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Sarah J. Fox
University of Leicester, Law School

Author(s) ORCID Identifier:

https://orcid.org/0000-0002-5317-4982

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SPACE '*TOURISM*' A FRAMEWORK FOR ENSURING '*SAFE AND ORDERLY DEVELOPMENT*' *LESSONS LEARNT FROM THE U.S. AND AVIATION*

Dr. Sarah Jane Fox*

ABSTRACT

In August 2023, following its successful mission, Virgin Galactic announced the intention to provide scheduled services into space. Yet, this paper sets out to present evidence to argue that, from an international (U.N.) perspective, there has been a lack of activity to establish safeguards and to ensure a fit for purpose governance and oversight mechanism is in place for this new and growing sector—*space tourism*. The research is undertaken by way of a comparison law/policy analysis which factors in key historic events across both aviation and space. The main focus is given to the developments and approach of the U.S.

The research finds that there remains a number of areas where clarity and advancement is needed both nationally (U.S.) and internationally; and that, without suitable governance and frameworks being established—safety is compromised, and equitability is not ensured for space tourists. It is advocated that there are clear lessons to be learnt from aviation developments and practices and that one solution would be a governance and oversight

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* Dr Sarah Jane Fox is an experienced academic, currently, at the University of Leicester (Leicester Law School) whilst she also researches with Space Park Leicester across the areas of (outer) space, aviation (including UAV's-drones) technology and related risks and challenges. Dr Fox is a visiting Professor at DePaul University, Chicago, Il. In 2015, she obtained a prestigious Fulbright (post-doctoral) Scholarship, through the discipline of law (which was also supported of Lloyd's of London) for 12-months (2015-2016) whereby she was a researcher within the International Aviation Law Institute (IALI), Chicago. Sarah has recently taken part in several U.N. events (UNOOSA and ITU) where she spoke on the opportunities, but also the risks and challenges of space and UAV's.

system as has been established by the International Civil Aviation Organization (ICAO).

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I. INTRODUCTION

The Space Market comprises of many sub-sectors and undertakings both on Earth and above us, in space.[1] One of the fundamental aspects remains transport, which ultimately provides the means to get into space and facilitate other activities[2]—including, depositing items (such as satellites) within various orbits.[3] It is also essential to the developing *space tourism* sector.

Humankind has always had a "thirst for adventures,"[4] and it is not surprising perhaps that the opportunities of space pursuits have extended into the realms of tourism, including a protracted

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[1] Alina Orlova, Roberto Nogueira & Paula Chimenti. *The Present and Future of the Space Sector: A Business Ecosystem Approach*, 52 Space Pol'y 1, 1 (2020).

[2] Sam Spector, James E.S. Higham & Stefan Gössling, *Extraterrestrial transitions, Desirable transport futures on earth and in outer space*, 68 Energy Rsch. & Soc. Sci., 1, 1 (2020).

[3] *See generally* Sarah Jane Fox, *The evolving 'Space' in the EU: A Circular Journey*, 48 Annals of Air and Space L. (2024).

[4] Sarah Jane Fox, *SPACE: The race for mineral rights 'The sky is no longer the limit' Lessons from Earth!*, 49 Res. Pol'y, 165, 165–78 (2016); Sarah Jane Fox, '*Exploiting – land, sea and space: Mineral Superpower' In the name of peace: A critical race to protect the depths and heights*, 79 Res. Pol'y, 103066, (2022); Ayşe Meriç Yazicia, Satyam Tiwarib, *Space tourism: An initiative pushing limits*, 3 Tol. J. Tourism, Leisure, & Hosp., 38, 38–46 (2021).

stay at the International Space Station (ISS) and a short trip into space.[5]

It is often cited that Barron Hilton—the former president of the Hilton Hotel chain—was futuristic in terms of planning a hotel on the Moon, even before Neil Armstrong had set foot on the Moon. In 1967, speaking at an American Astronomical Society Conference, Hilton commented, "[s]carcely a day goes by when someone doesn't ask me, jovially, when the Lunar Hilton is going to be opened. They're joking, of course—but I don't see it as a joke at all."[6]

That said, it remains questionable as to whether there are limitations or prohibitions in regarding actually putting a physical structure on the Moon (or a planet or other 'celestial body') in terms of international agreements to allow this. And, hence, while there are some international treaties governing space pursuits these remain both subject to interpretation and ultimately agreement. In other areas relating to space, it could also be said, that no regulations or governance exist.

While, in Europe it was as early as 1954 that Thomas Cook had sought to provide tickets for a commercial flight to the Moon.[7] The Cook "Moon Register" was a list created for enthusiasts to sign-up for a commercial trip to the Moon, with the company—Thomas Cook—guaranteeing to provide tickets at the earliest possible date.[8] Today it is not only feasible but achievable to reach the Moon and hence, to undertake a flight into space.

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[5] *See* Yazicia & Tiwarib, *supra* note 4, at 40. There have been a number of Russian and other wealthy persons who visit the ISS for a number of years, including, in 2001, Dennis Tito who became the first American space tourist, reportedly paying Russia $20 million (£16 million) to fly to the International Space Station, where he spent a week. *See* Ankit Kumar et al., *Legal conundrums of space tourism*, 184 Acta Astronautica, 269, 269–73 (2021). On October 11, 2008, Richard Garriott, an American computer game millionaire, boarded a Russian *Soyuz* spacecraft for a ten-day trip to the International Space Station. *See id.* And, a year later, Guy Laliberté, a Canadian billionaire and owner of the famous *Cirque du Soleil*, also travelled on board a Russian *Soyuz TMA 16* spacecraft to the International Space Station, where he spent eleven days in orbit. *See id.*

[6] Jacopo Prisco, *Hilton's bizarre 1967 plan for a space hotel*, CNN (June 7, 2021), https://edition.cnn.com/travel/article/hilton-hotel-on-moon-scn-cmd/index.html [https://perma.cc/E66X-B2Z2].

[7] *See* Fabian Eilingsfeld & Sven Abitzsch, *Space Tourism for Europe: a Case Study*, Space Future (Oct. 1993).

[8] *See id.*; *see also* Yi-Wei Chang & Jeng-Shing Chern, *Ups and downs of space tourism development in 60 years from moon register to spaceshiptwo crash*, 127 Acta Astronautica, 533, 533–41 (2016).

Invariably, from day one—humankind's first flight into space—it could be postulated that the development of the space tourism segment should have been viewed as inevitable.

On Thursday, August 10, 2023, this therefore expected development took a further step forward when Virgin Galactic announced that it had taken its "first [paying] tourists to [the] edge of space."[9] Following the success, the Virgin group was reported to have joined the ranks of Jeff Bezos' Blue Origin and Elon Musk's SpaceX in the space tourism business. Maximizing on the achievement, the Virgin group also announced its intention to offer monthly (scheduled) trips to space in the not-too-distant future.[10]

Yet, this paper sets out to present evidence to argue that, from an international (U.N.) perspective, there has been a lack of activity to establish safeguards and to ensure a fit for purpose governance and oversight mechanism is in place for this new, and set to be growing, sector—*space tourism*. This is hampered, furthermore, due to the lack of definitions and agreements in respect of operational domains and jurisdictions.

Presently, for now, the space tourism segment is largely contained within the United States (U.S.), which has slowly been putting national scaffolding and mechanisms in place to strengthen the shortfalls that exist at an international level. In doing so, it has utilized or adapted legislation and procedures from the aviation domain. However, this, by and large, relates to national sovereignty measures, and therefore, it remains questionable whether this national approach is adequate and sufficient and, whether there are lessons and practices that should be built on from both an international, and even national perspective—in terms of ensuring a safe and sustainable mode and sector, as has occurred within the aviation sector.

A. Research Design–The Approach

This article is an analysis and comparative study reviewing the present position regarding space tourism, particularly considering the national and international regime that exists. Nationally, the primary focus of this research is the approach of the U.S., with the focal point being on the development and position of

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[9] *See* Niamh Lynch, *Virgin Galactic takes first tourists to edge of space - as British ex-Olympian calls flight 'most exciting day of my life'*, Sky News (Aug. 10, 2023), https://news.sky.com/story/virgin-galactic-takes-first-tourists-to-edge-of-space-12937379 [https://perma.cc/SQZ2-VVUD].

[10] *See id.*

the Federal Aviation Administration (FAA) across aviation and space. This will be done predominately from a legal and policy perspective, which intersects with historical coverage that charts the legal developments and overlaps with the aviation and space sector from a chronological perspective. In so doing, it factors in the best practices from both the U.S. and the national and international aviation sector.

Analytical commentary is provided, which draws conclusions and advocates needs for the future regarding the developing space tourism sector. Summarized, the flight path for this commentary is as follows. Section II considers space tourism, the opportunities alongside the challenges. It discusses some of the early visions for space tourism, while factoring in the projected market opportunities before identifying some of the risks associated with new travel and tourism ventures. Section III factors in the U.N. framework for space and considers the Outer Space Treaty—the Magna Carta of Space—before discussing the legal Subcommittee Working Groups, whilst providing commentary as to the challenges faced and the future needs for the space tourism sector. Section IV discusses the developments and approach of the U.S. in terms of both the aviation and the space sector. This includes historical contextualization relating to aviation alongside identifying the U.N. framework for aviation and key timelines and advancement of the U.S. Section V further considers and analyzes the U.S. advancements for space alongside related legislation and limitations applied for the fledgling space (tourism) sector—particularly relating to the liabilities regime for tourists. In doing so it also considers the needs for the future. Section VI presents a conclusion, drawing together the findings with summary discussions alongside advocating a possible way forward for advancement of the sector.

