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Following Dennis Tito's flight to space aboard the Russian Soyuz capsule in 2001, suborbital travel has become a new form of commercial activity. Fuelled by an eager public and decreasing prices, the industry is rapidly expanding. Because the current space law regime was originally designed for governmental exploration, it is inadequate to handle the range of legal challenges emerging from this private commercial activity. This article therefore suggests that the current legal regime is incapable of sustaining the space tourism industry and that there is an urgent need for a new international convention.

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I. INTRODUCTION

We live in an epoch where the experience of space travel is quickly becoming a form of private commercial activity. Space tourism agencies already exist and 'offer customers direct or indirect experience with space travel'.¹ This practice began after Dennis Tito, a private citizen, travelled to space aboard the Russian Soyuz capsule in 2001.² Since then, the increase in the development of suborbital space travel and the rise in the public's interest have encouraged the growth of this venture.³ Now, in order to provide a more accessible service, companies have made efforts to reduce the price of such trips. At the moment, the cost of such flights ranges from £60,000 to £120,000, although several companies are developing vehicles which can bring people into space for a portion of the current price. Because of these developments, it is expected that prices will drop by 90% in the near future.⁴

The current legal regime, however, was not designed to address these new commercial activities; it was drafted solely to assist in the progress of governmental use and exploration of outer space. As a result, a number of legal and regulatory concerns arise in relation to commercial space travel and space tourism. The development of such a novel venture has created a need for a suitable framework to regulate its activities. Accordingly, the objective of this paper is to evaluate whether the current legal regime can handle the emerging space tourism industry and if there is a need for a new international convention. It is therefore necessary to assess the applicability of the current legal framework to this new commercial venture, particularly in regard to vital issues such as the legal status of space tourists, the potential conflict between air law and space law, and the liability regime for damage caused to states, tourists, and third parties.

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1. Stephan Hobe and Jürgen Cloppenburg, "Towards a New Aerospace Convention?: Selected Legal Issues of "Space Tourism"" (Proceedings of the Forty-Seventh Colloquium on the Law of Outer Space, Vancouver, October 2004) 377, 377.

2. Richard Branson, *Business Stripped Bare: Adventures of a Global Entrepreneur* (Virgin Books 2008) 228.

3. OECD International Futures Programme, *Space 2030: Tackling Society's Challenges* (OECD Publishing 2005) 304.

4. 'Space Tourism and Commercial Space Travel' (*Paramount Business Jets*) <www.paramount-businessjets.com/space_tourism.php> accessed 04 December 2011.

5. Cosmonaut is a Russian loanword originating from the 'space race' to distinguish soviet space travellers from astronauts of other nationalities. Anna Coetzee, 'Russies en Afrikaans se Gemeengoed: Internasionale Woorde en Ander Leenwoorde' (2007) 25 *Southern African Linguistics and Applied Language Studies* 259, 272.

II. SEEKING A LEGAL DEFINITION OF 'SPACE TOURIST'

When space law was originally developing, the status of spacecraft passengers presented no challenge as only astronauts and cosmonauts⁵ participated in space flights. The *corpus iuris spatialis in iuri gentium*⁶ had no need to provide a definition of space tourists or to clarify their status.⁷ Hence, an issue now arises regarding the legal status of, rights of, and obligations owed to, commercial passengers. This is because it is unclear whether previously used terms, such as 'astronaut', 'personnel of a space craft', and 'envoy⁸ of mankind', may apply to space tourists. Although these terms have not been defined by international space law,⁹ they have been included and utilised in key international treaties and principles on outer space such as the Outer Space Treaty ('OST')¹⁰ and the Agreement on the Rescue of Astronauts ('Rescue Agreement').¹¹

However, the possible inclusion of space tourists under the above terms is further complicated by the fact that the treaties often define these terms in differing ways, resulting in different implications upon their use.¹² Furthermore, regarding interpretation, international law permits a reliance on

6. This is translated as 'body of space law in international law'.

7. Gabriella Catalano Sgrosso, 'Legal Aspects of the Astronaut in Extravehicular Activity and the "Space Tourist"' (Legal and Ethical Framework for Astronauts in Space Sojourns Symposium, Paris, October 2004) <<http://unesdoc.unesco.org/images/0013/001397/139752m.pdf>> accessed 12 December 2010, 57, 63.

