enables these lacunae to be traversed. This discussion will advocate creative fusion of both binding and non-binding agreements to try and break the deadlock.

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1. Introduction

Creativity has been responsible for some of the greatest inventions and technological progress. Yet the notion of creativity in law is essentially absent. The law's very character disregards creativity as irrelevant, favouring precedent so strongly that the law itself is beginning to calcify, whereas human experience is constantly increasing. This is especially evident in the realm of space law, which this article will use as a lens through which to consider the importance of creativity within the law. The unknown nature of space exploration has resulted in a palpable lack of Earthly laws that are capable of acting as appropriate guidance. Through a doctrinal methodology examining what current law exists, this article will argue that it is necessary to development for creativity to be embraced. The primary aim of this paper is to emphasise how integrating creativity into the legal process can stimulate successful development despite geopolitical influences. Discussion will centre on integrating creativity as a process into the legal process to answer the primary research question of what legal lacunae have emerged as a result of having insisted upon orthodox international law? This includes the sub-question of which legal lacunae could be resolved through embracing a creative approach to legal development?

Answering these questions will make a significant contribution to existing literature. Calls for integrating creativity into legal problem solving have been made elsewhere[1]. However, the originality of this paper's contribution lies in its level of depth and novel consideration of the importance of creativity through the lens of outer space law and space exploration. By analysing space activity and how the law correlates to this, this paper shows in stark relief how creative interactions, specifically with the extra-terrestrial environment is causing a socio-cultural evolution in usage which the law must accommodate and attempt to pre-empt of risk systemic instability. By using space activity as a lens, where the existing legal framework is the bare minimum required for activity to take place this paper illustrates the breadth and extent of lacuna that are capable of quickly growing when legal development stagnates. This research is also significant in that it considers how 'workable solutions'[2] can be produced without dismantling the current system but to rather resolve geopolitical deadlock. This discussion will benefit both space law specifically and the wider international legal realm by emphasising how the creative and legal processes can be reconciled to one another, providing an imaginative solution to the issues raised. The paper will begin by discussing the creativity which originally enabled space exploration and its law. Then it will consider how lacunae have grown because existing legal mechanisms are ill-adapted to govern the new scenarios that human space activity is experiencing, using the prevalent issues of the growing diversity of

[1] See for example: Carrie Menkel-Meadow, Aha? Is Creativity Possible in Legal Problem Solving and Teachable in Legal Education? (2001) 6 Harv. Negot. L. Rev 97–144; Gillian Triggs, The Antarctic Treaty System: A Model of Legal Creativity and Cooperation, in Paul Arthur Berkman et al. (eds), Science Diplomacy: Antarctica, Science, and the Governance of International Spaces (Smithsonian Contributions to Knowledge 2011) 39–49.
[2] Menkel-Meadow, ibid.

actors and the ambiguity about the role of individuals as case studies. It will examine how embracing creativity could resolve these issues, comparing the parallels drawn between extra-terrestrial and earthly exploration before concluding the developments necessary for space law to provide appropriately for planned activity can be achieved by embracing creative legal solutions, including a mixture of binding and non-binding agreements.

1.1 The problem with Intellectual Property: protecting creativity in outer space.

Before continuing, it is necessary to first offer a definition of creativity that will be utilised throughout this discussion. As Gerard O'Neill stated, 'creativity is the most difficult of the human attributes to predict',[3] let alone define, which makes the reticence to integrate the concept within the law understandable. Yet forgoing it in the current manner is only constraining the law and for space actors restricting the very opportunities which they seek to realise. While defining such an abstract concept is difficult and the wider practicalities of such an exercise are beyond the remit of this paper, it is necessary to provide a working definition in this paper in order to demonstrate the importance of the contribution which creativity can make in supporting the law.

The matter of defining creativity is a multi-faceted discussion.[4] For present purposes, creativity is understood as 'potential originality and effectiveness',[5] resolving a recognised problem.[6] In the space sector, creativity has focused on technological capability, with proficiency in engineering new materials or extracting rare resources such as Helium3 or other scientific development including growing pharmaceutical supplies in vegetables to offset supply issues in-orbit[7] being amongst desirable areas for progress. Without physical resources or enticing investment, the sector is unsustainable, so this is understandable.

Therefore, creative engagement is ongoing, with the advent of multiple new plans for space's exploration. For example, International Space Station [ISS] operations are to

[3] Gerard K O'Neill, The High Frontier: Human Colonies in Space (2nd edn, Space Studies Institute Press 2019) 274.
[4] Chetan Walia (2019) A Dynamic Definition of Creativity, Creativity Research Journal, 31:3, 237–247.
[5] Corazza, G. E. (2016). Potential originality and effectiveness: The dynamic definition of creativity. Creativity Research Journal, 28, 258–267.
[6] Amabile, T. M., & Pratt, M. G. (2016). The dynamic componential model of creativity and innovation in organizations: Making progress, making 8 WALIA C meaning. Research in Organizational Behavior, 36, 157–183.
[7] Allie Narwat, 'Manufacturing medicines in space: how astronauts will make their own drugs' (*Pharmaceutical Technology*, 23 January 2020) <https://www.pharmaceutical-technology.com/features/medicines-in-space-astronauts-make-own-drugs/> accessed 08/02/2023.

be expanded with new modules to be launched to facilitate this.[8] Yet it is precisely because of continuous advancement of the physical capabilities of space exploration that it is growing increasingly necessary for the law to receive the necessary investment in its progress in order for it to correlate appropriately. The most obvious area for creative legal development would be through intellectual property [IP], as an area of progress. Yet in the space sector IP is currently relatively barren by comparison. Rather than corresponding to any wider international legal instrument,[9] the only recognition for IP in outer space is either the ISS' governing agreement or the USA's own domestic law.[10] The ISS Intergovernmental Agreement[11] stipulates that 'for [the] purposes of intellectual property law, an activity occurring in or on a Space Station flight element shall be deemed to have occurred only in the territory of the Partner State of that element's registry'.[12] The problem causing this lack of further substantiation for IP law in space law is twofold. Firstly, that by comparison, space law is explicitly non-territorial,[13] a stipulation which was, and remains, foundational to space activity and its success beyond the territorial conflicts which continue to dictate Earthly relations. IP law stands in direct contrast to this stipulation.[14] Secondly, this contradiction in terms is furthered by the sole ownership which IP law grants inventors, whereas space was declared 'the province of all mankind'.[15] Calls for reform of this issue have already been made elsewhere.[16] Although it would be possible for creativity to engage with IP law in order to produce a framework that assisted in governing this intersectionality between inventions, the law and the protection of individual rights, this discussion is beyond the scope of this paper. Attempting to transplant Earthly laws directly into outer space is inherently problematic and further discussion in pursuit of bespoke, creative development will not be successful without first resolving the geopolitical deadlock.

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[8] Brian Dunbar, Biden-Harris Administration Extends Space Station Operations Through 2030, 31st December 2021, NASA.org, < https://blogs.nasa.gov/spacestation/2021/12/31/biden-harris-administration-extends-space-station-operations-through-2030/> accessed 22nd September 2022.

[9] See for example EU Charter of Fundamental Rights; Article 1 of Protocol No 1 to the ECHR; Convention Establishing the World Intellectual Property Organization. 14 July 1967.

[10] § 105, 'Inventions in outer space', to the Patents in Outer Space Act, Pub L No 101–580, 104 State 2863 (1990), codified at 35 USC § 10 (2000).

[11] Agreement Among the Government of Canada, the Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States Concerning Cooperation on the Civil International Space Station (1998) (hereinafter IGA).

[12] Ibid., Art. 21 (2).

[13] OST [1967], Art. II.

[14] See further Ruwantissa Abeyratne, The Application of Intellectual Property Rights to Outer Space Activities, 29 J. SPACE L. 1 (2003).

[15] OST [1967], Art. I.

[16] Bradford Lee Smith, Towards a Code of Conduct for the Exercise of Intellectual Property Rights (IPR) in Space Activities – Moderation of the Monopoly? in Proceedings Of The Thirty Ninth Colloquium On The Law Of Outer Space 176 (1997).