II. SPACE TOURISM: THE POTENTIAL–OPPORTUNITIES AND RISKS!

One of the primary challenges in regulating space tourism is the lack of a clear definition of what constitutes a 'space tourist,' which complicates establishing international agreements, alongside guidelines and standards for the industry. Furthermore, arguably, the separation between 'astronauts' and 'tourists' is also becoming complex[11]—given that all tourists going to space

[11] Francis Lyall, *Who is an astronaut? The inadequacy of current international law*, 66 Acta Astronautica, 1613, 1615 (2010).

could be deemed astronauts, while the likes of companies such as SpaceX are contracted to transport government-astronauts and commercial tourists to the International Space Station. However, even defining space, also, remains contentious.[12]

The U.S. Congress has been undeniably reticent to openly use the phrase space tourists, instead referring to such passengers as "space flight participants" perhaps to draw a parallel with that of a research subject—whereby one accepts the associated risks of such new forms of transport and tourism.[13]

The Cambridge dictionary defines space tourism as, "the activity of travelling into space for pleasure and interest, rather than as a job."[14] However, it has also been expanded to show the synergy to the air transport sector in terms of "space tourism [being viewed as] another niche segment of the aviation industry that seeks to give tourists the ability to become astronauts and experience space travel for recreational, leisure, or business purposes."[15] Certainly, it is a sector that is set to expand, however it is defined.[16]

Space tourism is presently available to a limited market due to the current high costs associated with this travel mode.[17] Hence, it is utilized by wealthy adventure seekers who are able to select from one of the limited service providers and provisions on offer. This said, the industry is expanding at a tremendous growth rate, largely due to technological innovations, coupled with users' disposition toward space adventures.[18]

"In 2022, the global space tourism market was valued at USD 695.1 million" and is expected to expand at a compound "annual growth rate [(CAGR)] of 40.2% from 2023 to 2030."[19] This said, predictions do vary significantly in terms of forecasting

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[12] Sarah Jane Fox, *Securing the "Space" Above Us: Reflections on the Past – to Consider Tomorrow's Challenges . . . Today*, 22 ISSUES IN AVIATION L. & POL'Y 35, 35 (2022).

[13] Commercial Space Launch Act of 1984, 51 U.S.C. § 50902(20). *See infra* note 90.

[14] *Space Tourism*, CAMBRIDGE DICTIONARY ONLINE, https://dictionary.cambridge.org/dictionary/english/space-tourism [https://perma.cc/D4CP-N9EC].

[15] ISAAC LEVI HENDERSON & WAI HONG KAN TSUI, THE ROLE OF NICHE AVIATION OPERATIONS AS TOURIST ATTRACTIONS 239 (2019).

[16] Derek Webber, *Space Tourism: Its History, Future and Importance*, 92 ACTA ASTRONAUTICA, 138, 140–42 (2013).

[17] *See* Webber, *supra* note 16, at 140.

[18] *See id.*

[19] *See The Future of Space Tourism*, EVONA, https://perma.cc/VGP8-DQV3; *see also Space Tourism Market Size, Share & Trends Analysis Report By Type (Orbital, Sub-orbital), By End Use (Government, Commercial), By Region, And Segment Forecasts 2023–2030*, RSCH. & MKTS., https://www.researchandmarkets.com/reports/5644945/global-space-tourism-market-size-share-and-trends [https://perma.cc/7MDR-2HBX].

the rate of growth and therefore potential, with one estimate identifying that the global space tourism market will "surpass around USD 3,884.18 million by 2032,"[20] as compared to another identifying that multi-billions could be achieved by 2030.[21] The development and growth would likely be down to the lowering of costs and the competition between new market entrants, which would certainly see an expansion, not only in the U.S. but across the globe.

Ironically, Thomas Cook and Virgin are quintessentially identified as British brands. Although the Virgin Group is extensive and consists of a number of enterprises owned through a complicated series of offshore trusts and overseas holding companies,[22] Virgin Galactic is the space tourism company founded by British billionaire businessman Richard Branson in 2004, although the name was registered even earlier.[23] It is, however, not a British but rather an American company, with its headquarters in California, and the operation largely being undertaken in New Mexico.[24] This, no doubt, reflecting the infrastructure and the experience the U.S. has in terms of space exploration and launches.

The Virgin brand (like Thomas Cook) is certainly no stranger to tourism and air travel, however, unlike aviation, from an international level, the space sector noticeably lacks governance and oversight that is needed to commence regular and frequent services.[25] And, whilst this may be perhaps manageable at the present time, largely due to national provisions put in place (within the U.S.), it will likely be unsustainable with more market entrants and hence competitors, from across the globe, joining the arena. This will also see variable crafts and vehicles competing to operate in space. The choice of a launch vehicle, ultimately, affects any profit, whilst also being significantly dependent upon

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[20] *See Space Tourism Market*, Precedence Rsch., (Jun. 2023), https://perma.cc/UE83-DJWY; Sarah Jane Fox, *Blueprint for the Carriage of Passengers . . . into Space: Lessons Learnt! (A comparative analysis)*, 23 Issues Aviation L. & Pol'y, 123–53 (2023).

[21] *See* Michael Sheetz, *How SpaceX, Virgin Galactic, Blue Origin and others compete in the growing space tourism market*, CNBC (Sept. 26, 2020), https://www.cnbc.com/2020/09/26/space-tourism-how-spacex-virgin-galactic-blue-origin-axiom-compete.html [https://perma.cc/AT59-FYMD].

[22] *Virgin Group Corporate Structure*, Federal Court of Australia.

[23] *Sir Richard Branson*, Concordia, https://www.concordia.net/community/sir-richard-branson/#:~:text=Space%20travel%20has%20been%20a,on%20the%20first%20space%20flight. [https://perma.cc/CZE4-MC4R].

[24] *Virgin Galactic*, Visit Las Cruces, https://www.visitlascruces.com/listing/virgin-galactic/294/ [https://perma.cc/74ZW-L7EV].

[25] Molly M. McCue, *A Regulatory Scheme for the Dawn of Space Tourism*, 55 Vand. J. Transnat'l L. 1087, 1099 (2022).

the operation, for example, the mass of the payload, and, also, on how far from Earth it intends to venture. A heavy payload or a higher altitude requires more power to battle Earth's gravity than would be required for lighter payload at a lower altitude.[26]

Presently, several recognized markets exist in terms of space travel and the height of operations, which are normally said to operate either within the suborbital or orbital domains. Moving forward, trips to the Moon and even to Mars are anticipated, which would see extensive travel within the orbital domain.[27] "The main difference between orbital and suborbital flight is the [power and, hence,] speed at which a vehicle" is able to and needs to travel, and, therefore, the ability to be able to undertake a chosen orbit.[28] "An orbital spacecraft must be able to achieve what is known as 'orbital velocity,'" "the speed that an object must maintain to remain in orbit around" an object (normally, in this case, a planet—Earth); whereas, "a suborbital rocket flies at a speed below that"—they also normally operate therefore at a lower altitude, and do not undertake an orbit.[29]

It is suborbital tourism[30] which is first likely to experience the market growth in space tourism in the short term and is therefore the main focus of this paper.[31] A spacecraft in the suborbital domain follows a parabolic trajectory, wherein microgravity is experienced before returning to Earth. Operators use various craft and utilize various altitudes for suborbital tourism.[32] For example, Virgin Galactic uses a vehicle called a spaceplane that is launched in mid-air from a more traditional carrier-based plane at an altitude of about 9.4 miles (15km). Its rocket then fires the craft and its crew into sub-orbital space at least 50 miles (80km) above

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[26] *See Types of orbits*, European Space Agency (Mar. 3, 2020), https://www.esa.int/Enabling_Support/Space_Transportation/Types_of_orbits [https://perma.cc/G57Q-SZPY].

[27] Patrick Collins, *Space tourism: From Earth orbit to the Moon*, 37 Advances Space Rsch., 116, 116–18 (2006).

[28] Comm. on the Peaceful Uses of Outer Space, The definition and delimitation of outer space, U.N. Doc. A/AC.105/C.2/L.303 at 4 (2018).

[29] *See* Adam Mann, *What's the difference between orbital and suborbital spaceflight*, Space (Feb. 10, 2020), https://www.space.com/suborbital-orbital-flight.html# [https://perma.cc/T47C-WTCQ].

[30] Derek Webber, *Point-to-point sub-orbital space tourism: Some initial considerations*, 66 Acta Astronautica, 1645, 1645 (2010).

[31] William A. Gaubatz, *Sub-orbital flights, a starting point for space tourism*, 51 Acta Astronautica, 647, 647 (2002).

[32] Edd Gent, *What is suborbital flight? (And why do we care)*, Live Science, https://www.livescience.com/what-is-suborbital-flight.html [https://perma.cc/A897-J7KK].

Earth.[33] This allows passengers to experience approximately five minutes of weightlessness.[34] Blue Origin, on the other hand, uses a more traditional rocket system called the *New Shepard* which ascends vertically and takes its passengers approximately 62 miles above Earth.[35] Travelers also enjoy a few minutes of weightlessness, while part of the unique selling point (USP) for this mode and operator is said to be the opportunity of looking out their own windows which is the largest of all providers on the market.[36] The capsule then glides back down to Earth.[37]

The ability to get into orbit and remain there is both far more challenging and therefore costly. Space X, for example, is one of the few operators providing this service currently in terms of space tourism.[38] It uses a powerful, traditional rocket system, its Falcon 9 rocket and Crew Dragon capsule, which has previously shuttled NASA astronauts to the ISS.

However, all operations have the similarity of starting from the terrestrial domain, which is where Earth-based infrastructure and systems are utilized at the commencement of the space operations. The journey is also further supported by space systems and technology, such as satellites. Invariably, terrestrial operations are critical for the success of all space-based activities, as they enable the launch, the control, and the monitoring of the space vehicle. Likewise, the journey into space necessitates going through the airspace.

All travel modes carry a significant number of risks, and this is certainly so, in terms of new and evolving systems such as spacecraft, and other vehicles, that enter space.[39] Shortly before Virgin Galactic's August 2023 success, tragedy struck at the other end of the spectrum, when Titan—a submersible—imploded the Atlantic Ocean when it too was looking to enter into a new area

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[33] *Virgin Galactic*, WIKIPEDIA, https://en.wikipedia.org/wiki/Virgin_Galactic#:~:text=The%20company%20develops%20commercial%20spacecraft,with%20its%20VSS%20Unity%20spaceship [https://perma.cc/F2V8-HVXG].

[34] *See* Fox, *supra* note 20 at 123–53.

[35] *Blue Origin*, WIKIPEDIA, https://en.wikipedia.org/wiki/Blue_Origin [https://perma.cc/E2P9-AK99].

[36] *Id.*

[37] *See id.*

[38] *Falcon 9 First Orbital Class Rocket Capable of Reflight*, SPACEX, https://www.spacex.com/vehicles/falcon-9/ [https://perma.cc/CQD7-ANMQ].