8. The word envoy originates from diplomatic law and customarily relates to privileges and immunities of the relevant persons. Aleksander Sergeevich Piradov and Boris Belitskii, *International Space Law* (Progress Publishers 1976) 103.

9. Christopher M Hearsey, 'A Review of Challenges to Corporate Expansion into Outer Space' (The American Institute of Aeronautics and Astronautics Space 2008 Conference and Exposition, San Diego, September 2008) <http://www.astrosociology.org/Library/PDF/Hearsey_CorporateExpansion.pdf> accessed 12 December 2010, 1, 8; See generally, E Kamenetskaya, 'Cosmonaut ("Astronaut"): an attempt of international legal definition' (Proceedings of the Thirty-First Colloquium on the Law of Outer Space, Bangalore, October 1988) 177-78 (defining both cosmonauts and astronauts as 'people who carry out professional activities connected with the exploration and use of outer space in outer space itself and on celestial bodies in accordance with the principles and rules of international space law').

10. The 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. The Treaty was opened for signature by three depository governments (Russia, UK, and USA) in January 1967. As of 2011, the Treaty has been ratified by 100 states and signed by 26 others.

11. The 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space has been ratified by 90 states and signed by 24 others. In addition, two international intergovernmental organisations (the European Space Agency and the European Organisation for the Exploitation of Meteorological Satellites) have declared their acceptance of the rights and obligations provided for in the Agreement.

12. Ram Jakhu and Raja Bhattacharya, 'Legal Aspects of Space Tourism' (Proceedings of the Forty-Fifth Colloquium on the Law of Outer Space, Houston, October 2002) 112, 119.

both the ordinary meaning of words¹³ and the intention of the drafters at the time of preparation.¹⁴ Professor Stephan Hobe tried to bring clarity to the matter by proposing that the term ‘astronaut’ suggests an explorative or scientific meaning, whereas ‘personnel of a spacecraft’ suggests a functional meaning.¹⁵

A status of a symbolic value¹⁶ is given to astronauts by the OST, which provides that astronauts shall be regarded as ‘envoys of mankind in outer space’.¹⁷ Dr Manfred Lachs stated that, ‘[t]he mission they perform and the risks they incur justify the special standing and legal protection afforded to them’.¹⁸ Astronauts are provided ‘all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or the high seas’.¹⁹ Similar support is offered by the Rescue Agreement; however, the Rescue Agreement refers to ‘personnel of an aircraft’ — usually spacecraft crew.²⁰ These terms do not as easily cover space tourists as they cover astronauts: the latter venture into space for the benefit of the public interest rather than for personal pleasure.²¹ Therefore, we can glean from the variations existing within the original meanings that the current commercialisation and privatisation of space activities was not encompassed in the drafting of either agreement, as it was not foreseen that private entities might participate in such activities.²²

A. *Tourists as Astronauts?*

In the absence of a legal definition of ‘space tourist’, it is important to evaluate whether space tourists fall within the ambit of the term ‘astronaut’ and whether clients of space tourist companies or visitors to the International Space Station enjoy the special standing and protection afforded to astronauts.

13. The Vienna Convention on the Law of Treaties 1969, Article 31(1) (‘A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose’).

14. *ibid* Article 31(4) (‘A special meaning shall be given to a term if it is established that the parties so intended’).

15. Stephan Hobe, ‘Legal Aspects of Space Tourism’ (2007) 86 *Nebraska Law Review* 439, 455.

16. Mohammed Bedjaoui, *International Law: Achievements and Prospects* (Martinus Nijhoff Publishers 1991) 964.

17. OST (n 10) Article V.

18. Manfred Lachs, *The Law of Outer Space* (Sijthoff 1972) 72.

19. OST (n 10) Article V.

20. Brian Beck, ‘The Next, Small, Step for Mankind: Fixing the Inadequacies of The International Space Law Treaty Regime to Accommodate the Modern Space Flight Industry’ (2009) 19 *Albany Law Journal of Science and Technology* 1, 18.

21. Zhao Yun, ‘A Legal Regime for Space Tourism: Creating Legal Certainty in Outer Space’ (2009) 74 *Journal of Air Law and Commerce* 959, 979.