The perpetuating cause of these legal lacunae stems from space exploration's origins with the exclusive hegemony enjoyed by States. While the OST recognised that private actors may become involved in space activity and accommodated accordingly,[17] its drafters firmly considered outer space as the purview of States,[18] and it is under the remit of their control[19] actors continue to engage. Nevertheless, private companies such as SpaceX and Blue Origin are thriving and actually directing the sector's progress. Unfortunately, the corresponding legal development to this geopolitical shift is startlingly absent. No progress regarding IP would bear any sort of fruitfulness until this monopoly of State control is resolved to reflect the new reality of the space industry's range of actors and engagement. Indeed, the barrenness limiting IP within outer space is a symptom of the wider difficulties caused by the lack of integrating any creative legal problem solving to the path and pace that space exploration has taken since its beginning. It is for this reason that this paper focuses on examining how these wider systemic difficulties can be rectified to provide a route whereby creativity is a structural part of space law's next evolution.

2. 'Necessity is the mother of invention': the Cold War and space exploration

The importance of legal creativity is perhaps most obvious within space exploration, since the activity and its continued progress would not be possible *without* creativity. That space exploration proved to be the method by which the significant geopolitical tensions of the Cold War dissipated demonstrates how integral and beneficial embracing creative solutions can be. While relevant, the full history of space exploration's beginning during the Cold War has been discussed in ample detail elsewhere.[20] A brief examination will be beneficial in discussing how problematic creativity's absence is by comparison. The desire to access outer space via satellite launches was highly attractive to the USA and USSR during the 1960s. The eagerness of these States to ensure their own 'freedom of action in space',[21] and the desire of other States who did not have spacefaring capability to reap the potential rewards,

[17] Art.VI; P. J. Blount, Renovating Space: The Future of International Space Law, 40 Denv. J. Int'l L. & Pol'y 515 (2011–2012)., p 518.
[18] EILENE GALLOWAY, The Community of Law and Science, 1 PROC. COLL. L. OUTER SPACE 62 (Andrew G. Haley & Welf Heinrich eds., Wein, Springer, Verlag 1959) See Legal Problems of Space Exploration: A Symposium, prepared for the use of the Committee on Aeronautical and Space Sciences, U.S. Senate, by the Legislative Reference Service, Mar. 22, 1961, Washington, Library of Congress, 450 (1961).
[19] OST 1967, Art. III.
[20] See, for example, Walter McDougal, *The Heavens and the Earth: A Political History of the Space Age* (1985, Johns Hopkins University Press) and also Naomi Oreskes and John Krige (eds), *Science and Technology in the Global Cold War*, 2014, MIT Press.
[21] Ibid.

without the threat of mutually assured destruction[22] instigated a burst of legal creativity. This creativity led space activity to become the peaceful endeavour it remains today. Even more remarkable was the alacrity with which its foundational framework of multilateral agreements was accomplished[23] and secured widespread consensus. These treaties exemplify the fruitfulness that the legal creativity can stimulate. It is worthy of note that this hastening of the legal process was certainly a result of the consequences of the Space Race, including the haste of international law to accommodate[24] the most prevalent issues States may encounter within space activity.

Concern for the consequences of this necessary haste only grows when considering that in the periods which followed, creativity has since stagnated both in the field of space law specifically, but also in the wider realm of international law overall. This discussion will examine the ramifications of this, including the lacunae that the absence of any subsequent in-depth development has generated.

2.1 The beginning of everything: the OST and its satellite treaties

The ingenuity of the Outer Space Treaty [1967] drafters can be seen in their recognising that the most salient concerns would be environmental protection[25] and the specific designation of outer space as an avenue for strictly peaceful purposes,[26] without recourse to weaponry,[27] They designated astronauts as envoys of humanity,[28] to explicitly recognise the equality and unity of space exploration, with some topics being expanded into independent agreements.[29] Despite this, the geopolitical haste that motivated development led to the enshrinement of these new terms, without defining the specific ambit intended for them.[30] Indeed, the treaties were 'adopted by the drafters without effectively implementing all its specific technical

[22] Roger G. Harrison, Space and Verification, Vol I: Policy Implications 9 (Eisenhower Center, 2011).
[23] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty]. See also: Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 3rd December 1968, 19 U.S.T. 7570 [Hereinafter the Rescue Agreement]; Convention on Registration of Objects Launched into Outer Space, 15th September 1976 28 U.S.T. 695 [Hereinafter the Registration Convention]; Convention on International Liability for Damage Caused by Space Objects, 1sst September 1972, 24 U.S.T. 2389 [Hereinafter the Liability Convention].
[24] 1085th plenary meeting that took place on December 20, 1961 in the General Assembly Hall in New York, United States of America, the General Assembly of the United Nations; UNGA UNCOPUOS 17TH June 1966, A/AC.105/32, United States of America, Draft Treaty governing the exploration of the moon and other celestial bodies, <https://www.unoosa.org/pdf/limited/c2/AC105_C2_L012E.pdf>, p 3.
[25] OST 1967, Art IX.
[26] Ibid., preamble, Art IV.
[27] Ibid.
[28] Ibid., Art V.
[29] Supra, (n.4).
[30] Francis Lyall and Paul B Larsen, Space Law: A Treatise (2nd edn, Routledge 2020) p 130.

consequences'.[31] Whilst frustrating, the innate vagueness of foundational space law was somewhat strategically instigated, enabling speed and acknowledging the need for flexibility. The sheer lack of explicit contemporary knowledge about human spaceflight l must also be taken into account. Sending people into space remains a risky business which somewhat explains why no significant legal development yet exists to match the scale of human ambition. However, it also spawns continual questions as the capabilities of human activity expand.

This illustrates the burst of legal creativity that humanity accessing outer space produced, on an international scale and the international co-operation required. Encouragingly, co-operation has resulted in collaboration, as illustrated by the ISS and international components supplied to the Apollo crafts.[32] However, the importance of legal collaborations expanding simultaneously cannot be understated.

It has been claimed previously that outer space is already a 'highly regulated environment',[33] despite its perennially popular preconception as the so-called final frontier.[34] This view has a limited veracity. The space treaties' drafters did identify the foremost areas of immediate concern for formal enshrinement as legal principles. This is emphasised by their subsequent expansion into individual treaties, proving the accuracy of the observation that 'the extension of international law to outer space has been gradual and evolutionary'.[35] Given the time-sensitive nature of space law's development, certain aspects identified initially were dismissed for in-depth consideration at a more pertinent time.[36] However, this pertinent time has yet to arrive, despite the fact that the range of activities now possible is increasingly surpassing the space treaties' purview. The sudden halt to explorative progress further illustrates how the mismanagement of individual projects can have community-wide repercussions. This includes the emergence of lacunae regarding areas which international law has never developed in any significant regard. The reasoning for this is as a result of certain factors, including the law's very character itself.

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[31] Michelle Caianiello, Law of Evidence at the International Criminal Court: Blending accusatorial and inquisitorial models, 36 N C J Int'l l 287 (2010), p 288.

[32] A.M. Platoff (1993), 'Where no flag has gone before: Political and technical aspects of placing a flag on the Moon', NASA Contractor's Report 188251, <https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19940008327.pdf> p 2.

[33] Roger G. Harrison, Space and Verification Vol I: Policy Implications 9 [Eisenhower Center 2011] p 8.

[34] See for example: Jayson Haile, The New Age of Conquest and Colonialism: How Admiralty Will Be Used on the Final Frontier, 29 Tul. Mar. L.J. 353 (2005); Joseph MacMillian Blythe, Space for Improvement: A Review of the Legal Complications Arising from a Martian Colony, 2 U. Cent. Fla. Dep't Legal Stud. L.J. 83 (2019), p 84.

[35] UN Treaties and principles on outer space, Foreword, UN New York 2002 ST/SPACE/11.

[36] Goldberg, International Law in the United Nations, 56 DEP'T STATE BULL. 140, 142 (1967).

3. *Non liquet*: setting standards or stubbornness?

Law regards itself[37] as inherently complete,[38] which explains the evident lack of creative problem-solving within the law generally; it is erroneously considered unnecessary. It has been insisted that legal lacunae either cannot actually exist, or if a gap does exist, it is immediately filled via interpretation.[39] This degree of confidence in the law's capability to resolve such matters is accurate to a certain extent. Overreliance is misplaced. Judges have recognised this regarding international law,[40] but it is not the prevailing opinion. It seems to have been forgotten that legal systems themselves, such as international law itself after WW2 and the Cold War, had to begin and develop in the first place, embracing the creative process in order to do so. Previous laws had to be replaced, precisely because they did not reflect the new reality caused by significant geopolitical shifts. Individual criminal responsibility was amongst the numerous conceptual difficulties requiring consideration[41]. The transformation 'into a highly developed body of law … [was] because of a great deal of judicial activism'[42] that has since stagnated.