[39] *See id.; see also* Jonathan Clark & Scott Parazynski, *194 Disasters in Space Travel: From Earth to Orbit, and Beyond*, CIOTTONES DISASTER MEDICINE, 1002, 1002–05 (Gregory Ciottone ed., 3rd ed. 2024);

of tourism—visiting the Titanic on the seabed.[40] Invariably, all it would take is one similar accident where fee-paying passengers are being carried to affect the potential growth of the space tourism sector.[41] Accidents will happen, but it is known that there are various methods to mitigate risks through the application of robust systems, practices and processes, which frequently necessitate legislation.[42] For transport modes this often requires international input to ensure consistent safety approaches are in place, as is the case in the civilian aviation sector. Yet, internationally, the U.N. has not adopted a similar approach to space (and space tourism) and advanced the original framework from a similar transport perspective.[43] This includes agreements and consensus in terms of do's and don'ts and operational procedures and practices requirements, including even the simplest concept of defining similarities and differences between modes and uses.

III. THE U.N. FRAMEWORK–*OOSA AND COPUOS*

The history of the Office for Outer Space Affairs (UNOOSA) is linked to the first space race; and, in 1959, the Committee on the Peaceful Uses of Outer Space (COPUOS) was set up by the General Assembly to govern the exploration and use of space for the benefit of all humanity with a focus on "peace, development and security."[44] While UNOOSA was initially created as a small expert unit within the United Nations Secretariat to service the ad-hoc Committee on the Peaceful Uses of Outer Space,[45] it has since undergone a number of developments, including, in 1993, being relocated to the U.N. in Vienna.[46] At that time, the Office also assumed responsibility for substantive secretariat services to the Legal Subcommittee, which had previously been provided by the Office of Legal Affairs in New York.

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[40] *See id.* at 1002–05; Fox, *supra* note 20, at 123–53.

[41] *See* Fox, *supra* note 20, at 123.

[42] *See id.*; *see also* J.W. Seastrom et al., *Risk management in international manned space program operations*, 54 ACTA ASTRONAUTICA, 273, 273–79 (2004).

[43] *See* Qijia Zhou, *The U.N.'s Role in Interplanetary Protection*, HARV. INT'L REV. (Jan. 31, 2022), https://hir.harvard.edu/the-uns-role-in-planetary-protection/ [https://perma.cc/SW9J-DGJT].

[44] J.W. Seastrom et al., *Risk management in international manned space program operations*, 54 ACTA ASTRONAUTICA, 273, 273–79 (2004).

[45] G.A. Res. 1348 (XIII), ¶ 1 (Dec. 13, 1958).

[46] *History*, U.N. OFF. OUTER SPACE AFFS., https://www.unoosa.org/oosa/en/aboutus/history/index.html#:~:text=The%20unit%20was%20moved%20to,the%20Department%20for%20Political%20Affairs [https://perma.cc/TG8K-7HBZ].

A. The Magna Carta of Space

It was COPUOS which was instrumental in the creation of the five treaties and five principles of outer space.[47] The first, the 1967 Outer Space Treaty (OST),[48] has often been referred to the "Magna Carta" for space, setting down key principles.[49] In this regard, COPUOS could be deemed to have been proactive, as well as responsive to the competitive nature and associated risks, in what was the Cold War period of tension between the U.S. and (the then) USSR.[50] There was the far-sightedness to ensure that certain protections regarding space were put in place. Whilst, conversely, it could also be viewed from the contrary perspective, namely, in terms of being very limited. Since the OST only served to provide a basic framework, applicable only to the formative years of space; and therefore, it lacked the foresight to predict or anticipate certain (perhaps even obvious) developments—such as more frequent travel, or even tourism into space.

In terms of principles enshrined within the OST, and relevant to the scope of this paper, it was stated that "the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind" and that "outer space shall be free for exploration and use by all States."[51] In terms of international relations, more specifically, staking a claim it is identified that, "outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means," while "the Moon and other celestial bodies shall be used exclusively for peaceful

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[47] *See Space Law Treaties and Principles*, U.N. Off. Outer Space Affs., https://www.unoosa.org/oosa/en/aboutus/history/index.html#:~:text=The%20unit%20was%20moved%20to,the%20Department%20for%20Political%20Affairs [https://perma.cc/J3ZU-YZ8M].

[48] *See* Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty]. The Treaty was considered by the Legal Subcommittee in 1966 and agreement was reached in the General Assembly in the same year (resolution 2222 (XXI)). *See* G.A. Res. 2222 (XXI) (Dec. 19, 1966). The Treaty was largely based on the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, which had been adopted by the General Assembly in its resolution 1962 (XVIII) in 1963, but added a few new provisions. *See id.*

[49] *See, e.g.*, E.R. Finch, *Magna Charta of Outer Space for all nations*, 11 Acta Astronautica 337, 337 (1984); He Qizhi, *The Outer Space Treaty in Perspective*, 25 J. Space L. 93, 93 (1997).

[50] *See Space Law Treaties and Principles, supra* note 47.

[51] Outer Space Treaty, *supra* note 48, at art. I.

purposes.[52] Liability attaches to States as well, insomuch as it is identified that "[s]tates shall be responsible for national space activities whether carried out by governmental or non-governmental entities" and "[s]tates shall be liable for damage caused by their space objects."[53] Finally, "[s]tates shall avoid harmful contamination of space and celestial bodies."[54]

Outside of the OST, there are another four principal U.N. space treaties.[55] These include: the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space 1968 (Rescue Agreement);[56] the Convention on International Liability for Damage Caused by Space Objects 1972 (Liability Convention);[57] the Convention on Registration of Objects Launched into Outer Space 1975 (Registration Convention);[58] and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies 1979 (Moon Agreement).[59]

Today, COPUOS identifies that part of its role is to aid countries to understand the fundamentals of international space law and to increase their capacity to draft or revise national space law and policy in line with international normative frameworks on space, which UNOOSA stresses is a significant aspect, since more and more actors are entering the space arena.[60] Alongside this, the Committee acknowledges that there are rapid advances in space technology, and that the space agenda is

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[52] *Id.* at art. II, IV.

[53] *Id.* at art. VI.

[54] *Id.* at art. IX.

[55] *See Space Law Treaties and Principles*, *supra* note 47.

[56] The "Rescue Agreement" (RA) opened for signature on 22 April 1968, entered into force on 3 December 1968. Adopted by the General Assembly in its resolution 2345 (XXII). *See id.*

[57] The "Liability Convention" (LC) opened for signature on 29 March 1972, entered into force on 1 September 1972. Adopted by the General Assembly in its resolution 2777 (XXVI). *See id.*

[58] The "Registration Convention" (RC) opened for signature on 14 January 1975, entered into force on 15 September 1976. Adopted by the General Assembly in its resolution 3235 (XXIX). *See id.*

[59] The "Moon Agreement" (MA) opened for signature on 18 December 1979, entered into force on 11 July 1984. Adopted by the General Assembly in its resolution 34/68. *See id.*

[60] The scope is to "assist any United Nations Member States to establish legal and regulatory frameworks to govern space activities," alongside, "strength[ening] the capacity of developing countries to use space science technology and applications for development by helping to integrate space capabilities into national development programmes." *About Us*, U.N. Off. Outer Space Affs., https://www.unoosa.org/oosa/en/aboutus/index.html [https://perma.cc/6DCP-MHAZ].

constantly evolving.[61] This said, it is debatable whether COPUOS has kept pace legally with the technology advancements that have occurred, in particular, relating to the development of craft/vessels (that are to be used for space travel) alongside the regulations needed for (space) travel/tourism at an international level, including in terms of customer safeguards and other protective mechanisms.

In essence, commentators contend that space governance is now failing the safe development of space, and that the existing multilateral conventions and treaties have repeatedly proven ineffective at managing today's international space activities.[62] This could be argued from various stances, not least either the reluctance to refine and even define the existing structure, and/or extend the current space governance framework. Invariably, there has been a lack of pro-activity in advancing certain sectors—such as space tourism, that is, from the perspective of ensuring consistency and putting safety at the forefront of expeditions.

Arguably, UNOOSA has applied a detrimental approach of allowing "States [to] be [overly] responsible for national space activities (whether carried out by governmental or non-governmental entities)" and thus leading to an internationally unregulated and insufficiently protected space—certainly from the perspective of civilian passengers (tourists) which are set to become part of this evolving market.[63] Ultimately, this stands to compromise the safety and equity of space tourism.

B. Legal Subcommittee–Working Groups

This said, COPUOS has both a Legal Subcommittee and a Scientific and Technical Subcommittee and under both sit various working groups (WGs).[64] Part of their role is to consider studies that can be undertaken connected to space-related activities, with no doubt the intention of advancing space pursuits and ensuring that the correct support is put in place.[65]

In this regard, naturally, there remains considerable overlap across both the Legal and Scientific and Technical Subcommittees, and across the various working group.[66] Hence, this could be

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[61] *See id.*

[62] *See* Fox, *supra* note 20, at 123–53.

[63] *See infra* note 75.

[64] *Working Groups*, U.N. Off. Outer Space Affs., https://www.unoosa.org/oosa/en/ourwork/copuos/working-groups.html [https://perma.cc/VWZ2-CHGH].

[65] *See id.*

[66] *See id.*

seen as both an enabler, or an inhibitor to progress, depending upon the communications and actions taken between the Subcommittees and various WGs.

COPUOS Legal Subcommittee WGs address a broad range of areas, where advancements are needed.[67] These groups include: (1) the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space;[68] (2) the Working Group on the Definition and Delimitation of Outer Space;[69] (3) and the Working Group on Legal Aspects of Space Resource Activities.[70] Analysis of the three working groups would tend to indicate that there is still considerable work to be achieved, which could manifest to significant challenges for space tourism, unless addressed.

In relation to the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space, it should be noted that reference is made to the States and to existing U.N. instruments, whilst it is clear that there has been a lack of advancement in ensuring specific U.N. provisions are in place—for example, provisions that specifically address the current realms of passengers' traveling into space as tourists, alongside the standards and safety requirements relating to the various crafts that can be used by private entities for this purpose.[71] Likewise, the reference to fault and damage relates, again, only to existing instruments, which arguably lack the precision needed for travel/tourism activities as occurs in other transport areas—such as aviation.[72]

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[67] *See id.*

[68] Part of this working group's role is to consider the application and implementation of the concept of the launching State; including, issues relating to the implementation of the mechanisms for responsibility and liability of States parties to the U.N. treaties on outer space activities, including the notions of fault and damage under the U.N. instruments; and on issues related to the registration of space objects, including their ownership, jurisdiction, and control. *Working Group on the Status and Application of the Five United Nations Treaties on Outer Space*, U.N. Off. Outer Space Affs., https://www.unoosa.org/oosa/en/ourwork/copuos/lsc/wg-tre/working-group-on-tre.html [https://perma.cc/C63Y-NHUA].