22. Henri A Wassenbergh, ‘The Law of Commercial Space Activities’ in Gabriel Lafferranderie (ed), *Outlook on Space Law Over the Next 30 Years: Essays Published for the 30th Anniversary of the Outer Space Treaty* (Kluwer Law International 1997) 173.

From a legal standpoint, defining an astronaut should consist of two main considerations: training and altitude.²³ This approach provides a practical and valuable distinction between a tourist and an astronaut.²⁴ Firstly, various providers of space tourist services require and provide training for their customers. For instance, programmes such as the Atlas Aerospace Crew Training Program²⁵ and Project Odyssey²⁶ provide medical screening, centrifuge, and cosmonaut or astronaut training for prospective space tourists. Tourists undertaking this type of training are more likely than others to be considered astronauts. But, if training is considered to be an element of achieving the status of an astronaut, then an assessment of the longevity and the extent of the training may also be required. To illustrate, before a space tourist can visit the International Space Station, they are required to have at least six months of training.²⁷ Further training is necessary if tourists decide to enjoy additional activities, such as space walks, which are offered by providers such as Space Adventures.²⁸ By contrast, Virgin Galactic customers undertake only one week of training²⁹ and, in some cases, as few as three days of training.³⁰

Regarding the second component, altitude, there is no recognised boundary of space under international space law.³¹ Several countries and organisations have, however, suggested various space boundary heights. The United States of America, for example, states that space starts at 80km above sea level³² and, accordingly, the Office of Commercial Space Transportation has awarded two astronaut wings³³ to commercial travellers.³⁴ A more common

23. Francis Lyall and Paul B Larsen, *Space Law: A Treatise* (Ashgate Publishing 2009) 131.

24. Email from Francis Lyall to author (1 March 2011).

25. See further, 'Crew Training' (*Atlas Aerospace*) <<http://www.atlasaerospace.net/eng/podgotovka.htm>> accessed 12 January 2011.

26. See further, 'A New Training Option for Space Tourists' (*New Space Journal*, 5 December 2008) <<http://www.newspacejournal.com/2008/12/05/a-new-training-option-for-space-tourists/>> accessed 12 January 2011.

27. United Nations Office for Outer Space Affairs, International Astronautical Federation, and International Institute of Space Law, *Highlights in Space 2006: Progress in Space Science, Technology and Applications, International Cooperation and Space Law* (United Nations Publications 2007) 37.

28. See further, 'Spacewalk' (*Space Adventures*) <<http://www.spaceadventures.com/index.cfm?fuseaction=orbital.Spacewalk2>> accessed 13 January 2011.

29. 'Virgin Boss in Space Tourism Bid' (*BBC News*, 24 September 2004) <<http://news.bbc.co.uk/1/hi/sci/tech/3693020.stm>> accessed 13 January 2011.

30. 'Training' (*Virgin Galactic*) <<http://www.virgingalactic.com/overview/training/>> accessed 13 January 2011.

31. Gbenga Oduntan, 'The Never Ending Dispute: Legal Theories on the Spatial Demarcation Boundary Plane between Airspace and Outer Space' (2003) 1 *Hertfordshire Law Journal* 64, 64.

32. cf Walter D Reed, 'The Outer Space Treaty: Freedoms - Prohibitions - Duties' (1967) 9(5) *US Air Force JAG Law Review* 26, 29 (defining a pilot astronaut as '[a] pilot who is qualified to operate or control powered vehicles in flight above 50 miles from the earth's surface').

33. Astronaut wings are badges that are awarded to civilian pilots who have completed training and performed a successful spaceflight.

and widely accepted frontier is the Kármán line, which marks the edge of space at 100km above sea level.³⁵ This level is recognised by both international organisations, such as the Fédération Aéronautique Internationale, and countries, such as Australia. It is important to note, however, that no limit is universally accepted. At best, the varying ranges simply provide a common reference, which may eventually result in the establishment of a customary international rule.³⁶ Therefore, although a demarcation limit exists in practice,³⁷ it still remains necessary to establish a legally defined boundary to resolve a number of challenges related to space activities, particularly the challenge of defining an astronaut or rather a space tourist.