This issue is not exclusive to international law. In a study, ironically funded by NASA in the pursuit of the most creative scientists and engineers, it was discovered that 'non-creative behaviour is learned'.[43] The implications of this have a far-reaching multi-disciplinary impact, beyond this paper's scope. In terms of the law, the absence of creative behaviour is unsurprising. The law's supposed completeness stems partly from reliance on precedents to provide instruction, as is their purpose. Yet this is problematic, since the revision and adaptation of this guidance is becoming progressively strained. One resolution to any apparent legal lacunae could be to declare the matter as *non liquet,* whereby the situation before the court is declared to be so unclear that it renders any existing laws inapplicable.

In space law's current state, this would be a feasible and creative solution. Spaceflight participants may find themselves in situations beyond any guidance that precedent or prior experience can offer. But since the law rejects the *non liquet* principle so entirely, in favour of wresting the law into compliance, it is unlikely. But as space law

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[37] Stanley Fish, *Doing what comes naturally* (Durham, NC, and London: Duke University Press 1989), p 7.
[38] Prosper Weil, The Court Cannot Conclude Definitively . . . Non Liquet Revisited, 36 Colum. J. Transnat'l L. 109 (1998), p 110.
[39] Prosper Weil, The Court Cannot Conclude Definitively . . . Non Liquet Revisited, (1998) 36 Colum. J. Transnat'l L. 109, p 110.
[40] Judge Sir Gerald Fitzmaurice, Case concerning the Barcelona Traction, Light and Power Co (Belgium v Spain) 1970 ICJ 4, (1970), p 78, para 25.
[41] Salvatore Zappalà, Part A Major Problems of International Criminal Justice, IV International Criminal Trials, Judicial Activism v. Judicial Restraint in International Criminal Justice in *The Oxford Companion to International Criminal Justice.Oxford, New York: Oxford University Press, 2009,* p 325–326.
[42] Ibid., p 327.
[43] For further detail of this finding, see George Land & Beth Jarman, *Breakpoint and Beyond: Mastering the Future Today. (*1992*,* Harpercollins Publisher).

showcases, these feats of contortionism are becoming increasingly strained. Human activity is moving farther away from Earth, and with it the realm of human experience. Rejecting *non liquet* stems from the implication that to make a ruling of *non liquet* denies access to justice,[44] because no legal remedy is given. Seen in this light, it is understandable that the principle is so abhorred that its lack of usage is almost customary international law[45] in itself. Employing *non liquet* defeats law's very purpose. Yet this does not explain why an alternative principle has not been developed to countermand ambiguity, if *non liquet* is so unpalatable. One that, having recognised the need for better understanding of what is the appropriate solution, provides a route to resolution.

However, it is probable that the lack of alternative is because it would recreate the current issue in that admitting that the law in its current form is unable to produce the appropriate result and therefore still deny access to justice. It is this awkwardness that emphasises the need for creative problem solving within the legal process.[46] Enabling innovation would circumvent situations outside established precedent, enabling consideration of how best to ensure access to justice. It could also avoid having to follow a legal route that does not apply to the actual circumstances.

Alternatively, provided the due processes which ensure equality before the law are not sacrificed, deviating from established precedent may not be as problematic as the abhorrence for *non liquet* suggests. Nevertheless, whether it is the adherence to standards or an innate stubbornness that the law can resolve all issues put before it, *non liquet* is unlikely to become accepted in the future. Therefore, creativity is integral to allowing the current infrastructure to continue without having to be dismantled. Embracing creativity within the legal process could hopefully provide a route whereby other interdisciplinary influences can be incorporated to better inform the law about governing unprecedented scenarios. This would deliver the access to justice the law strives to provide. For example, it could circumvent a scenario where a case could fall within an existing precedent's remit but is so beyond the circumstances conceived when that precedent was created that its inclusion could instead destabilise the law's integrity.

3.1 Individual Acts: the problem with Space Projects

It would be highly inaccurate to claim that law-making for space activity has ceased altogether. Multiple countries continue to regularly enact legislation enabling satellites and space industrialisation.[47] Yet these are formulaic, reactive documents as

[44]Prosper Weil, The Court Cannot Conclude Definitively . . . Non Liquet Revisited, (1998) 36 Colum. J. Transnat'l L. 109, p 112.

[45] Hereafter CIL. See further H. Lauterpacht, Some Observations on the Prohibition of Non Liquet and the Completeness of the Law (1958) Symbolae Verzijl (The Hague), 197.

[46] Carrie Menkel-Meadow, Aha? Is Creativity Possible in Legal Problem Solving and Teachable in Legal Education? (2001) 6 Harv. Negot. L. Rev 97–144.

[47] For example, see the UK's Space Industry Act 2018, the USA's Commercial Space Launch Competitiveness Act 2015 or Japan's Promotion of Business Activities Related to the Exploration

opposed to proactive and while no less necessary to space activity's legal framework, they do not concern the aspect which States and commercial actors mostly strongly advertise:[48] human spaceflight. By contrast, legal development regarding physical human involvement is probably the area which has stagnated most significantly, causing lacunae to grow instead. Although the Artemis Accords[49] concerning the space programme of the same name[50] were only signed in 2020, they do not dissipate concerns regarding the want of creativity in human spaceflight. Intended to comprise of bilateral and multilateral agreements,[51] the Accords' flexibility is commendable. Similarly, the Accords' structure and tone are especially notable for their promises to further the international collaboration that the OST fostered with its clauses on co-operation.[52] International collaboration in this style was at the centre of the International Space Station [ISS], whose governing agreement[53] continues to ensure the co-operation between its partner nations, as a decisively peaceful project.

The ISS governing agreement is further laudable for being recommended as a template for future space law,[54] particularly its innovative solution to the problematic jurisdiction question. The appropriate jurisdiction for outer space has been long debated.[55] The ISS utilises the nationality principle, whereby each State party has jurisdiction 'over personnel in or on any flight element who are their respective nationals'.[56] This encapsulates the issue discussed earlier in relation to IP, which plagues both space and wider international law; specific laws are developed only on

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and Development of Space Resources (Act No. 83 of 2021), Luxembourg's Space Resources Act 2017.

[48] Shammas, V.L., Holen, T.B. One giant leap for capitalistkind: private enterprise in outer space (2019) *Palgrave Commun* 5, 10.

[49] Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of The Moon, Mars, Comets, and Asteroids for Peaceful Purposes (13 October 2020). Hereafter the Artemis Accords.

[50] NASA, 'The Artemis Plan, NASA's Lunar Exploration Program Overview', (NASA, September 2020) <https://www.nasa.gov/sites/default/files/atoms/files/artemis_plan-20200921.pdf>.

[51] The Artemis Accords [2020], S. 2, S. 11 (6).

[52] Ibid., preamble. OST [1967], preamble, Arts. I, III, IX, X.

[53] Agreement among the government of Canada, Governments of member states of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America concerning co-operation on the civil international Space Station [1998]. Hereafter IGA.

[54] Taylor Stanton Hardenstein, *In Space, No One Can Hear You Contest Jurisdiction: Establishing Criminal Jurisdiction of the Outer Space Colonies Tomorrow*, (2016) 81 J. Air L. & Com. 251 at http://scholar.smu.edu/jalc/vol81/iss2/4, p 281; See further: Charles Chukwuma Okolie, International Law Principles of jurisdiction in Regard to Settlements of Humankind on the Moon and Mars, 34 COLLOQUIUM ON THE LAW OF OUTER SPACE 64–69, p 65; Stacy J. Ratner. Establishing the Extraterrestrial: Criminal Jurisdiction and the International Space Station, 22 B.C. Int'l & Comp. L. Rev. 323 (1999). P.339; official COPUOS LSC reports for 2013 (A/AC.105/1045, par. 161 et seq., particularly par. 170) and 2014 (A/AC.105/1067, par. 175 et seq.

[55] Ibid., See also P.J. Blount, Jurisdiction in outer space: challenges of private individuals in space (2007), 33. J. Space L. 22; Hans Sinha, Criminal Jurisdiction on the International Space Station, 30 J. SPACE L. 85, 86 (2004).

[56] Intergovernmental Agreement 1998, Art 22 (1).

a reactive, independent basis. Although a solution was introduced for the ISS, it is specific to that space station, rather than expanding to encompass the breadth of human space activity. These situational frameworks are beneficial for the level of detail, but not their scope. Even as space activity is becoming regularised, it has yet to be more regulated. The exact parameters of the OST are unknown and neither the Artemis Accords nor the ISS have become successors capable of resolving the OST's inherent ambiguity.