[69] Part of this working group's scope is to consider various matters relating to defining aspects such as outer space and, hence its limits. It considers factors such as information on national legislation and practices relating to the definition and delimitation of outer space. It also deliberates on issues relating to suborbital flights for scientific missions and/or for human spaceflight. *Id.*

[70] This working group was established under the Legal Subcommittee agenda item "*General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources*" and, hence, the group covers this remit. *Id.*

[71] *See* Fox, *supra* note 20, at 123–53.

[72] *See id.*

While, considering the Working Group on the Definition and Delimitation of Outer Space, there still remains various interpretations of space, in particular, where it begins—which affects not only jurisdictions but associated legislation also.[73] This lack of consensus and ambiguity has been identified for a number of years, and will become more problematic moving forward, particularly if the transport mode (however defined) increasingly operates not only in the (sub)orbital domains but in the airspace too. Hence, there remains the need to denote the boundary between sovereign territory and territory deemed to be the "common heritage of [hu]mankind."[74]

Advocating more applications and direction to national laws is questionably not the way forward, it is notably thwart with challenges that could arise, particularly given the ambiguity in identifying where 'international space' begins and what countries are nationally able to legislate for in such a space.[75] This will also lead to variable approaches and standards being adopted by Member States, and, particularly so, in respect to suborbital flights involving (human) tourism, where there is due to be significant growth in a matter of years. This therefore equates to an urgency to address some of these matters. The almost total lack of a legal framework to regulate space traffic and movements creates physical risks and, also, the risk of disputes.

Space activities require geographical control to enter space—which is currently interpreted as coming within national/sovereign controls and hence is subject to differing interpretations.[76] The definition and delimitation of space is hence needed to clarify each user's rights and obligations, while legal stability would also aid to ensure that economic opportunities are managed in a safe and consistent manner. In essence, from an international perspective, space remains insufficiently regulated (and even defined) at the present time, which hinders the development and aspirations for regular-scheduled movements into space.

The Working Group on Legal Aspects of Space Resource Activities remains key, as there needs to be ongoing and heightened discussions that seek to achieve a resolution in terms of

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[73] Fox, *supra* note 12, at 35.

[74] G.A. Res. 34/68, annex, Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Dec. 5, 1979).

[75] *See* Comm. Peaceful Uses of Outer Space, Matters related to the definition and delimitation of outer space, U.N. Doc. A/AC.105/C.2/2022/CRP.24 at 3 (2022).

[76] *Id.*

regulating more specific space activities—such as space tourism. This will need to include related factors and allied sectors, such as aviation, and the management of space. While the scope will need to include limitations and controls that will perhaps need to be applied as more traffic inevitably is set to go into space. And of course, this stands to have continued implications to airspace (even when a spacecraft is not engaged in a tourism activity). If, as has been proposed, these two sectors—space travel and air travel—potentially merge in the future, with long-distance air travel utilizing higher sub-orbital realms[77] there could be even more challenges to address in terms of jurisdictions and control of operations.

It is therefore contended that the U.N., in the form of OOSA/COPUOS, has debatably been slow to build on its 1950's origins in terms of a proactive start to space, and, it has not kept pace with sector advancements—such as the growing area of space tourism. No doubt, this is due to the reluctancy (or even inability) of national States to collectively address such issues, and to agree on the approach needed. Arguably, as a consequence, there remains a need for the UNOOSA/COPUOS to intensify discussions, whilst working more closely with adjacent sectors, in particular aviation, and key players, such as the International Civil Aviation Organization (ICAO). This approach should also factor in the policies, practices, and legislation, already being implemented by nations such as the U.S. who have additionally recognized the synergy to aviation and the need to adapt, many of the established practices emanating from this mode of travel.

This would necessitate the UNOOSA taking onboard States' evolving approaches and considering the best practices of nations in order to achieve a more sustainable and safe future, which will invariably also require a more uniform approach being adapted. In terms of space vehicles, it is argued that the U.N. has not factored in technological changes and the pace of the advancements—namely, the fact that space tourism is now a reality. Likewise, it has not considered the protections that need to be put in place for passengers.

There can be little doubt that the U.S., in particular, has been proactive, and, at times, reactive in putting practices, procedures and legislation into place.[78] Whilst there are also clearly lessons to be learnt from ICAO, which is a U.N. specialized agency (or

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[77] *See* Fox, *supra* note 12, at 35.

[78] *See, e.g.*, H.R. REP. NO. 104-793, at 6–7 (1996).

organization) that was established to help nations share their skies to the mutual benefit of nations.[79] Hence there are similarities with space in this regard in terms of precedence for the U.N. to be more actively involved—yet, unlike space, the aviation sector has continued to be proactive in terms of ensuring a safe and supportive infrastructure across nations.[80] Inevitably, with the development of space travel, part of the skies will become more saturated territory, as space vehicles will need to pass through this airspace. From an aviation perspective, ICAO has previously expressed concerns as to this growing segment and the lack of governance and oversight, which could, moving forward, stand to compromise their services.[81] The disintegration of the Space Shuttle Columbia on re-entry in 2003 is known to have almost caused an aviation accident, and as ventures into space increase, so does the risk to aircraft.[82]

IV. THE U.S.–PROACTIVITY IN AIR AND SPACE

The U.S. has ratified four out of the five principal U.N. space treaties, with the exception being the Moon Agreement.[83] And, since its early involvement in space ventures, the U.S. has been proactive and forward thinking in terms of developing its own national framework. This noticeably commenced with the 1958 National Aeronautics and Space Act, which, significantly, created the National Aeronautical and Space Administration (NASA).[84]

The long title of the Act relates further to the aims of the U.S. government (at that time), namely, to "provide for research into problems of flight within and outside the earth's atmosphere,

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[79] *Convention on International Civil Aviation*, WIKIPEDIA, https://en.wikipedia.org/wiki/Convention_on_International_Civil_Aviation [https://perma.cc/D35G-SLY9].

[80] *See Current list of parties to multilateral air law treaties*, ICAO, https://www.icao.int/secretariat/legal/Pages/Parties.aspx#InplviewHashb9c18929-1759-4682-b2d0-65a1a524c0c7=Paged%3DTRUE-p_ID%3D259-PageFirstRow%3D31 [https://perma.cc/F7KY-D2PQ].

[81] *See* Fox, *supra* note 20.

[82] *See* COLUMBIA ACCIDENT INVESTIGATION BD., THE CAIB REPORT - VOLUME 1, 6 (2003); William Ailor, Paul Wilde, *Requirements for Warning Aircraft of Reentering Debris*, 3RD INTERNATIONAL ASSOCIATION FOR THE ADVANCEMENT OF SPACE SAFETY CONFERENCE (2008); Russell Patera, *Risk to Commercial Aircraft from Reentering Space Debris*, Atmospheric Flight Mechanics Conference and Exhibit, AM. INST. AERONAUTICS ASTRONAUTICS (Aug. 20, 2006).

[83] *International Space Law: United Nations Instruments*, U.N. OFF. OUTER SPACE SPACE AFFS. (May 2017).

[84] The National Aeronautics and Space Act of 1958, Pub. L. No. 85-668, 72 Stat. 426, 426 (1958).

and for other purposes."[85] Hence, from the early days of space activities, the U.S. significantly acknowledged the linkage to other forms of flight, namely aviation and the use of the airspace. The U.S. also recognized that there would be associated *problems* and, hence, *risks* associated with space flights.[86] In tackling some of these issues, the U.S. sought to build upon its experiences and the guidance and developments occurring internationally in terms of aviation.

A. National and International Unity: A Framework For Aviation

From the outset, the U.S. had been proactive in terms of establishing national mechanisms and a framework, some years earlier, for aviation. In doing so, it worked in unison with the international community, both adopting joint approaches but also being influential in leading in advancements and innovation.

There are several key events and developments to note, firstly, the 1925 Air Mail Act, which was far more expansive than the name suggests—as it charged the Secretary of Commerce with fostering air trade, issuing and enforcing air traffic rules, licensing pilots, certifying aircraft, establishing airways, and operating and maintaining aids to air navigation.[87] It also facilitated the creation of a profitable commercial airline industry, and the establishment of airline companies such as Pan American Airways.[88] Running parallel to this however, there were international conventions and agreements being established for aviation.[89] These stem back to 1919 and the development of the Paris International (Air) Convention,[90] which also created the International Commission for Air Navigation (ICAN)—the forerunner of ICAO.[91] ICAN was tasked to meet at least once a year in relation to technical matters, and, an international committee of jurists was also established, to consider the intricate legal questions created by cross-border aviation.[92]

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[85] *International Space Law: United Nations Instruments*, *supra* note 71.

[86] *See* Pub. L. No. 85-668, § 102(c), 72 Stat. at 427.

[87] *A Brief History of the FAA*, Fed. Aviation Agency (Nov. 15, 2021), https://www.faa.gov/about/history/brief_history [https://perma.cc/Y8XY-V7HY].

[88] *Id.*

[89] *Id.*

[90] Convention Relating to the Regulation of Aerial Navigation, Oct. 13, 1919, 11 L.N.T.S. 297.

[91] *Id.*

[92] *The Postal History of the ICAO*, Int'l Civ. Aviation Org., https://applications.icao.int/postalhistory/international_aviation_organizations_working_alongside_ican_part_1.htm [https://perma.cc/G5Z5-RH6T].

However, the U.S. was further proactive in also considering safety implications, whilst recognizing the value that this growing sector had to the nation. In 1931 a high-profile air crash killed all on board and led to the public call for greater federal oversight of aviation safety.[93] By 1934, the Department of Commerce renamed the Aeronautics Branch the "Bureau of Air Commerce" to reflect the importance of aviation to the nation.[94] One of the first acts undertaken was to charge the airlines with establishing the first air traffic control centers to ensure safe navigations.[95]

By the mid-1930s, the U.S. had four major domestic airlines (United, American, Eastern, and Transcontinental and Western Air (TWA)) that dominated commercial travel for most of the 20th century.[96] In many ways, this is replicated in terms of the dominance of the key U.S. space players, albeit from a noticeably private sector stance.