If commercial passengers satisfy these requirements of training and altitude, it is possible to argue that they hold the status of an astronaut and are entitled to relevant protection and immunity. However, as noted above, it is difficult to determine the extent of training necessary for a passenger to be considered as 'a person who has received professional training',³⁸ such as that of an astronaut. Moreover, the element of altitude is also difficult to determine and apply to space tourists due to the unresolved ambiguity between international regimes of both air and space law, and a need for further legal clarification on the issue.

If commercial passengers cannot be described as astronauts, an alternative approach to ensure their protection and regulation is to classify them as 'personnel'.³⁹ While the term is generally defined as 'people employed in an organisation or engaged in a service or undertaking',⁴⁰ it has no specialised definition under international space law. But, as is the case with the terms discussed above, the lack of a specialised definition indicates that the OST does not necessarily exclude passengers and non-crew persons from the jurisdiction and control of the states of registry while they are in outer space. However, even if a broader view of the term was adopted, and passengers and non-crew persons were deemed 'personnel', it would still be uncertain

34. See generally, Henry J Price, 'Fact Sheet - Commercial Space Transportation' (*Federal Aviation Administration*, 28 June 2010) <http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=11559> accessed 15 January 2011 (noting the significant milestones in commercial human space flight).

35. Wilson WS Wong and James Fergusson, *Military Space Power: A Guide to the Issues* (Praeger 2010) 16.

36. See further, Steven Freeland, 'Up, Up and ... Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space' (2005) 6 *Chicago Journal of International Law* 1, 9.

37. Stephan Hobe, 'The Legal Regime for Private Space Tourism Activities - An Overview' (2010) 66 *Acta Astronautica* 1593, 1593-94.

38. Gabriella Catalano Sgrosso, 'Legal Status, Rights and Obligations of the Crew in Space' (1998) 26 *Journal of Space Law* 163, 166.

39. Tanja Masson-Zwaan and Steven Freeland, 'Between heaven and earth: The legal challenges of human space travel' (2009) 66 *Acta Astronautica* 1597, 1604.

40. 'personnel, n', *Oxford English Dictionary Online* (Oxford University Press 2012) <<http://www.oed.com/view/Entry/141512?redirectedFrom=personnel>> accessed 6 June 2012.

whether privileges and immunities enjoyed by astronauts would be available for space tourists as it was ‘not the intention of the treaty makers to cater for this group’.⁴¹

B. Regulation Under the International Space Station

Efforts to clarify the legal status of crew and passengers can be found in legal documents concerning space travel to the International Space Station (‘ISS’). For instance, the Inter-Governmental Agreement (‘IGA’) — an agreement reached between the space agencies participating in the ISS project⁴² — and the related Multilateral Crew Operations Panel Agreement (‘MCOP Agreement’)⁴³ have divided crewmembers into two main divisions: space flight participants and professional astronauts or cosmonauts.⁴⁴ The former are defined in the MCOP Agreement as:

individuals (e.g. commercial, scientific and other programs; crewmembers of non-partner space agencies, engineers, scientists, teachers, journalists, filmmakers or tourists) sponsored by one or more partner(s). Normally, this is a temporary assignment that is covered under a short-term contract.⁴⁵

Further, a distinction between ‘expedition or increment crewmembers’ and ‘visiting crewmembers’ is established. The former are defined as ‘the main crew of the ISS and are responsible for implementing the planned activities for an increment [crewmember]’.⁴⁶ The latter are those who simply ‘travel

41. Lesley Jane Smith and Kay-Uwe Hörll, ‘Legal Parameters of Space Tourism’ (Proceedings of the Forty-Sixth Colloquium on the Law of Outer Space, Bremen, October 2003) <http://www.webersteinhaus.com/bereiche_de/publikation_downloads/003LegalParameters.pdf> accessed 5 December 2011, 1, 3.

42. ‘Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station’ (Washington, 29 January 1998). The five main agencies participating are: the United States National Aeronautics and Space Administration (‘NASA’), the Russian Federal Space Agency, the Japan Aerospace Exploration Agency, the Canadian Space Agency, and the European Space Agency (‘ESA’).

43. ‘The Principles Regarding Processes and Criteria for Selection, Assignment, Training and Certification of ISS (Expedition and Visiting) Crewmembers’ (*Multilateral Crew Operations Panel*, November 2001) <<http://www.spaceref.com/news/viewsr.html?pid=4578>> accessed 4 December 2011.