Instead, the poor health and criticisms levied at these projects is a testament to the difficulty of a project-specific approach. Having specific agreements to facilitate these specific programmes is understandable, given their nature. The style, technology and international relations of these projects were ambitious for their times and the laws required to govern these activities had to correlate to this fact. No other contemporary activities could provide a template. These projects are insular, and while they may generate ramifications beyond themselves, the fact remains that the ISS and Artemis Accords were intended to operate independently, thereby requiring more in-depth structure than the breadth of space law provides. Yet the duration of these projects has resulted in them becoming fixtures of the extra-terrestrial landscape, including their legal principles. Such particularity of focus has not bred widespread longevity. It is here, as incidents of conflict attest[57] that the extent of the lacunae caused by creativity's absence within space and general international law becomes apparent.

Any criticism of ongoing human spaceflight must be tempered by acknowledging the sector's youth. The Lunar Gateway has barely begun to germinate, let alone launch, making fully-fledged legislation impossible at this stage. Regardless, the Artemis Accords have already been heavily criticised, primarily because they echo the OST's principles,[58] rather than creating new ones.[59] In contrast to its genesis, space exploration has advanced, and access is continually expanding. As a result, the legal lacunae present are simply growing wider. Although the legal development of space law is certainly 'gradual',[60] the reception of the Artemis Accords shows it is no longer 'evolutionary'.[61] This lack of creativity is somewhat understandable given the way that any significant planned activity, including which celestial body to explore or potentially settle upon has oscillated between one goal or another for several years. Intentions have changed from a desire to return to the Moon or continue further

[57] Nasa said to be investigating first allegation of a crime in space, 24th August 2019, BBC, <https://www.bbc.co.uk/news/world-49457912>, accessed 6th March 2022.
[58] S. Hobe, Keynote Speech, International Astronautical Congress 2020, quoted in Alexander Stirn, 'Do NASA's Lunar Exploration Rules Violate Space Law?' (Scientific American, 12 November 2020) < https://www.scientificamerican.com/article/do-nasas-lunar-exploration-rules-violate-space-law/>, accessed 28th September 2022.
[59] Deplano, R (2021). The Artemis Accords: Evolution or Revolution in International Space Law? *International and Comparative Law Quarterly*, 70(3), 799–819; Ibid.
[60] UN Treaties and principles on outer space, Foreword, UN New York 2002 ST/SPACE/11, p.v.
[61] Ibid.

afield to Mars[62] and back again, hindering the opportunity for either genuine technical capability or appropriate law to come to fruition.

This is one of the primary reasons why space law has failed to keep pace with space activity, the inability to commit to a particular direction. Freedom to create as part of the legal process, rather than adherence to poorly serving precedent could be such a remedy. In recent years, popular focus has centred upon the future of celestial settlements. Yet discussion has oscillated between whether to begin on the Moon or Mars. Although each planet has a unique environment, posing unique challenges markedly different from each other, the similarities are apparent enough that, provided the effort to transplant earthly laws is abandoned, there is no reason specific efforts could not be made for each planet. From environment, resources, impact on physiology and location, the Moon and Mars necessitate sufficiently different approaches to require their own creative approaches.

3.2 Digging a hole: legal contortionism, lacunae and space mining

The Artemis Accords and ISS face the same difficulty; their partner States' primary interest in utilising creativity is to maintain the current state of affairs. Being soft law in character, maintaining relations and catering to existing geopolitical issues is something space law has always done,[63] which neither disturbs US dominance nor its prohibition on working with China.[64] However, attempting to enable human ambition while preserving legal principles enacted before those ambitions formed places great strain on those same principles. This is predominantly obvious from the poor manner in which creativity has been employed to perform an act of legal contortionism. Namely, that the Accords explicitly grants permission to mine celestial bodies whilst claiming it does not contravene one of space law's most central tenets; the non-territoriality principle.[65] This circumvention was met with confusion for its awkward claim that the non-territoriality principle was not offended by the Accords' introduction.[66] While evolutionary,[67] rather than erase lacunae, this has instead generated more, owing to the Accords' contradictory nature. As such, although

[62] Robert M Zubrin 'The Economic Viability of Mars Colonization.' (2018), p 166; Cameron M Smith, 'Estimation of a genetically viable population for multigenerational interstellar voyaging: Review and data for project Hyperion' [2014] 97 Acta Astronautica 16–29 ; Andrew Rader, Leaving Earth: Why one way to Mars makes sense (CreateSpace Independent Publishing Platform 2014), p 123; Rayna Elizabeth Slobodian, 'Selling space colonisation and immortality: A psychosocial, anthropological critique of the rush to colonise Mars', Astra Astronautica, 113 (2015) 89–104.

[63] P. J. Blount, Renovating Space: The Future of International Space Law, 40 Denv. J. Int'l L. & Pol'y 515 (2011–2012), p 525.

[64] S. 539 Public Law 112–55. Popularly referred to as The Wolf Amendment, after former Rep. Frank Wolf (R-VA).

[65] The Artemis Accords 2020, S 10 (2).

[66] Ibid.

[67] (N.50).

creativity has been used, its ungainliness in seeking to satisfy the hopes of capitalism and return of investment is unsatisfactory.

The Accords' growing number of signatories[68] demonstrates how problematic the dominant leadership of one nation, here the USA, can be. The USA firmly has its own intentions for the future of international space exploration, and is utilising creative means to secure this end. This shows in America's blatant rejection of the concept of outer space as a 'global commons'.[69] minimising the impact of 'regulations and limitations on the freedom of US non-governmental entities to explore and use space'.[70] The USA is acting in such a forthright manner to maintain dominance[71] it has even been explicitly stated that the Accords are intended to ensure compliance to America's preferred standards of behaviour.[72] Such rigidity hardly conveys either inclusivity or innovation, given that America has previously intended to send 'a clear message to the rest of the world, indicating that there are no "legal black holes"[73] in its jurisdiction. However, it is not alone in this desire to exploit space's 'material wealth',[74] with Luxembourg actually being the first nation to enact such legislation[75] and other nations followed suit.[76] America's dominance will probably force such a dramatic change in the legal landscape. It would be more beneficial to the health of the law to encourage overall structural change. Although time consuming, the pace of human space activity necessitates it, and investment would be mutually beneficial. This example illustrates that creativity has been utilised within the law, but apparently it is only used to secure commercialism and the lucrative futures promised by commercial actors, dubbed 'capitalist-kind',[77] who are set to gain rather than provide substantive solutions to the onslaught of legal issues that will spring from the legal infrastructure's underdevelopment. It is necessary to rebuff this particular style of creativity with a creativity that is inclusive and open to resolving the confusion and lacunae caused by this assertion of rights.

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[68] Bahrain became the latest signatory in March 2022. See 'Bahrain signs Artemis Accords', NASA Press release, NASA, 8th March 2022, Ed. Sean Potter <https://www.nasa.gov/press-release/bahrain-signs-artemis-accords>, accessed 23rd March 2022.

[69] HR 2809, 115th Congress (2017-2018), American Space Commerce Free Enterprise Act (2018), §80308; See also Commercial Space Launch Competitiveness Act [2015]; Dr. Scott Pace, then-Exec. Sec'y, Nat'l Space Council Lunch Keynote at IISL Galloway Space Law Symposium, Space Development, Law and Values (13th December 2017).

[70] HR 2809, 115th Congress American Space Commerce Free Enterprise Act (2018), §80305

[71] Michael Griffin in Linda Billings, 'How shall we live in space? Culture, law and ethics in spacefaring society', Space Policy 22 (2006) 249–255, p 251.

[72] Jim Bridenstein, in Jeff Foust, 'What's in a name, when it comes to an "accord"?'(The Space Review, 13th July 2020) <https://www.thespacereview.com/article/3987/1>, accessed 22nd March 2022.

[73] 58 Steyn, LJ, 'Guantanamo Bay: The Legal Black Hole', (2004) 53 ICLQ 1.

[74] (n.49) p 272.

[75] Space Resources Act 2017.

[76] (n 35).

[77] See further Shammas, V.L., Holen, T.B. One giant leap for capitalistkind: private enterprise in outer space. *Palgrave Commun* **5,** 10 (2019).