Within a matter of years, President Franklin Roosevelt signed the Civil Aeronautics Act (1938) which established the independent Civil Aeronautics Authority (CAA).[97] This resulted in the Air Safety Board that would conduct accident investigations and make recommendations for preventing accidents.[98] In 1940, President Roosevelt split the CAA into two agencies, the Civil Aeronautics Administration, which went back to the Department of Commerce, and the Civil Aeronautics Board (CAB).[99]

The war years (1939–1945) led to significant advancements for aviation in terms of the technological developments.[100] It was also key in establishing the present Convention for aviation, which was reached when the war was still not concluded.[101] This was the 1944 Convention on International Civil Aviation (also known as the Chicago Convention).[102]

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[93] Scott Stahl, *The Evolution of Aviation Safety*, Aerocrew News (Dec. 6, 2016), https://aerocrewnews.com/education-2/safetywx/safety-matters/the-evolution-of-aviation-safety/ [https://perma.cc/5Z2D-Z25V].

[94] *Id.*

[95] *A Brief History of the FAA*, *supra* note 87.

[96] *Id.*

[97] *Id.*

[98] *Id.*

[99] *Id.*

[100] *Id.*

[101] *The History of ICAO and the Chicago Convention*, Int'l Civ. Aviation Org, https://www.icao.int/about-icao/History/Pages/default.aspx [https://perma.cc/XDY5-7NMR].

[102] Convention on International Civil Aviation, Dec. 7, 1944, 5 U.N.T.S. 295.

1. The Chicago Convention

The Chicago Convention is over twenty years older than the OST and although it has not been updated since 1944, annexes have been added and refined over time.[103] Presently, there are 193 contracting States to the Convention, who cooperate to adopt standards, practices, and policies for international civilian flights.[104] In comparison there are 114 parties to the OST,[105] with the latest ratifier being Panama as of August 9, 2023.[106]

ICAO was created as a consequence of the Convention—its role is focused on promoting the "safe and orderly" development of international civil aviation throughout the world.[107] Alongside this, industry and civil society groups, as well as relevant multilateral organizations, contribute to the ICAO outcomes as "Invited Organizations."[108]

Today, there are nineteen Annexes to the Chicago Convention, covering multiple safety matters—across a variety of areas, such as personnel, airworthiness of aircraft, aerodromes, air traffic services, etc.[109] While Annex 13—entitled "Aircraft Accident and Incident Investigation"—emphasizes the need for thorough investigations, in order to identify the cause of an accident or incident,[110] it also identifies that the objective of investigating an accident, or incident, is ultimately on future prevention and not on blame.[111] As part of the related obligations, ICAO Member States are required to report accidents and serious incidents in accordance with Annex 13 through the ICAO Accident/Incident Data Reporting (ADREP) system.[112] There are another eighty-

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[103] *Id.*

[104] *Backgrounder - Convention on International Civil Aviation and its annexes*, GOV. CA (Jan. 8, 2024), https://www.canada.ca/en/global-affairs/news/2024/01/backgrounder—convention-on-international-civil-aviation-and-its-annexes.html [https://perma.cc/SX7Z-Q5Z9].

[105] There are another 89 countries that have signed it but have not yet completed ratification. *See Outer Space Treaty*, *supra* note 48.

[106] *Id.*

[107] *Safety*, INT'L CIV. AVIATION ORG, https://www.icao.int/safety/Pages/default.aspx [https://perma.cc/268Z-C36F].

[108] *Invited Organizations*, INT'L CIV. AVIATION ORG., https://www.icao.int/about-icao/Pages/Invited-Organizations.aspx [https://perma.cc/NYV8-2PPR].

[109] *See Convention on International Civil Aviation*, *supra* note 79.

[110] *Annex 13 - Aircraft Accident and Incident Investigation*, INT'L CIV. AVIATION ORG., https://applications.icao.int/postalhistory/annex_13_aircraft_accident_and_incident_investigation.htm [https://perma.cc/TP4Y-FWAM].

[111] *Id.*

[112] *Id.*

nine countries that have signed it but have not yet completed ratification.[113]

ICAO also develops programs, guidance materials, and closely integrated auditing, training, and implementation support initiatives to help countries benefit and prosper from their improved compliance with global norms.[114] Over time, ICAO has adopted a multi-layered system of oversight relating to aviation safety,[115] which includes national, regional and international perspectives. Part of this entails ensuring standardized minimum standards for commercial aviation operations.[116]

In addition to the Chicago Convention, there have been a number of related international developments and agreements for civil aviation covering a whole array of areas. Aviation, by its very nature, is largely international, as the mode crosses boundaries and borders entering foreign territories where different private laws apply. This results in complexity as to which law would be applicable to citizens traveling onboard, or who has liability if a foreign aircraft causes damage to third parties on the surface—for example, if part of the aircraft or the aircraft falls onto the territory below. Hence, it has been established that unification of law is the only method to remove such conflicts.[117] While some of the same approaches have been applied to space pursuits, for example, the 1972 Convention on International Liability for Damage Caused by Space Objects, by comparison with commercial air travel, space remains sorely lacking in terms of international agreements for today's developments and those envisaged for the near future, for example, protections and a compensatory redress mechanism for paying passengers engaging in space tourism.[118] Again, here there are clearly lessons to be learnt from the aviation sector.

During the formative years of cross-border aviation, in the 1920s, the French attempted to adopt national laws relating to

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[113] *Id.*

[114] *Id.*

[115] Sarah Jane Fox, *Aviation: A Risky Business. Green and Level Playing Fields? A Paradox of Virtues 'Dumping' - Anti-Competitiveness!*, *in* LEGAL RISK MANAGEMENT, GOVERNANCE AND COMPLIANCE: INTERDISCIPLINARY CASE STUDIES FROM LEADING EXPERTS 4 (Stuart Weinstein & Charles Wild eds., 2016).

[116] *Id.*

[117] *See, e.g.*, S.A. Bayitch, *Unification of Aviation Law in the Western Hemisphere*, 19 UNIV. MIAMI L. REV. 535, 537 (1965).

[118] *Convention on International Liability for Damage Caused by Space Objects*, U.N. OFF. OUTER SPACE, https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliability-convention.html [https://perma.cc/YQM3-YARK].

a liability regime with respect to carriage by air but soon realized the complexity of doing so—due to the foreign element of travel,[119] leading to the establishment of a body of legal experts appointed by different governments but acting in their individual capacity. The remit was extended beyond the original initiative of the French government, in dealing with not only problems of liability in international carriage by air but the uniform rules regarding the documents of carriage. The subsequent 1929 Warsaw Convention led to the governing of air carriers' liability for death, wounding, and other body injuries to passengers.[120] Liability of the carrier being based on its fault intention or negligence, with the Convention adopting a bold stance by reversing the burden of proof; namely, it is not for the passenger or claimant to prove the fault of the carrier.[121] However, as a nascent industry, a limitation of liability was originally deemed necessary—thus, setting parameters that aided to protect the fledgling industry.[122] Overtime, amendments were passed to increase the limits of liability with respect to passengers, as particularly in the U.S., the set limit was considered to be outdated and unrealistically low.[123] This was a sentiment that continued to surface spasmodically until the 1999 Montreal Convention, which created a new separate and independent instrument.[124]

2. Key U.S. Development–Timelines

Since 1944, and the Chicago Convention, the U.S. has continued to evolve and update its national structure for aviation, whilst applying, if not exceeding, the standards emanating from ICAO.[125] As above, it has been influential in leading and influencing international developments in aviation.

Furthermore, very soon after humankind's first ventures into space—namely the launch and success of the first artificial satellite into space (Sputnik-1), the U.S. was quick to realize the

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[119] *The Warsaw System on Air Carriers Liability*, INT'L CIV. AVIATION ORG., https://applications.icao.int/postalhistory/the_warsaw_system_on_air_carriers_liability.htm [https://perma.cc/52VU-NVVT].

[120] Convention for the Unification of Certain Rules Relating to International Carriage by Air art. 17, Oct. 12, 1929, 3145 U.N.T.S. 137.

[121] *See id.*

[122] *See id.*

[123] *See id.*

[124] *The Montreal Convention 1999 (MC99)*, IATA, https://www.iata.org/en/programs/passenger/mc99/ [https://perma.cc/NHQ3-38QB].

[125] *The History of ICAO and the Chicago Convention*, *supra* note 101.

significance of aviation and air space to the realms of further space pursuits.[126] This is evidenced not only through the establishment of NASA, but the restructuring of the administration agency for aviation.[127]

The most significant factor perhaps leading to today's structure for aviation nationally came in 1958, when the CAA functions were transferred to a new independent Federal Aviation Agency responsible for civil aviation safety.[128] However, there was still fragmentation between aviation services and other transportation systems, leading later to the creation of the Department of Transportation (DOT) which "began full operations on April 1, 1967.[129] "On that day, the Federal Aviation Agency became one of several modal organizations within the DOT and received a new name, the Federal Aviation Administration (FAA)—as it is known today."[130] And, "[a]t the same time, CAB's accident investigation function was transferred to the new National Transportation Safety Board (NTSB)."[131]

There can be little doubt that the FAA has continued to have a significant impact, not just nationally but globally, which extends past aviation into space operations also. In 1984, Congress passed the Commercial Space Launch Act (CSLA),[132] establishing a regulatory function within the DOT for commercial space transportation.[133] The original Act assigned to the Secretary of Transportation the role of addressing the safety of commercial launches, and, the Act referred to liability insurance for such launches—stating that it should be as considered "by the Secretary to be necessary for such launch or operations [while] considering the international obligations of the United States."[134] Although, in essence, the Act did not factor in the extent to which the private space sector and tourism would grow; however, in 1985 the FAA assumed some responsibility for this function which has been extended to additionally include re-entry as well.[135]

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126 *Sputnik and The Dawn of the Space Age*, NASA, https://www.nasa.gov/history/sputnik/index.html [https://perma.cc/5Z6F-T42R].

127 *Id.*

128 *A Brief History of the FAA*, *supra* note 87.

129 *Id.*

130 *Id.*

131 *Id.*

132 Commercial Space Launch Act, Pub. L. No. 98-575 (1984) (codified as amended as 51 U.S.C. § 50901).

133 *See id.*

134 49 U.S.C. § 2615 (emphasis added).

135 51 U.S.C. § 50904.