44. RP Veldhuyzen and TL Masson-Zwaan, ‘ESA Policy and Impending Legal Framework for Commercial Utilisation of the European Columbus Laboratory Module of the ISS’ in FG von der Dunk and MMTA Brus (eds), *The International Space Station: Commercial Utilisation from a European Legal Perspective* (Martinus Nijhoff Publishers 2006) 47, 54.

45. MCOP Agreement (n 43) Article III.

to and from the ISS, but are not expedition crewmembers' and may also be referred to as a 'visiting scientist, commercial user or tourist' with limited functions.⁴⁷ Article 8.3 and Article 11 of the Memorandum of Understanding⁴⁸ regulate the rights and assignment of these two types of crewmembers, thereby allowing non-partners to be included in the ISS crew if they have met the criteria regarding selection, assignment, training, and certification.⁴⁹

Although the above definitions only apply to the ISS, Professor Frans von der Dunk believes that this distinction may constitute a 'trendsetting, if not an industry standard'.⁵⁰ The IGA's regulation in this matter has helped to develop soft law rules of a legally binding character, which appear to provide security and certainty in relation to passengers travelling to the ISS.

C. Space Flight Participants in the United States

In addition to the ISS's regulations, domestic laws also have the ability to determine the manner in which jurisdiction is exercised on space objects which are registered nationally. An example of a nation exercising this jurisdiction can be seen from the federal laws governing outer space in the United States.

The Commercial Space Launch Act of 1984 ('CSLA') and the Commercial Space Launch Amendments Act of 2004 ('CSLAA') were promulgated by Congress to promote freedom for the private sector to innovate and develop the commercial use of space.⁵¹ The amended Act, in particular, has provided a vital legal classification by defining 'crew' and 'space flight participants'.⁵² The requirements for assignment are similar to those relating to the ISS, but

46. *ibid.*

47. Frans G von der Dunk, 'Space Law in the Age of the International Space Station' in L Codignola and K-U Schrogl (eds), *Humans in Outer Space - Interdisciplinary Odysseys* (Springer Wien 2010) 148, 156.

48. Memorandum of Understanding between the National Aeronautics and Space Administration of the United States of America and the Russian Space Agency Concerning Cooperation on the Civil International Space Station <http://www.nasa.gov/mission_pages/station/structure/elements/nasa_rsa.html> accessed 4 December 2011.

49. MCOP Agreement (n 43) Articles III-VII.

50. Frans G von der Dunk, 'A Sleeping Beauty Awakens: The 1968 Rescue Agreement after Forty Years' (2008) 34 *Journal of Space Law* 411, 433.

51. Commercial Space Launch Amendments Act of 2004, section 2(a)(5); See generally, Meredith Blasingame, 'Nurturing the United States Commercial Space Industry in an International World: Conflicting State, Federal, and International Law' (2010) 80 *Mississippi Law Journal* 741 (critically discussing the CSLAA).

52. See further, Arthur Piper, 'The Right Stuff' (*International Bar Association*) <<http://www.ibanet.org/Article/Detail.aspx?ArticleUid=3ed3e145-68ca-44of-b1b6-df545bbc65a6>> accessed 2 February 2011.

the definitions are slightly different. ‘Crew’, in the United States, is defined as:

any employee of a licensee or transferee, or of a contractor or subcontractor of a licensee or transferee, who performs activities in the course of that employment directly relating to the launch, re-entry, or other operation of or in a launch vehicle or reentry vehicle that carries human beings.⁵³

A ‘space flight participant’ is defined as ‘an individual, who is not crew, carried within a launch vehicle or reentry vehicle’.⁵⁴ In accordance with the CSLA and its 2004 amendment, the Federal Aviation Administration, in 2006, introduced the Human Space Flight Requirements for Crew and Space Flight Participants,⁵⁵ which concerned the qualification, training, and informed consent of both crew and space flight participants.⁵⁶ The requirements aided operators in determining the training and medical certifications for their crew and passengers but failed to elaborate on issues of insurance and liability which may have aided in delineating the status of space tourists.⁵⁷