Firstly, despite the enthusiasm of spacefaring nations to mine extra-terrestrial resources, the creativity used to achieve this end is primarily unrepresentative, and intentionally so.[78] It excludes the Global South from benefiting from the equitable distribution of shared resources, which was an express hope of the Common Heritage of Mankind principle[79] during the OST's drafting.[80] Secondly, it raises the question of what becomes of the overall status of outer space as the Common Heritage of Mankind, and the risk of causing the 'tragedy of the commons'[81] whereby excessive exploitation and consumption of a shared resource, can deplete or entirely destroy it, to become a reality. This is also the case in terms of what clear intentions do exist regarding governance for future celestial settlements. The USA has asserted that whenever a celestial settlement does occur, its culture must be Western, as 'the best … seen so far in human history'[82] on the presumption that it will be Western powers who establish that first settlement. This includes the establishment of a democratic regime.[83] Overall, this prospective future is as uncreative as it is unrepresentative of humanity's diversity, especially when diversity is imperative to success.[84] Imagining that the same techniques and ways of life can be transplanted into extra-terrestrial soil, without considering the unique differences between life in Earth and outer space, is an astounding lack of foresight. It displays an unsettling political and legal rigidity, when another perhaps less traditional option may be more appropriate for outer space's unique environment. This illustrates the sheer breadth of lacunae within international space law and the amount of work that must be undertaken to break the current geopolitical deadlock.

There is also ambiguity regarding the contribution the Accords make to space law's development. Their youth and vague language obscure the full extent of potential consequences at the time of writing, but do highlight the difficulties which this lack of true construction and legal contortionism generates. Rather than employing creative methods to secure policy goals, or build a genuine infrastructure which complements other advances, this approach merely creates additional lacunae, both in international law and humanity's efforts to traverse the universe. The Accords did not even contemplate recognising one of the most significant aspects: the role of the individual in outer space.

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[78]Arthur Goldberg, Ambassador to the United Nations, Treaty on Outer Space: Hearings Before the S. Comm. on Foreign Relations, 90th Cong. 35 (1967), at 10.

[79] OST, Art. I. Hereafter CHM principle.

[80] Ram Jakhu, 'Legal issues relating to the Global Public Interest in Outer Space', 32 J. Space. L., 31, 37–39.

[81] Garrett Hardin, 'The Tragedy of the Commons', 162 Science 1243, 1244 (1968).

[82]Then-NASA Administrator, Michael Griffin [2005] in Linda Billings, How Shall we live in space? Culture, law and ethics in spacefaring society, (November 2006) Space Policy 22 (4): 249–255 p 250.

[83] Ibid.

[84] See Cameron M. Smith, 'Estimation of a genetically viable population for multigenerational interstellar voyaging: Review and data for project Hyperion', (April-May 2014), Acta Astronautica, Vol. 97, 16–29.

3.3 Lone Rangers: Individuals at the Final Frontier

Despite space law's rapid creation as a discipline being launched to ensure that a legal framework would surround the first man on the moon in the race to land him there,[85] there is little to no specific consideration for individual humans in the 'province of all mankind'.[86] Under contemporary logic, this is understandable, since States are the foremost intended subjects of international law and space was envisioned as being their sole purview, given the sheer expense and effort required to access it. But neither of these elements remains accurate, since the actions of private individuals can now have a significant impact both in outer space and the wider international realm. Private actors are not only funding but also shaping space activity and its future and calls have been made that space law must be developed to reflect that[87]. Yet another element that has arisen to develop simultaneously is the physical presence of private individuals in orbit at the same time, whose rights, obligations and remedies must be clear if human space activity is be truly sustainable.

One such instance of a failure to account for the presence, and indeed the impact of the individual in the wider international realm can be seen in the acts of terrorism committed by extremists, either alone or as part of non-state organisations. Failure to recognise that these instances could even be a possibility at the time of instigation appears as a lack of foresight by the respective drafters. However, it is more accurate to observe that the geopolitical landscape of both these spheres has evolved so dramatically and rapidly, that these lacunae have widened in tandem. Individuals' ability to access space is coming closer, although it will still remain the purview of the few[88] rather than the many, until celestial settlements can be realised. Even when that does occur, it reinforces the need for special consideration of individuals; they will be living there rather than the intangible State entities they may represent. It also emphasises the increasing need for creativity in the effort to accommodate the pace at which these activities are increasing and accelerating.

Existing international law provides little guidance. The only standing instance of individuals being recognised in space law that is parable to international law, is that of diplomatic law. Dubbing astronauts 'envoys of mankind',[89] surpassed geographical boundaries to instead make them representatives of all humanity. This created highly beneficial obligations upon State actors to protect them.[90] Yet, as aforementioned, the responsibilities of these supposed envoys is left undefined. Initially, the

[85] Ivan A. Vlasic, The Space Treaty: A Preliminary Evaluation, California Law Review Vol. 55, No. 2 (May 1967), pp. 507–519, p 507.
[86] OST 1967, Art. I.
[87] P. J. Blount, Renovating Space: The Future of International Space Law, (2011–2012) 40 Denv. J. Int'l L. & Pol'y 515.
[88] Victor L Shammas, Tomas B Holen, One giant leap for capitalistkind: private enterprise in outer space. *Palgrave Commun* **5,** 10 (2019).
[89] OST 1967, Art. V.
[90] Ibid.

appropriate candidates were those brave, or reckless,[91] enough to enter the unknown darkness of outer space. But the very concept of 'envoys of humanity' is awash with creative notions, which may require equal innovation to answer. Will it one day be necessary to posit such envoys to engage with extra-terrestrial life, in such a manner as the phrase suggests? If so, what standards ought they follow? Otherwise, will they be imbued with the same powers and prestige awarded to their Earthly counterparts? Or will such measures be unnecessary? Traditional diplomatic and international law[92] are ill-fitted in this regard to answer for the needs and uniqueness of outer space.

Although the Rescue Agreement[93] is couched in traditional diplomatic language, as the term 'envoys of humanity' demonstrates, it does not confer typical diplomatic protections. Most astronauts work for their official state space agencies but are not formal state representatives imbued with full diplomatic powers or authority. The replication of the spirit of traditional diplomatic law can be seen in that by proclaiming astronauts as envoys it recalls 'that people of all nations from ancient times have recognised the status of diplomatic agents',[94] thus enabling them to perform on humanity's behalf. Immediately here the similarities are imperfect enough to present lacunae which CIL cannot 'govern [any] questions not expressly regulated'[95] by the Vienna Convention on Diplomatic Relations[96] precisely because of the scarcity of CIL in relation to human space activity. Furthermore, although there is some parallel in terms of there being both sending and receiving States.[97] this is no residency within a receiving state's territory for a fixed period. Instead, as far as the Rescue Agreement is concerned, even though parties are obliged to 'render them all necessary assistance'[98] this essentially extends to their rescue from incidents of distress and prompt return to the requisite launching authority.[99] While this does satisfy the UN Charter's requirement for States to show 'respect for human rights and fundamental freedoms for all without distinction',[100] this sole representation of individuals in space law is no longer reflective of the breadth of human activity in-orbit, present or future.

Recourse to any of the foundational space treaties on this issue can be expected to be problematic, since they were seen as 'furnishing a general legal basis for the peaceful uses of outer space and providing a framework for the developing law of outer space'.[101] Yet it is precisely this development of law, and whether the framework is to be maintained, heavily adapted or even abandoned that requires innovative consideration, whichever option is chosen. The awkwardness of

[91] Tom Wolfe, *The Right Stuff*, (2005, Vintage Books), p 39.
[92] Vienna Convention on Diplomatic Relations 1961.
[93] [1968].
[94] Ibid., preamble.
[95] Ibid.
[96] 1961. Hereafter VCDR.
[97] Ibid., Arts. 8 & 9.
[98] Rescue Agreement 1968, Art. 2
[99] Ibid., Arts 3, 4.
[100] U.N. Charter, Art. 1, para 3.
[101] UN Treaties and principles on outer space, Foreword, UN New York 2002 ST/SPACE/11 P.VI.

maintaining it, or even certain routes of adaptation will result in contortionism that will be more of a hindrance than the development intended.