The transferring action to the FAA, no doubt further aided to reinforce the linkage of space with aviation, not least the use of airspace during both the launch and re-entry stages. The CSLA has therefore been "amended several times" since 1984 to reflect the changes and rapid developments across the broader areas of space commercialization—including space tourism.[136]

In 1988, Congress created a three-tiered regime for risk-sharing relating to injuries or losses to third parties from commercial space transportation activities.[137] The first tier required FAA-licensed launch and re-entry operators to purchase insurance or otherwise confirm financial stability in the event of injuries or loss to third parties arising from such launch or re-entry activity.[138] This also had to be sufficient as to protect the Government, with the amount of insurance required called the "maximum probable loss"—capped at $500 million per launch (or an amount available at reasonable costs).[139] The second tier identified that the federal government indemnifies the launch or re-entry operator for third-party claims above the insured amount (at that time of $3 billion) however, noting that the funds were not automatic and subject to congressional approvement: the later 2015 Space Act; extending this indemnification regime until 2025.[140] In the third tier, it was stated that liability reverts back to the launch or re-entry operator in the unlikely event that third party claims exceed $3 billion, plus the insurance obtained by the launch or re-entry operator.[141]

V. SPACE: THE LESSONS OF THE U.S.: *ADVANCEMENTS AND FURTHER NEEDS*

In 2006, a review was undertaken by the U.S. Government Accountability Office as to the current position in the U.S. and future needs for space ventures.[142] This was due to the fact that recognition was being asserted that commercial space launches were likely to be a growing sector, and that the FAA needed to

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136 S. Rep. 114–88, Background and Needs (2015).

137 *See* Andrea Reed, *Space, the Final Frontier for Negligence Suits—Why Commercial Space Operators Should Be Liable for Personal Injuries to Space Flight Participants*, 84 J. AIR L. & COM., 477, 481 (2019); Matthew Schaefer, *The Need for Federal Preemption and International Negotiations Regarding Liability Caps and Waivers of Liability in the U.S. Commercial Space Industry,* 33 BERKELEY J. INT'L. L. 223, 230 (2015).

138 *See* Reed, *supra* note 137, at 480–81.

139 *See id.*

140 *See id.*

141 *Id.*

142 See *infra* note 143.

continually plan and monitor in order to oversee the safety of the emerging space tourism industry.[143]

It was consequently found that that the FAA licensing activities incorporated a reasonable level of safety oversight for space launch vehicles, applying a safety system process, not unlike that found in aviation, while it also supplemented and amalgamated the experiences from the Air Force.[144] Reference was also made as to the transferability of practices from aviation in respect to oversight duties and technical issues.[145] This was particularly seen of relevance to reusable launch vehicles and the procedures for the launch and recovery of vehicles.[146] Further comments noted that the NTSB offered courses on aviation Accident Investigation that would be useful in the event of a space launch incident.[147] However, the findings also identified the industry had raised concerns about the costs of complying with regulations, while the FAA also identified that it, too, faced challenges in regulating space tourism, not least having experienced staff for safety oversight as new technologies emerged.[148] At the time the FAA's experience was limited, as just five launches had taken place, and all had used the same launch vehicle—SpaceShipOne.[149]

No doubt the 2014 fatal accident involving Virgin Galactica's new SpaceShip (*SS2*–being an enlarged version of the SpaceShipOne vehicle), only too clearly reinforced some of challenges identified by the FAA in 2006.[150] In the crash, the reusable suborbital rocket was being operated and tested by Scaled Composites LLC (Scaled). This resulted in both the death of the co-pilot and injury to the pilot—although it was not carrying passengers.[151] The subsequent report[152] identified some of the safety oversight mechanisms in place at the time and while certain revisions had

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143 U.S. Gov't Accountability Off., GAO-07-16, Commercial Space Launches: FAA Needs Continued Planning and Monitoring to Oversee the Safety of the Emerging Space Tourism Industry 35 (2006).

144 *Id.*

145 *Id.*

146 *Id.*

147 *Id.*

148 *Id.*

149 *See* U.S. Gov't Accountability Off., *supra* note 143, at 35.

150 *In-Flight Breakup During Test Flight Scaled Composites SpaceShipTwo*, Nat'l Transp. Safety Bd. (Oct. 31, 2014).

151 Miriam Kramer, *Virgin Galactic's SpaceShipTwo Crashes in Test Flight: 1 Dead, 1 Injured*, Space (Oct. 31, 2014), https://www.space.com/27618-virgin-galactic-spaceshiptwo-crash-kills-pilot.html [https://perma.cc/PC8G-YPP55].

152 *Id.*

occurred (since 2006 and the time of the report) this has not factored in the need of tourists being carried.[153]

The 2006 review also drew attention to the fact that, whilst in 2004, the Commercial Space Launches Amendments Act[154] gave the FAA specific responsibility of overseeing the safety of space tourism, the act prohibited, through a "moratorium," the FAA from regulating crew and passenger's safety before 2012 (except in response to high-risk incidents serious injuries or fatalities).[155] This would be part of a phased approach to increase the safety role of the FAA, with it initially being set to expire after eight years.[156] However, at the time, the FAA's interpretation was noticeably contrary to this, with it stating that it interpreted that it did have authority to protect the crew because they were part of the flight safety system which overlapped into their broader remit of protecting the general public; and hence, in doing so, the FAA role should naturally, also therefore, extend to passengers. However, this created some nuances in terms of divisions—given that it was largely recognized that the FAA could not regulate crew and passenger safety wherein the public was not implicated.[157] While the 2006 review additionally raised concerns as to the FAA having a dual role—both as a regulator and promoter of the industry—which had been perceived as presenting a possible conflict of interest moving forward. This said, it should also be identified that the moratorium deadline has since been extended through The FAA Modernization and Reform Act of 2012[158] and The Commercial Space Launch Competitiveness Act.[159]

In 2015 the U.S. passed the Commercial Space Launch Competitiveness Act (CSLCA, or Space Act),[160] with the long title perhaps further reiterating the aims of the nation in terms of "facilitat[ing] a pro-growth environment for the developing commercial space industry by encouraging private sector investment and creating more stable and predictable regulatory conditions

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153 *See* Fox, *supra* note 20, at 123.

154 Commercial Space Launch Amendments Act of 2004, Pub. L. No. 108-492, § 2(b), 118 Stat. 3974, 3975 (codified as amended at 49 U.S.C. § 70102 (2004)) (current version at 51 U.S.C. § 50902(20)).

155 *See infra* note 167.

156 *See* Commercial Space Launch Amendments Act, *supra* note 154.

157 *See* U.S. GOV'T ACCOUNTABILITY OFF., *supra* note 143, at 35.

158 The FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, § 827, 60 Stat. 179 (2012).

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

160 *Id.*

and, for other purposes."[161] The legislation was designed to foster commercial growth in space, in particular, in areas such as mining and tourism whilst streamlining the related regulation and controls.[162] The Act, although identifying that the U.S. does not have sovereignty or jurisdiction over objects in space, as established by the Outer Space Treaty, nevertheless clearly seeks to promote U.S. national interests. This includes arguably extending limiting the liability of commercial space companies, as the Act contains a new provision relating to jurisdiction by providing that "any claim by a third party or space flight participant for death, bodily injury, or property damage or loss resulting from an activity carried out under the license shall be the exclusive jurisdiction of the Federal courts."[163]

In other words, this move is seen "to insulate operators from legal responsibilit[ies]" even further "in the event of bodily injury or the death of a space flight participant."[164] Certainly, there has been criticism of some parts of the Act, while some Democratic members of the Congress, including representative Eddie Bernice Johnson, have been critical also of the Act in terms of the priorities being given to the industry.[165] Representative Alan Grayson was even more vocal however, by stating the provisions were tantamount to "corporate welfare" that creates a "moral hazard" and that limiting liability was equal to inviting an accident or a tragedy.[166]

The current Act noticeably requires operators to inform "space flight participants" of the risks of space flight and thereby allowing them to make informed decisions as to the risks associated with their flights.[167] Commercial space operators are additionally re-

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161 *Id.*

162 *Id.*

163 *See* 51 U.S.C. § 50914 (2015).

164 *See* Reed, *supra* note 137, at 480.

165 *See* Fox, *supra* note 4, at 177; P.J. Blout, Christian Robinson, *One Small Step: the Impact of the U.S. Commercial Space Launch Competitiveness Act of 2015 on the Exploration of Resources in Outer Space*, 8 N.C. J. L. & TECH., 160, 162 (2016); Jeff Foust, *Congress launches commercial space legislation*, SPACE REV. (May 26, 2015), https://www.thespacereview.com/article/2759/1 [https://perma.cc/HBV6-UECS]. *See also* Jeff Foust, *House Science Committee Approves Four Commercial Space Bills*, SPACE (May 15, 2015), https://www.space.com/29409-commercial-space-bills-house-approval.html [https://perma.cc/JA2H-J423].

166 *See* Foust, *supra* note 165.

167 14 C.F.R. § 460.45 (2020); *see also Human Space Flight*, FED. AVIATION ADMIN. (May 23, 2024), https://www.faa.gov/space/human_spaceflight#:~:text=Vehicle%20Licensing%20Requirements%20to%20Carry,certified%20the%20vehicle%20as%20safe [https://perma.cc/7CLZ-QCCM].

quired to notify flight crew and spaceflight participants in writing that the U.S. government has not certified the launch or re-entry vehicle "as safe for carrying crew or space flight participants."[168]

The legislation thus requires a licensee to sign reciprocal waivers relating to claims (waivers) with its contractors and its customers—including the flight participants, as well as the U.S. government.[169] In other words, regardless of fault, the space participant (or tourist) must agree to relinquish all claims against the U.S. government for any injuries sustained during the license activity; not hold responsible the U.S. for injury; and, hence—indemnify the U.S. "from and against liability, loss or damage arising out of claims that any of licensee's or permittee's contractors and subcontractors may have for property damage sustained by them and for bodily injury or property damage sustained by their employees, resulting from licensed or permitted activities."[170]

In so many ways, it could be contended that, although the U.S. government recognized the challenges for the new space sector and the need to aid the commercial developments, it overstepped the boundaries in terms of wider implications, which invariably include a failure to put safety first—not just for 'participants' but for all citizens, and therefore to carry a modicum of 'governance-liability' (financial and otherwise) for permitting the operations to go ahead in the first place.