The categorisations provided by the IGA and the CSLAA, aimed at differentiating between a career astronaut and a space flight participant, offered legal certainty for tourists and was a vital development for the space tourism industry.⁵⁸ Furthermore, it helped tackle both the marketing⁵⁹ and political pressure to refer to non-astronaut passengers on spacecrafts as astronauts. An example of this controversy arose when NASA called Sheikh Muszaphar Shukor — the first Malaysian to travel into space — a space flight participant, instead of an astronaut.⁶⁰ Whilst NASA maintained its position, others have argued that Shukor is a full-fledged cosmonaut and not a spaceflight participant. Captain Robert Gibson, a former American astronaut, said that Shukor trained in Russia for a year and that ‘he is eminently qualified to function as a cosmonaut or an astronaut’.⁶¹ These types of difficulties in

53. Commercial Space Launch Amendments Act of 2004, section 2(b)(2).

54. *ibid* section 2(b)(9).

55. See further, ‘New Regulations Govern Private Human Space Flight Requirements for Crew and Space Flight Participants’ (*Federal Aviation Administration*) <http://www.faa.gov/about/office_org/headquarters_offices/ast/human_space_flight_reqs/> accessed 15 February 2012.

56. Erik Seedhouse, *Tourists in Space: A Practical Guide* (Praxis Publishing 2008) 7.

57. *ibid*.

58. Smith, ‘Legal Parameters of Space Tourism’ (n 41) 8.

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

60. Jeff Ooi, ‘Astronaut? “Spaceflight Participant?”’ (*Asian Correspondent*, 11 October 2007) <<http://asiancorrespondent.com/5656/astronaut-spaceflight-participant/>> accessed 12 Feb 2011.

61. ‘Malaysian a full-fledged cosmonaut, says ex-astronaut’ (*The Star Online*, 11 October 2007) <<http://thestar.com.my/news/story.asp?file=/2007/10/11/nation/19142225&sec=nation>> accessed 26 July 2012.

terminology have created uncertainties in relation to the extent of the protections and obligations owed to space flight participants. For instance, travelers defined as space flight participants may be excluded from the protection of the Rescue Agreement, which may be seen as unfair,⁶² especially given the 'sentiments of humanity' referred to in the preface of the OST.

Despite the developments mentioned above, the legal status of space tourists is still uncertain. The current corpus of space law is not sufficient to adequately define and regulate these new commercial actors or this new commercial venture. Therefore, perhaps a new regime, such as an international convention dealing with the commercialisation of space flights and their participants, is necessary. Dr Zhao Yun, amongst others, has supported this suggestion and believes that extending or establishing a new protocol for the Rescue Agreement is a reasonable solution to this legal dilemma.⁶³

III. LIABILITY REGIME

Space activities are risky and dangerous. Therefore, when considering space tourism from a legal perspective, addressing the issues and challenges of the current liability regime of the *corpus iuris spatialis in iuri gentium* should be prioritised in terms of space development and regulation. Ever since the 1963 UN Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, the OST, and the 1972 Liability Convention,⁶⁴ regulating liability has been a crucial element in regulating space. The current liability regime, which is narrowly defined,⁶⁵ was not designed to meet the requirements of the commercial evolution that has occurred in the past two decades.⁶⁶ Furthermore, while current national and international regimes have provided several provisions which regulate liability of commercial space activities,⁶⁷ as far as the commercialisation and privatisation of space activities are concerned, legal issues continue to arise.⁶⁸

62. Masson-Zwaan (n 39) 1604.

63. Yun (n 21) 979.

64. Convention on International Liability for Damage Caused by Space Objects 1972. As of 2007, the Convention has 82 ratifications and 25 signatories. Three European intergovernmental organisations, including the ESA, have accepted the rights and obligations provided for in the Convention.

65. Armel Kerrest, 'Liability for Damage Caused by Space Activities' in Marietta Benkö and Kai-Uwe Schrogl (eds), *Space Law: Current Problems and Perspectives for Future Regulation* (Eleven International Publishing 2005) 91, 104.

66. Dimitrios Buhalis and Carolos Costa, *Consumer, Products and Industry* (Butterworth Heinemann 2006) 157.

67. See further, R Bender, *Space Transportation Liability: National and International Aspects* (Kluwer Law International 1995) 39.