Returning to established diplomatic law,[102] it also fails to explain whether astronauts would ever have to represent humanity in a formal capacity in outer space, or if they did, what that role would entail. Although democracy has been posited as the preferred system of extra-terrestrial governance,[103] this is a Western initiative and may 'result in locking in companies and organisations to standards that turn out to be less than optimum'.[104] Of particular concern is whether the laws guaranteeing astronauts safety will also apply to civilian spaceflight. The presumption that the law of the sea,[105] whereby anyone in danger should be rescued[106] would apply in such similar circumstances in-orbit or during a return to Earth is not guaranteed. Rather, the Rescue Agreement stipulates that personnel will be rescued.[107] It is likely that this linguistic stipulation was the result of a simple lack of foresight that non-professional spaceflight would ever become a reality rather than a genuine exclusion. It has however, created a genuine issue, especially owing to US leadership in space when that nation considers a crewmember as a 'person assigned to perform duty in an aircraft during flight time'.[108]

This example illustrates the popularity of the ISS as a template for outer space's wider legal architecture, since it considers personnel to be those on-board.[109] It has been claimed[110] that the law's innate completeness automatically means that any lacunae can immediately be traversed once identified through the interpretation of existing principles, to meet the needs of any situation. Indeed, the transfer of the law of the sea could be presumed as a natural progression in response to the expansion of human space activity. Yet the inherent complexities of space's unique environment mean that neither maritime nor aeronautical law can fill these lacunae, at least not in-orbit. Nonetheless, it is highly likely that passengers, especially as paying customers would be rescued from any disaster without any legal requirement to induce such behaviour. The idealistic language used throughout the foundational

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[102] Vienna Convention on Diplomatic Relations 1961.
[103] Michael Griffin in Linda Billings, 'How shall we live in space? Culture, law and ethics in spacefaring society', Space Policy 22 (2006) 249–255, p 251.
[104] Laura Montgomery in Jeff Foust, 'What's in a name when it comes to an "accord"?', The Space Review (TheSpaceReview.com, 13th July 2020).
<https://www.thespacereview.com/article/3987/1> accessed 6th March 2022.
[105] UN Convention on the Law of the Sea 1982, 1833 U.N.T.S. 397.
[106] Ibid., Art. 98.
[107] Rescue Agreement 1978, Art 2. See also P.J. Blount, 'Jurisdiction in outer space: challenges of private individuals in space',(2007) 33. J. Space L. 22, p 313.
[108] USA Federal Aviation Administration CFR 14 1.1.
[109] ISS Code of Conduct, S. 1 (7); European Space Agency, 'International Space Station grant flight exemption for Dennis Tito', 25th April 2001,
https://www.esa.int/Our_Activities/Human_Spaceflight/International_Space_Station/International_Space_Station_partners_grant_flight_exemption_for_Dennis_Tito/(print), accessed 6th March 2022.
[110] (n.26).

space treaties, and extended by commercial actors[111] promotes this perception without confirming it by developing accompanying legal principles, highlighting 'the tendency to conceal unsolved problems under beautiful legal phrases'.[112] This is apparent from the way that the Rescue Agreement was formulated according to the broad spectrum of 'sentiments of humanity'.[113]

It is a general assumption that crew will protect their passengers[114] A transplant of existing law and standards of behaviour in this way would contort their functioning, in some instances beyond recognition or even functionality. For instance, if the crew prioritise passengers, in outer space there is no guarantee, especially at this early stage when spaceflight is far from regularised, that another craft would be passing by to render assistance. Without the appropriately trained crew on-board to pilot any craft, passengers would still perish.

Instead, will the interdependency present on space missions extend with the regularisation of civilian spaceflight, owing to the need for a social contract wherein passengers need crew to care for them, and crew need passengers to comply with standards necessary for safe flight in such a perilous and unique environment create a situation where, quite literally, 'we are all crew'?[115] If so, this brings a definite veracity to the extensive use of the concept of unity as a species within space exploration[116] and international law more widely. As such, space's unique environment and evolving activity means that these established international precedents would be wildly inaccurate to the actual requirements for navigating space safely.

The extent of this issue is exemplified in the simple fact that current space law fails to recognise the presence of spaceflight participants as people, rather than formal organs of intangible State entities. Calls have already been made for 'law to precede man into space',[117] and that international space law must accommodate the private commercial actors which are beginning to occupy such significant swathes of outer space.[118] However, this must go even further, stretching to acknowledge that individuals who travel there are just as much involved in space exploration as States

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[111] Victor L Shammas, Tomas B Holen, One giant leap for capitalistkind: private enterprise in outer space (2019) *Palgrave Commun* 5, 10.
[112] Adrian Bueckling, 'The strategy of semantics and the 'Mankind provisions' of the Space Treaty' 7 Journal of Space Law 15 (1979) p 22.
[113] Rescue Agreement 1968, preamble.
[114] Darcy Beamer-Downie, 'Considering the unthinkable – a review and discussion of current international law and suggestions regarding how we deal with a catastrophe in space', Acta Astronautica (2013) 92 255–262, p 258.
[115] Marshall McLuhan, in Daniel A. Vallero, *Paradigms Lost: Learning from Environmental Mistakes, Mishaps and Misdeeds* (2005), p 367.
[116] (n 4); (n.103).
[117] Andrew G. Haley, 'Space Age presents immediate legal problems', 1 PROC. COLLOQ. L. OUTER SPACE 5 (Andrew G. Haley & Welf Heinrich eds., Wein, Springer, Verlag 1959).
[118] P.J. Blount, 'Jurisdiction in outer space: challenges of private individuals in space', 33. J. Space L. 22 (2007) p 301.

and companies, if not more. Already, it has been recognised that the foundational treaties 'tend to ignore the gamut of possible interactions between individuals in space'.[119] Individuals will need clear obligations, rights and crucially, remedies within the law to reflect that. But it is insufficient to call for just the need to create law to resolve the lacunae in outer space and the international realm, since there is the urgent need to be *creative*, also. This has become apparent from the questions raised from the way in which people are already interacting with outer space.

4. Colonies, constitutions and creativity

To an extent, the deficit caused by the lack of any substantive development in space law's infrastructure is unsurprising, for three prevailing reasons. Firstly, the confidence in the OST, which has been deemed efficient enough to act as a 'constitution for space'[120] has left the law unable to keep pace with actual progress. Although imagining the style of governance and constructing constitutions for human space activity is a popular, well-trodden exercise,[121] no conclusive international agreement has been produced. This may be owing in part to the lack of and indeed, inability to commit in the face of the breadth of possibility that waits in outer space. This highlights another issue; creativity does not permit carelessness. By inserting a series of principles into international law, if using more established law as their template, it is crucial to utilise great care. Whether the foundational space law treaties did, is a matter of opinion. On the one hand the OST broad principles are frustrating and provide little guidance. On the other, strictness discourages the very creativity that is necessary, tying actors to problematic policy.[122]

Indeed, it raises the question of what style of legal agreements will be needed to accommodate the unique needs of human space activity. It is submitted here that a combination of binding and non-binding agreements would be most appropriate to cater to the unique environment and differences that humanity will encounter during space activity. The foundational treaties provided a firm, and vitally, binding basis by which States could pursue space exploration. Yet the range of activities that have become possible since then, and the widening of access has transformed the legal landscape. Not only is the OST and its fellow treaties outdated but also, while treaties certainly have their place in international law, creating new treaties would not be a

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[119] Ibid., p 300.

[120] Stanley B. Rosenfield, 'When Air Space Ends and Outer Space Begins', (1979) 7 J. Space L. 137, 144.

[121] T. A. Heppenheimer, 'Toward Distant Suns: A Bold, New Prospectus for Human Living in Space', Stackhole Books (2017) p.179. George S. Robinson, Transcending to a Space Civilization: The Next Three Steps toward a Defining Constitution, 32 J. Space L. 147 (2006); George S. Robinson, No Space Colonies: Creating a Space Civilization and the Need for a Defining Constitution, 30 J. Space L. 169 (2004).

[122] Laura Montgomery in Jeff Foust, 'What's in a name when it comes to an "accord"?', The Space Review (TheSpaceReview.com, 13th July 2020). <https://www.thespacereview.com/article/3987/1> accessed 6th March 2022.

guaranteed solution to the lacunae, jurisdictional[123] and otherwise. Pursuing a range of legal agreements, will enable the fully-fledged governance of the international and celestial realms to be accomplished. One of the most popular which academics have already imagined is that of a constitution for a celestial settlement.