There is little doubt that allowing more commercial operators aids the government pursuits and visions for space; and, hence, actions that limit liabilities speak of government protection for both the fledgling industry and more broadly for a nation. Possibly, this runs parallel to the continued argument regarding the U.S. not being a signatory to the Moon Agreement and advancing its own national interests in terms of Moon developments—including mining and tourism—*even, perhaps, linking back to the extent of building a hotel on the lunar surface!*[171]

As part of the legislative requirements for CSLCA, Congress instructed the FAA to prepare a report with "key industry metrics that might indicate readiness of the commercial space sector and the Department of Transportation to transition to a safety

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[168] *See Human Space Flight*, *supra* note 167. The participants are informed that "the United States Government has *not certified the launch vehicle's safe for carrying crew or Space Flight participants.*" *See* 51 U.S.C. § 50905(4)(b) (2023) (emphasis added).

[169] *See* 14 C.F.R. § 460.45 (2020).

[170] *See* 14 C.F.R. § 440.17(2)(i) (2016).

[171] *See* Moon Agreement, *supra* note 59.

framework that may include regulations . . . that considers space flight participant, government astronaut, and crew safety."[172] In response, the FAA identified that the industry had overseen over "10,000 launches in the eight years following passage of the 2004 amendments."[173] However, quite clearly the expected amount of activity had not been met, either prior to 2015 (or since)—with launches remaining lower than anticipated with passengers on board.[174] Hence, this remains a reason cited for the continuance, or extension to regulatory limitations and, the protection of the sector. As late as 2017, the FAA concluded that the spaceflight industry was still not ready for more regulation (that is, from a national perspective)—although this would have to be questioned in terms of the safety needs to others, particularly given that the initial 8-year delay period (as per the moratorium) was to allow for the establishment of a body of "safety lessons learned"—which presumably also took into account failings.[175]

As of 2021, the Government Accountability Office acknowledged that the FAA continued to have some difficulties regulating and overseeing the evolving space tourism industry,[176] while, in the period 2006–2021, the FAA, through its Office of Commercial Space Transportation (AST), had previously streamlined rules for applicants seeking launches and re-entry licenses.[177] This said, it was still apparent that there was the need to undertake further revisions to other regulations. Not least, the FAA faced continual challenges of whether and when to regulate the safety of crew and other spaceflight participants, with it being identified that the FAA was prohibited from regulating crew and passenger safety before 2023.[178] This aligned to the fact that the moratorium was, thus, due to expire on October 1, 2023.[179] However as

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[172] *See* 51 U.S.C. § 50905(c)(6).

[173] Laura Montgomery, *Should Congress Extend the Moratorium on Regulating Human Spaceflight?*, CTR. GROWTH & OPPORTUNITY, https://www.thecgo.org/research/should-congress-extend-the-moratorium-on-regulating-human-spaceflight/#:~:text=As%20noted%20in%20the%20FAA's,well%20and%20which%20did%20not [https://perma.cc/K4YF-SDU9].

[174] *Id.*

[175] *Id.*

[176] U.S. GOV'T ACCOUNTABILITY OFF., GAO-21-105268, COMMERCIAL SPACE TRANSPORTATION - FAA CONTINUES TO UPDATE REGULATIONS AND FACES CHALLENGE TO OVERSEEING AND EVOLVING INDUSTRY 10 (2021).

[177] *Commercial Space Transportation*, FED. AVIATION ADMIN. (May 18, 2021), https://www.faa.gov/regulations_policies/faa_regulations/commercial_space [https://perma.cc/SA84-LDWQ].

[178] *See Human Space Flight*, *supra* note 167.

[179] *Id.*

of researching, writing and reviewing this paper, the moratorium has continued to be further extended—in October, until January 2024; and then in January, it was extended again into March, and then again, further, into May 2024.[180] And so, the extensions continue, which therefore affects oversight and responsibilities of the FAA.[181]

As of today, the FAA's safety oversight responsibilities, remains only to "protect the safety of the public on the ground and others using the National Airspace System."[182] And, it would have to be questioned whether 2024 will result in any amendments to the role of the FAA, given that this is an election year. Hence, it will likely be postponed, yet again—until after the next U.S. President is in post.[183] Although, in anticipation of the expiration of the statutory moratorium (in 2023), arguably some steps forward have been taken—such as working with its industry advising committee to develop and disseminate human spaceflight best practices alongside planning for future requirements, including legislatively.[184]

In April 2023, the FAA established an Aerospace Rulemaking Committee (SpARC) to collaborate with industry on the development and cost of possible future regulations for commercial human spaceflight occupant safety. Hence the focus of SpARC encompasses safety considerations, and it is expected to submit a recommendation report in the summer of 2024 which consolidates some of its findings.[185] As part of this, comments were invited relating to a proposed rule.[186] In essence, the intention of the rule is to incorporate various changes required by the U.S. CSLC (Space) Act, such as providing regulatory clarity to applicants seeking licenses for space flight operations involving government astronauts by adding two new subparts to the human

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[180] *Id.*

[181] *Id.*

[182] Congress continues to limit the FAA's "authority in specific ways," not least under federal law, the "FAA is prohibited from regulating the safety of individuals on board." *Id.*

[183] It was confirmed that, "This legislative 'moratorium,' originally established in 2004, and extended multiple times by Congress, will now expire January 1, 2025." *See Human Space Flight*, *supra* note 167.

[184] *Legislation & Policies, Regulations & Guidance*, Fed. Aviation Admin. (May 23, 2024), https://www.faa.gov/space/legislation_regulation_guidance [https://perma.cc/DA5T-W849].

[185] *Id.*

[186] U.S. Commercial Space Launch Competitiveness Act Incorporation, 88 Fed. Reg. 159, FAA–2023–1656 (proposed Oct. 17, 2023).

space flight regulations.[187] This proposed requirement therefore aids to enhance public safety by ensuring operators provide mission specific training on safety-critical tasks to government astronauts, as has been done in the NASA Commercial Crew Program.[188] The proposed rule would also update definitions relating to commercial space launch and re-entry vehicles as well as occupants.[189] It also aims to expand applicability of permitted operations for reusable suborbital rockets including reusable launch vehicles, as well as implement clarifications to financial responsibility requirements in accordance with the Act.[190] Finally, this proposed rule would move the templates for waiver of claims to an advisory circular—noting that it does not seek to amend or refine the approach taken regarding the containment of any claim and the waiver mechanism in place.[191] However, there is no clarity in terms of a non-government astronaut or even the separation in terms of a tourist (or fee-paying astronaut), which should arguably also be stated.

Thus, this proposed rule is also likely to be impacted by the decision on whether the moratorium is again extended past 2024. And, linked to this, going forward, the remit of the FAA will no-doubt also be impacted upon whom is in office in the U.S., as there remain noticeable differences in terms of the role the FAA should have and the degree it should develop in terms of other space operations and activities (that is, away from launches and re-entries).

Presently the U.S. is undertaking yet another review, this time at a White House-level looking at its own internal governance.[192] Currently, the FAA's role remains limited by Congress.[193] For the time being at least, nationally, the FAA continues to regulate and license all U.S. commercial space launches and U.S. spacecraft, while it also implements certain registration standards required under the Registration Convention.[194] This applies to the opera-

187 88 F.R. 56546 (2023).

188 *See id.*

189 *See id.*

190 *See id.*

191 *See id.*

192 Theresa Hitchens, *White House nears plan to assign regulatory authorities for 'new' space activities*, Breaking Defense (Feb. 23, 2023), https://breakingdefense.com/2023/02/white-house-nears-plan-to-assign-regulatory-authorities-for-new-space-activities/ [https://perma.cc/3P78-99BX].

193 *See Human Space Flight*, *supra* note 167.

194 Convention on Registration of Objects Launched into Outer Space, Sep. 15, 1976, 1023 U.N.T.S. 15. (noting that the Office of Space Affairs of the Department of State implements other components of the U.S.'s obligations under the

tion and re-entry of tourism flights, that is—"when carried out by U.S. citizens or within the U.S," which have to be authorized by the U.S. Federal Aviation Agency (FAA) (through the AST).[195]

As identified, space operations and linked roles and responsibilities remains subject to political decisions. The divide between the FAA, in terms of an aviation/space regulator and its involvement in more commercial aspects of space continues to remain contentious amongst the other key players involved in space, and, hence, there have been concerns levied in terms of competence creep (particularly an extension of its current role—in terms of the proposed rule developments—as explained above).[196]

There is little doubting that space remains multi-faceted and complicated. This therefore leads one to question jurisdiction and oversight outside the launches and re-entry phases, particularly, when the spacecraft or vehicle is outside the nation's sovereignty, noting that the FAA does not have specific authority over '*in-space*' activities.[197] Hence, operations therefore necessitate that the FAA continues to work closely with other national bodies, while national governance is, or, invariably, stands to be (or arguably should be) impacted upon by international regimes and developments (much in the same way as occurs for civil aviation). That said, as postulated at the commencement of this paper, there remain clear grounds for advocating that there has been insufficient progress internationally in terms of providing the clarity to (or guiding) national structures and related policies relating to space (including from a commercial tourism perspective).

Outside of the FAA (and NASA) in the U.S., there are many other federal agencies that are extensively involved in not only policy developments, but specific space activities, such as the Department of Defense, the National Telecommunications and Information Administration (NTIA—an administrative agency of the Department of Commerce), the Federal Communications Commission (FCC), the National Oceanic and Atmospheric Administration (NOAA), and the Department of State.[198] As an example: in practice, regulatory requirements necessitate, that, depending

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Registration Convention, including maintaining the official US registry of space objects).

[195] *Commercial Space Transportation Activities*, FED. AVIATION ADMIN. (Oct. 4, 2023), https://www.faa.gov/newsroom/commercial-space-transportation-activities#:~:text=Launch%2C%20Reentry%20and%20Spaceport%20Licenses,or%20entity%20within%20the%20U.S [https://perma.cc/2ZFZ-JL5W].

[196] *See Human Space Flight*, *supra* note 167.

[197] *Hitchens*, *supra* note 174.

[198] *See* Convention on International Civil Aviation, *supra* note 90.

on the intended commercial space activities, a commercial operator must obtain an authority from the FCC, NTIA, NOAA (among others) alongside the FAA, before conducting its operations.[199] Such, in essence, is the complexity of space pursuits including commercial space tourism in the United States.

The latest ongoing U.S. space review has therefore reemphasized that determining who is responsible for (what is often called) "mission authorization and supervision," is still highly complicated.[200] Coupled with this, as identified by several government officials, the key agencies, with current legal say over space regulations, continue to jockey for control and, thus, "a piece of the regulatory pie."[201]

Regardless of the findings of the review, and the position adopted by the U.S. in 2024 (and, beyond), the question that ultimately needs asking, and inevitably determining, is the role to be played from an international—U.N.—perspective. That is, the needs and requirements for a coordinated approach and a set of agreed international standards and practices—in terms of both a solid framework and a regulatory approach for space tourism and travel activities, including the standards and requirements for the carriage of passengers into space. Inevitably, it should be concluded that more action is needed internationally, and that there are clear lessons to be learnt from national approaches together with the aviation governance system.