68. Peter Malanczuk, *Akehurst's Modern Introduction to International Law* (7th edn, Routledge 1997) 205.

It is important to note, that the current liability regime has never been used in practice, even though the 1978 COSMOS 954 accident almost set a precedent.⁶⁹

Accordingly, the following chapter will outline the current legal regime related to liability or responsibility for damage and will evaluate the procedures and legal bases under the various international treaties and agreements. The discussion will firstly consider damage caused to states and third parties.⁷⁰ It will then discuss the regime in the context of the International Space Station, and will conclude by analysing the liability regime relating to damage caused to space tourists.

A. Damage Caused to States and Third Parties

Generally, states cannot be held responsible for the actions of private individuals.⁷¹ In space law, however, there is no formal distinction between governmental and non-governmental entities.⁷² Furthermore, the Liability Convention has no specific provisions for private individuals.⁷³ Hence, when a private enterprise or person launches or procures a launch for an object, the state of nationality of the private person,⁷⁴ or rather the state providing the licence for the launch, will be deemed the launching state on their behalf.⁷⁵ Therefore, when discussing liability, potential breaches will be worded in terms of state violations, as opposed to personal violations. The following

69. Kerrest, 'Liability for Damage Caused by Space Activities' (n 65) 104.

70. A third party, in this context, may be defined as a person who does not belong to an entity related to the space mission that is responsible for the damage. Guillaume de Dinechin defines a third party as 'the man in the street towards which the liability is borne by a participant in a space mission [which] is absolute'. Guillaume de Dinechin, 'Astronauts in Space: Liability and Insurance Coverage' (Legal and Ethical Framework for Astronauts in Space Sojourns Symposium, Paris, October 2004) <<http://unesdoc.unesco.org/images/0013/001397/139752m.pdf>> accessed 6 June 2012, 82, 84.

71. cf International Law Commission, 'Draft Articles on Responsibility of States for Internationally Wrongful Acts' (Supplement No 10 (A/56/10), November 2001) Article 8 (noting that states will only be responsible for private acts if the private 'person or group of persons is in fact acting on the instructions of, or under the direction or control of, that State in carrying out the conduct'); See further, Craig Scott, *Torture as Tort: Comparative Perspectives on the Development of Transnational Human Rights Litigation* (Hart Publishing 2001).

72. See further, Armel Kerrest, 'The need to implement the Outer Space Treaty in national law in the light of current and foreseeable space activities' (The Space Law Symposium on National Space Legislation – Crafting Legal Engines for the Growth of Space Activities, London, March 2010) <<http://www.oosa.unvienna.org/pdf/pres/lsc2010/sympo1.pdf>> accessed 6 June 2012.

73. R Thomas Ranking, 'Space Tourism: Fanny Packs, Ugly T-Shirts, and the Law in Outer Space' (2003) 36 *Suffolk University Law Review* 695, 706-07.

74. Kerrest, 'Liability for Damage Caused by Space Activities' (n 65) 103.

75. Liability Convention (n 64) Article I(c) defines a launching state as '(i) a State which launches or procures the launching of a space object; (ii) a State from whose territory or facility a space object is launched'; See generally, Ka Fei Wong, 'Collaboration in the Exploration of Outer Space: Using ADR to Resolve Conflicts in Space' (2007) 7 *Cardozo Journal of Conflict Resolution* 445, 453-54 (providing an overview of the procedure for bringing a claim under the Liability Convention).

sections will evaluate this aspect of liability by examining the state-oriented responsibility system under the OST, the dual liability system under the Liability Convention, and the applicability of these concepts under parallel regimes found in domestic law.

i. The OST and International Law

The principles relating to state responsibility are established by Articles VI and VII of the OST. Article VI renders states internationally liable for both governmental and non-governmental activities in outer space.⁷⁶ As noted above, space law is unique compared to other forms of international law for adopting this broader form of accountability. For instance, in other types of international law, such as aviation law, the state is only responsible for the regulation of, but not for damage caused by, a private entity, such as an airline.⁷⁷ For this reason, Article VI also contains various safeguards, requiring states to ensure that they control, authorise, and supervise private space activities.⁷⁸ Article VI further stipulates that states are responsible for conducting outer space activities in conformity with the provisions set forth in the OST and international law.⁷⁹ The implication of this is that any breach, even if committed by a private entity, will be treated as a wrongful act of the relevant state under international law. This liability is governed by the International Law Commission's Draft Articles on Responsibility of States for Internationally Wrongful Acts.⁸⁰

76. OST (n 10) Article VI provides that: 'States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities'.

77. Xue Hanqin, *Transboundary Damage in International Law* (Cambridge University Press 2003) 77-78.

78. Gérardine Meishan Goh, *Dispute Settlement in International Space Law: A Multi-Door Courthouse for Outer Space* (Martinus Nijhoff Publishers 2007) 164.