4.1 Binding and Non-binding agreements

The OST's unsuitability, beyond its failure to reflect the organic developments of space activity, is that it does not enshrine the values of the actual community it would govern if installed over long-duration spaceflight. This stems from the particular difference of inflection in the notion of the term 'community'. While true that the OST governs States, private actors and individuals, given the principle of State responsibility,[124] it would be improper to view the OST as a viable constitution for a true community. 'Nations are not communities and never have been',[125] rather, a constitution is necessary for any community to provide the 'fundamental structure, and … the limits within which [a space community's] power can be exercised politically'.[126]

Constitutions also have the benefit of being readily amended and repealed, enabling celestial communities to alter their governance as they grow familiar with the reality of extra-terrestrial living. Beyond this, a constitution would provide a new dimension to the range of legal lacunae that currently exists in space, which the bilateral and multilateral agreements envisioned in the Registration Convention[127] that take shape through the ISS' Agreement[128] and Artemis Accords respectively. It would be a sensible solution to the governance of celestial settlements, as a clear recognition of the rules, rights and standards by which these diverse, international communities must exist in a new and extremely harsh terrain. However, this old solution to new legal, particularly jurisdictional problems may create new difficulties in turn. Restraint should be exercised towards any insistence that Earthly life and legal precedents can be readily transplanted to reflect *quod est superius est sicut quod inferius*, with extra-terrestrial laws replicating those of Earth, even if unsuitable. As aforementioned,[129] democracy is already favoured as space's intended system of governance. Despite the fact that this blatantly disregards the right to self-determination,[130] unless that is un-

[123] P.J. Blount, 'Jurisdiction in outer space: challenges of private individuals in space', (2007) 33. J. Space L. 22 p 300.
[124] OST 1967, Art. III.
[125] Howard Zinn, *A people's history of the United States* (2014, HarperCollins), p 10.
[126] Dario Castiglione *The Political Theory of the Constitution.* (1996) Political Studies 44(3) 417–435, pp 421–2.
[127] P.J. Blount, Jurisdiction in outer space: Challenges of private individuals in space, 33 J. Space L. 299 2007, p 312.
[128] Ibid.
[129] (n.95).
[130] International Covenant on Civil and Political Rights 1966, Art 1 (1). See also Declaration on the Granting of Independence to Colonial Countries and Peoples General Assembly resolution 1514 (XV) of 14 December 1960: para 2; UN General Assembly, *Declaration on Principles of*

expressed intention regarding future spacefaring civilisations, it is further inherently problematic.

The insistence on inserting democracy as the governance system of choice stems from the fact that humanity's ventures into outer space have been heralded as 'the story of the journey West',[131] paralleling its moniker as the final frontier. Such statements are inaccurate, uncreative and even worrisome. They fail to recognise that spaceflight is a global venture. Viewing the successful tone comparing space exploration to the American settlers, ignores the fact that the notion of the journey west depends upon perspective. As stated elsewhere, 'the story of the journey West is not one that ought to be repeated',[132] given the suffering of both native populations and even the settlers themselves[133] including the exploitation and colonialism which followed.

It would be far more productive and even profitable to embrace outer space's diversity. This includes the range of actors, situations people may encounter and the creative solutions that may be required. For instance, it has been recognised that spaceflight participants ought to have a constitutional right to oxygen,[134] which has no Earthly precedent given that it is perhaps the one resource everyone can access equally. The possibility of a right to return from a supposedly one-way trip has also been raised.[135] Space's commercialisation could alter that and without its recognition as a formal, essential human right could enable exploitation. Whilst this is an extreme example, it demonstrates the innate need for creative consideration within the law, given the stark contrast between human space activity and prior experience. Hopefully, installing new principles will break the deadlock that has descended on space law.

The protection and clarity of fundamental rights, as space activity and more widely, the international realm develops and alters is fundamental. Yet the need for innovative legal resolutions will be broader than that. It would be impossible at the present time to conceive a finite list of all the experiences humanity will have through space exploration, or the appropriate style of regulations. Yet instances of how individuals have already interacted with outer space and similar environments provides some indication. It also emphasises that the range of situations which spaceflight participants may encounter can find little guidance in general human

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International Law concerning Friendly Relations and Cooperation among States in accordance with the Charter of the United Nations, 24 October 1970, A/RES/2625(XXV).

[131] Charlie Bolden, then-NASA Administrator [2015] in Linda Billings, *Should Humans Colonize Other Planets? No*, (2017), Theology and Science, 15:3, 321–332, p 322.

[132] (n.117), p 142.

[133] Ibid., p 24; Susan-Mary Grant, *A Concise History of the United States of America*, (Cambridge University Press 2012), pp 40, 47.

[134] Richard Hollingham, 'How to create a bill of rights for Mars colonies' , (BBC.com, 9th July 2014) <https://www.bbc.com/future/article/20140709-why-mars-needs-a-bill-of-rights>, accessed 14th March 2022; See also Anel Ferreira-Snyman & Gerrit Ferreira, The Application of International Human Rights Instruments in Outer Space Settlements: Today's Science Fiction, Tomorrow's Reality', (2019) 22 Potchefstroom ELEC. L.J. 1.

[135] Ibid.

experience or law. Perhaps most prevalent is the variety of solutions which people have implemented in extreme situations to ensure their survival. This will certainly be a primary concern for spaceflight participants, even after long-duration spaceflight has become a stable and regular endeavour. Cannibalism,[136] sacrifice[137] and intentional abandonment of civilians by crew[138] have all occurred on Earth and may yet happen in outer space. These are all exceptional instances and hopefully, appropriate countermeasures will reduce such risks. Nonetheless, it raises the question of whether the judgements in the various incidences of these scenarios would be deemed established precedent. It reinforces the aforementioned argument of this paper, that it is necessary not only for laws to be creative but for the solutions the law introduces to also be creative.

Codes of conduct[139] and Memorandum of Understanding [MOU][140] already operate successfully in outer space and would provide a flexible platform to traverse existing lacunae. These styles of agreement bring a universality in standards of behaviour desired in a shared environment. This is visible in the current efforts, for example, to develop a code of environmental ethics for space.[141] Yet these remain the development of rules and obligations for States rather than individuals.

One of the more common likelihood of types of situations that may occur, which will need creative resolution surrounds space objects and installations. The way in which this technology is used is also changing. It could either conflict with established law or be ungoverned owing to the inherent vagueness of the foundational treaties' language. For example, in 2017 the Autonomous Space Agency Network,[142] launched

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[136] R v Dudley and Stephens (*1884*) 14 QBD 273 DC; Luke Harding, 'Cannibal who Fried Victim in Garlic is Cleared of Murder' (Guardian Unlimited, 31 January 2004) , https://www.theguardian.com/world/2004/jan/31/germany.lukeharding> accessed 23rd March 2022.

[137] Touching the Void [1988], Vintage, p 163; Simon Yates in 'A terrifying tale of him or me', (Harborough Mail, 1st April 2005), <https://www.harboroughmail.co.uk/news/a-terrifying-tale-of-him-or-me-1-1540473>, accessed 19th March 2022.

[138] U.S. v Holmes, Circuit Court ED Pennsylvania 26F Cas 360 (1842). See further Darcy Beamer-Downie, 'Considering the unthinkable – a review and discussion of current international law and suggestions regarding how we deal with a catastrophe in space', (2013) Acta Astronautica 92 255–262.

[139]The code for the crew on the International Space Station, which all crew are obliged to follow, has functioned successfully since its introduction. See further Arnaud Farand, *The Code of Conduct for International Space Station Crews*. (2001) *ESA Bulletin*, (105), pp.64–68.

[140] See for example: UNOOSA and EUSPA sign agreement to advance the understanding of and access to space benefits', UNOOSA press release, <https://www.unoosa.org/oosa/en/informationfor/media/2022-unis-os-566.html>, accessed 21st March 2022.

[141] Perhaps the most prominent example is the UN Debris Mitigation Guidelines 2007. U.N. Gen. Assembly, Report on the Committee on the Peaceful Uses of Outer Space, % 117, U.N. Doc. A/62/20 (July 26, 2007).

[142] Hereafter ASAN.

a weather balloon carrying what has been proclaimed as 'the first protest in space',[143] despite the fact that the object did not surpass the traditionally accepted air-space boundary.[144] Nonetheless the action raises intriguing questions that could either bring existing laws into conflict or require contortionism to answer. It also illustrates how instances which are not explicitly stated within space law are likely to encounter either lacuna or significant ambiguity that the traditional redress through interpretation[145] fails to resolve. Any space object is governed by the Registration[146] and Liability Conventions.[147] If the object on which the protest was constructed had reached true outer space, it would have fallen under these treaties' remit, including the requisite rights and obligations. Upon reaching Lower Earth Orbit [LEO] it would have also come into range of the various satellites and debris that occupy that already crowded area[148] and risk of collision.[149] This raises a question; if a political protest such as ASAN's was the subject of a collision, would additional ramifications beyond those enshrined in the Registration and Liability Conventions be triggered?