VI. CONCLUSION

The U.S. space framework and governance of space activities is debatably not perfect, and it is also far from being complete or even settled in terms of roles and responsibilities. Whilst it can be seen that the FAA's remit has necessitated becoming involved in 'certain' space activities and licenses, and, while the FAA has therefore extended its role, there remains contention is terms of how far this should be further extended. This has led to national

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199 *See* Anastasia Slivker, *Global Outer Space Guide: United States*, NORTON ROSE FULBRIGHT (Sept. 2023), https://www.nortonrosefulbright.com/en/knowledge/publications/08a2c80a/global-outer-space-guide-us [https://perma.cc/K2BE-KW2R] (both noting, depending upon the operation—a commercial space system operator may additionally be required to comply with export controls and seek regulatory approval from the Bureau of Industry and Security (BIS) of the DOC or the Directorate of Defense Trade Controls (DDTC) of the Department of State, or both.). *See, e.g.*, *Introduction to U.S. Export Controls for the Commercial Space Industry*, DEP'T OF COMMERCE & FED. AVIATION ADMIN. (Oct. 2008).

200 *See* Convention on International Civil Aviation, *supra* note 90.

201 *Hitchens*, *supra* note 174.

divisions in respect to the way forward, particularly relating to extending safety responsibilities for crews, which includes all astronauts and thereby tourists (or fee-paying passengers). This said, although this paper has levied some criticism towards the U.S. approach, there remains little doubt that the U.S. has been the most forward thinking and proactive nation in terms of applying a semi-secure structure, with plenty of supportive scaffolding for various space pursuits, nonetheless.[202]

Whereas, internationally, there remains a flimsy framework in place, as presently, the U.N. approach is built upon a limited foundation that requires some strengthening in order to support the current developments relating to space travel, and particularly the vision for commercial tourism and space travel moving forward.[203] Thus, there remain valuable opportunities to learn from the successes and failures from the U.S. that would aid both consistency and arguably the safety of space travel and tourism from a global perspective, as is befitting for a fledgling growth sector. Yet, the internal wranglings and debates within the U.S. also speak of the political divides and the wider politics associated with space activities.

The U.S. approach has largely been centered around the adoption of best practices and lessons learnt from aviation—including applying the early restriction regime on liabilities to space tourism.[204] However, there remains a number of areas where a more coordinated national, and international, approach is now needed.

New regulations addressing a number of areas, particularly linking to the flight crew and related safety factors, (such as medical requirements for crew that have a critical safety role) have transpired in the U.S. but these relate to a national approach.[205] However, it is suggested that there does need to be further regulatory advancements, including for space-tourists, not only nationally but internationally, who also need to be appropriately defined and catered for.

The argument that safety applied to the crew naturally sees an extension to passengers is far from sufficient, as fee paying tourist should be accorded the similar liability protections as is afforded to others that travel in the airspace. In itself, this could present a challenge given that any suborbital (or orbital) movements

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[202] *See supra* part V.
[203] *See supra* part III.
[204] *See Human Space Flight*, *supra* note 167.
[205] *See supra* part V.

always necessitate being in the airspace (however short a time this is)—so presumably a space traveler (tourist) will be viewed as an air passenger, as well as an astronaut. And again, even the latter is in need of clarification—as an astronaut is defined in many dictionaries only as a person, who is "trained to travel in a spacecraft."[206] This definition is largely consistent with that referred to by NASA—who simplistically identify that "an astronaut trains a long time on Earth before going into space."[207] However, this also calls into consideration the altitude that defines where space begins.[208] Thus, this also gives rise to questions concerning training and the national and international consistency or inconsistencies of such—for 'fee' paying passengers (tourists), or, even otherwise (the pilot/trained astronaut). Furthermore, the same could be argued in terms of the 'craft,' 'ship,' 'vessel,' or 'vehicle' that conveys the passenger and how these are invariably defined. Coupled with this, there arguably also needs to be the foresight to factor in automated transport modes, which may have only passengers (or tourists) on board in the future.

Hence, it is therefore contended that now is the time to consider many of these unanswered questions alongside ensuring that a governance mechanism exists for advancing space tourism. This must include having further oversight and allowing the advancement of regulations relating to the carriage of passengers on board commercial space flights, just as occurred in aviation—and not just nationally, but internationally. The purpose of delaying this, through the national U.S. moratorium, was to grant the industry a learning period, similar to the one that had been given to the aviation industry in the early 1900s. In this instance, aviation was subject to decades of experimental flights, and even commercial flights, before the FAA nationally began to regulate the industry, and internationally ICAO began to develop the overarching safety management system known today. This safety management approach, and more broadly the overarching governance for international aviation, still continues to evolve and

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[206] *See, e.g.*, *Astronaut*, CAMBRIDGE DICTIONARY ONLINE, https://dictionary.cambridge.org/dictionary/english/astronaut [https://perma.cc/8FLL-VFXA] (defining astronaut as "a person who has been trained for travelling in space.").

[207] *Astronauts*, NASA, https://www.nasa.gov/humans-in-space/astronauts/ [https://perma.cc/2VLB-MA8M]. The FAA offers a distinction between a government astronaut and other as: "[a]n individual designated by NASA who is on a launch or re-entry vehicle and is either an employee of the U.S. Government or an international partner astronaut." *See Human Space Flight*, *supra* note 167.

[208] *See* Fox, *supra* note 12.

develop, factoring in, not only the needs of the industry, but the passengers carried and transported.

More recently the FAA has taken a somewhat neutral stance by identifying that it no longer designates anyone as an 'astronaut.'[209] In addition, the FAA does not define where space begins,[210] while noting that it expects the commercial human spaceflight industry to continue to grow and the number of people launching into space to increase dramatically. Despite this, it does state that these modern-day adventurers that reach 50 statute miles above the surface of the Earth will have their name listed on the FAA Commercial Human Spaceflight Recognition webpage.[211] The reluctance to use the word 'tourists' is perhaps also telling in this regard, as it undoubtably necessitates much more legislation and protections being accorded than currently exists. As part of the broader picture, it is also crucial to remove the limited liability regime and waiver scheme, particularly for space participants, travelers or 'tourists' (however defined) who are carried into space and to consider an international approach—as occurs in aviation under the international Montreal Convention, which has unified certain rules for the carriage of air passengers.

Globally, ICAO has played a critical role in ensuring that aviation develops in an equitable and fair manner, and alongside the developments of the U.S., there is still much that could be transposed from this sector into the space tourism/travel sector—both are in effect transport modes. Over the years, the Chicago Convention has been supplemented by Annexes and other governing and oversight means, yet in comparison little has been added to the OST.[212]

From an international perspective some recent recognition has been given by the U.N. Committee (COPUOS) that there is now a need to move forward, with COPUOS considering how to implement the 21 "best practice guidelines" for ensuring the safety and sustainability of future space usage, which were approved in 2019. However, it is questionable whether the pace this is undertaken at is sufficient for the advancement and needs of the space tourism sector. Identifying that, it was only in 2023 that COPUOS established a further follow-on Working Group on the Long-Term Sustainability of Outer Space Activities, which has the aim to delve into how countries should apply such guidelines. It is

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209 *See Human Space Flight*, *supra* note 167.

210 *See id.*

211 *See id.* at 22.

212 *See generally* McCue, *supra* note 25, at 1092–99.

also observed that this working group has a five-year mandate—however, it is not primarily focusing on space tourism *per se*—but the wider use of space.[213]

In terms of aviation—ICAO, with its Member States, has, since the 1970's, factored in environmental protection and the broader approach of climate change for sustainable air travel.[214] This means that ICAO's strategic objectives are now centered across five pillars—namely, safety; capacity and efficiency; security and facilitation; economic development and environmental protection. As part of its stance, ICAO continues to advocate the value of a global approach, calling for better coordination of activities and the elimination of duplication of activities.[215]

Invariably, this leads to the supposition that space and the governance of space needs to be better coordinated from an international perspective, and that this may necessitate the formulation of a specialist entity, for example within UNOOSA, or even separate to it. Such an organization should coordinate best practices to-date, for example, as seen in the U.S., whilst seeking to set and achieve international standards for the safe, orderly and sustainable development of space travel and tourism. Hence, it is proposed that there is the need for the establishment of an 'International Civil Space Organization,' which has a remit relating to the mode and components that facilitates civil space travel (and tourism)—much in the same way that ICAO has for aviation. However, ultimately, such a move would require international willing and agreement, yet ironically the likelihood of achieving this seems even more remote than it was in the midst of World War II (1939–1945) when the 1944 Chicago Convention was achieved, that ultimately laid the foundations for ICAO.

In conclusion, it is contended that the lack of agreements and regulation internationally (and even nationally) has been, and will be, allowed to continue far longer than is appropriate, particularly when taking into account the best practices learnt from aviation (and the U.S.).

The development of space tourism presents an exciting opportunity for humankind to venture beyond the Earth, and, in the

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[213] *Long-term Sustainability of Outer Space Activities*, U.N. Off. Outer Space Affairs, https://www.unoosa.org/oosa/en/ourwork/topics/long-term-sustainability-of-outer-space-activities.html [https://perma.cc/H36G-T4XX].

[214] *See generally State Action Plans and Assistance*, Int'l Civ. Aviation Org., https://www.icao.int/environmental-protection/Pages/ClimateChange_ActionPlan.aspx [https://perma.cc/S7XT-8FJ8].

[215] *Policy on ICAO Implementation Support Provided to States*, Int'l Civ. Aviation Org.

future, to potentially explore the final frontier of outer space. However, the lack of a comprehensive regulatory framework, both nationally and internationally, poses significant challenges to ensuring the safety, sustainability and equitability of this new industry. Moreover, as commercial space travel becomes a reality, and extends beyond the current dominant nations, it becomes ever more critical that, not only State governments, but international organizations, and private companies, work together to establish clear guidelines and standards to ensure that space tourism, and travel, can flourish without compromising safety or, even, international accord. Ultimately, without this, it is argued that there remain unnecessary risks, not only to space occupants (including tourists), but to person on the Earth's surface, and also to aviation.