The political motivation behind the weather balloon as an intended protest against then-US president Donald Trump's environmental policies is a demonstration of freedom of expression, a recognised human right.[150] This raises a plethora of questions. For instance, would such acts be permitted in true outer space? Such objects would of course be placed under the same regulations and obligations as any other space objects in-orbit, and as a benign, peaceful protest it does not contravene space's designation as being exclusively for 'peaceful purposes'.[151] Yet if this political protest was involved in a collision, would this also impact the launcher's freedom of expression? Alternatively, as a qualified right, would an orbital protest be permitted, given freedom of access to space?[152] Or would it otherwise be unnecessarily contributing to so-called 'space junk', since it is a personal rather than public service launch? Concern has increased over debris' 'significant hazard to operational space

[143] Ben Guarino, '"First protest in space" targets Trump with an astronaut's famous words', The Washington Post, 14th April 2017, https://www.washingtonpost.com/news/speaking-of-science/wp/2017/04/14/first-protest-in-space-targets-trump-with-an-astronauts-famous-words/, accessed 21st March 2022.
[144] Ibid.
[145] Vienna Convention on the Law of Treaties 1969, Art 31.
[146] (n.4).
[147] Ibid.
[148] 'How many pieces of space debris are currently in orbit?', ESA, https://www.esa.int/Safety_Security/Clean_Space/How_many_space_debris_objects_are_currently_in_orbit#:~:text=More%20than%20170%20million%20%2D%20for%20sizes%20larger%20than%201%20mm, accessed 12th March 2022.
[149] For details on the current threat see, Heiner Klinkrad, *Space Debris: Models and Risk Analysis*, 2014, Springer.
[150] UN General Assembly, *Universal Declaration of Human Rights*, 10 December 1948, 217 A (III), Art 19.
[151] OST 1967, Art I.
[152] Ibid.

craft'[153] to the point that new guidelines[154] were introduced to alleviate the creation of new debris.[155] Adding a personal expression to an already crowded area of environmental value, specifically one involving protected rights presents a legal quandary to which there is no immediate answer.

The rapid, ad-hoc development of space law, the variety of new projects requiring governing and wider international law may come into conflict, rather than enabling resolution through interpretation. Once more, this can be attributed to the original treaties' drafters, accommodating contemporary 'underlying societal and political realities'.[156] While independent agreements have their place, as payload contracts illustrate, this reflects the same difficulty as recourse to municipal law as it 'can result in a patchwork of norms that are not uniform in outer space'.[157] Or, as with the example of ASAN's protest, how to govern creativity without employing creativity in turn.

Another example is the conflict that could arise between the inclusion of 'installations' in a purely military or scientific context.[158] This is owing to the range of activities which could yet be classified as installations; whether art, historic artefacts or even grassroots memorials. Grassroots memorials pose a particularly intriguing issue. They are not official, but popular.[159] These are each an example of spontaneous interaction with the environment, yet each could be classified as expressions of 'sentiments of humanity'[160] which prompted the Rescue Agreement. There is of course the marked difference between protecting human life and protecting human expression. Simultaneously, the fact that expression can be a form of human sentiment shows how the treaties' idealistic and vague language could cause numerous problems in its breadth. Existing domestic legislation is no longer suitable. It is vital that creativity is re-learnt, particularly in terms of law and policy as part of the process of development in order to correspond to humanity's diverse usage and sentiment in outer space. This is especially important when regulations can be

[153] Brian Weeden, 'Overview of the legal and policy challenges of orbital debris removal' (2011) 27 *Space Policy*, 38–43, 38.
[154] Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space as annexed to UN do. A/62/20, Report of the UNCOPUOS (2007).
[155] Jeff Foust, 'International partnerships to address orbital debris in absence of broader accord.' Space News, 24 September 2017. Available at http://spacenews.com/international-partnerships-to-address-orbital-debris-in-absence-of-broader-accord/ accessed on 11 March 2022.
[156] P. J. Blount, Renovating Space: The Future of International Space Law, (2011–2012) 40 Denv. J. Int'l L. & Pol'y 515, p 517.
[157] P.J. Blount, Jurisdiction in outer space: Challenges of private individuals in space, 33 J Space L 299 2007, p 306.
[158] OST 1967, Art IV.
[159] Paul Graves-Brown & Hilary Orange (2017) 'The Stars Look Very Different Today': Celebrity Veneration, Grassroot Memorials and the Apotheosis of David Bowie, Material Religion, 13:1, 121–123, p 121.
[160] Rescue Agreement 1968, preamble.

brought into force that ignore or restrict widely held social behaviours and values such as anti-abortion laws or criminalising homosexuality.

Some instances of these sentiments have already been identified as existing, both in-orbit and on celestial bodies such as the Moon. They have also gained unintentional significance by being State-sponsored activity there. Items discarded as rubbish by the Apollo astronauts now forms part of the historic sites of human lunar exploration. Indeed, laws have come into effect to protect these sites.[161] However, this does not answer questions regarding the various expressions of human life in-orbit, rather than preservation of historical acts, which possess different connotations. Since States are only obliged to observe behaviour where a prescriptive or prohibitive rule exists, and may otherwise act as they choose,[162] installing more detailed regulation for the everyday interactions of individuals, which could overlap with State usage may fetter their enjoyment of outer space. To an extent, this has already become apparent from the Moon Treaty's[163] failure when rejected by the primary space powers: Russia, China and the USA.

The treaty issued principles which could, if it had succeeded, have provided some guidance for an assortment of activities that could be re-interpreted and adapted as needed. Indeed, this could still be possible. The Moon Treaty mentions that 'installations on or below the surface of the Moon, including structures connected with its surface or subsurface, shall not create a right of ownership'.[164] This explicitly mentions the connection of installations to the surface of a celestial body beyond those of military or scientific character, and ensures that the non-territoriality principle remains intact. Yet its vehement rejection by the primary space powers renders the treaty essentially useless. This observation can be expanded to apply to the international realm generally. Creativity is vital within the law, to realise the breadth of human interaction with the unique and varied environments, both social and physical, on Earth and beyond. Without creativity to recognise the various interests of States, private actors and individuals, or the way these may interact, it will grow increasingly difficult to protect these rights. Otherwise, the foundational system may require dismantling, as the apparent legal contortionism to adapt existing principles to new situations grows increasingly inflexible.

Embracing creativity whilst maintaining the current overarching structure appears infinitely preferable. This is evident from the Artemis Accord's strenuous assertions that it will not offend the OST and the non-territoriality principle, at least while human space activity is still tethered directly to Earthly ground-based operations. As human

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[161] One Small Step to Protect Human Heritage in Space Act**;** NASA's *Recommendations to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artefacts'* .

[162] Prosper Weil, The Court Cannot Conclude Definitively . . . Non Liquet Revisited, 36 Colum J Transnat'l L 109 (1998), p 112.

[163] Agreement governing the activities of States on the Moon and other celestial bodies, 18th December 1979, 1363 U.N.T.S 22.

[164] Ibid., Art 11 (3).

activity grows more prolific and diverse, and the significance attributed alters, the question of whether existing law can be interpreted as applicable grows increasingly unlikely. Both of these examples emphasise the need for creativity, to traverse the lacunae created by the inherently creative way that individuals are engaging with outer space, beyond those predicted when States had sole usage.

5. Conclusion

The need to embrace creativity within the legal process is growing increasingly apparent in the face of this paper's research questions regarding finding a resolution to the extensive legal lacunae that have emerged within outer space law, as illustrated throughout this discussion. It is because of the innate diversity and creativity of human interaction that the law must therefore become creative. The OST's creative legal response has enjoyed enduring success and shaped the space sector. Yet as highlighted here, its stagnation in attempting to respect State sovereignty whilst failing to recognise a reduction in State led activity, paired with feats of impressive legal contortionism, have failed to rectify the extensive issues caused by this lack of creative problem solving, causing only additional confusion. It is necessary to be continually innovative and embrace the creative process within the legal process by opening discussion to which resolution would be appropriate, rather than which remedy existing precedent permits. Otherwise, major policy goals such as space tourism and human settlements will never be able to be realised successfully. It is through raising these points that the paper has emphasised how successfully development may occur despite these geopolitical influences, which are unlikely to lessen. Unless creativity is actively embraced into the law, Houston and the rest of society will have several monumental problems to contend with. It may be possible to put people on the Moon, but without creativity keeping them there will be too great a lacuna to leap.