79. *ibid*; See further, Fabio Tronchetti, *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies: A Proposal for a Legal Regime* (Martinus Nijhoff Publishers 2009) 33-37; See also, OST (n 10) Article III:

States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding.

80. International Law Commission, 'Draft Articles on Responsibility of States for Internationally Wrongful Acts' (Supplement No 10 (A/56/10), November 2001).

81. *ibid* Article 2. Article 12 further provides that '[t]here is a breach of an international obligation by a State when an act of that State is not in conformity with what is required of it by that obligation, regardless of its origin or character'; See generally, Corfu Channel Case (*United Kingdom v Albania*) [1949] ICJ Rep 4 (ruling that Albania committed an internationally wrongful act against the United Kingdom).

Under these Draft Articles, any internationally wrongful act or omission by a state 'constitutes a breach of an international obligation of the State'⁸¹ and is actionable *per se*.⁸² If the breach resulted in actual harm, the offending state will be compelled to provide full reparation either through *restitutio in integrum* or, where more practical, monetary compensation.⁸³ Finally, regardless of the type of liability imposed, the Draft Articles require the offending state 'to cease that act [and] to offer appropriate assurances and guarantees of non-repetition ...'⁸⁴ These requirements were established to restore any rapports that could have been affected as a result of the breach.⁸⁵

In addition to Article VI, Article VII of the OST also deals with liability and provides that each state party to the OST which falls under the definition of a launching state is:

internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies.⁸⁶

Thus, the fact that damage is often linked to responsibility can lead to a confusing overlap between the concepts of liability and responsibility, particularly as in some cases these notions have been used synonymously.⁸⁷ On this point, various experts have made suggestions about a distinction between the two terms. The International Law Commission has proposed that in relation to internationally wrongful acts resulting in injurious outcomes, the appropriate term would be 'responsibility'.⁸⁸ As for the term 'liability', Karl Zemanek suggests that it should be used to outline a 'duty to repair damage' not necessarily resulting from an unlawful act or a wrongdoing.⁸⁹ However,

82. cf Frans G von der Dunk, 'Liability Versus Responsibility in Space Law: Misconception or Misconstruction?' (Proceedings of the Thirty-Fourth Colloquium on the Law of Outer Space, Montreal, October 1991) 363, 364 (noting that the intrusion of a foreign aircraft in the sovereign airspace of another state is an example of liability *per se* and noting that an 'official apology' is an example of a typical remedy in such a case).

83. Paul G Dembling, 'A Liability Treaty for Outer Space Activities' (1970) 19 American University Law Review 33, 41.

84. Draft Articles (n 80) Article 30.

85. Marten Zwanenburg, *Accountability of Peace Support Operations* (Martinus Nijhoff Publishers 2005) 210.

86. OST (n 10) Article VII.

87. Marie-Louise Larsson, *The Law of Environmental Damage: Liability and Reparation* (Kluwer Law International 1999) 154.

88. International Law Commission, 'Report of the Commission on the Work of its Twenty-Fifth Session' (1973) 1 Yearbook of the International Law Commission, ch II.

89. Karl Zemanek, 'Causes and Forms of International Liability' in Bin Cheng and ED Brown (eds), *Contemporary Problems of International Law: essays in honour of Georg Schwarzenberger on his eightieth birthday* (Stevens and Son 1988) 319.

Professor Fabio Tronchetti explains that such a differentiation does not exist in three of the official languages of the OST; they instead use only the term 'liability'.⁹⁰

ii. The Regime under the Liability Convention

The Liability Convention greatly enhanced the liability framework within outer space. Article II of the Liability Convention imposes absolute liability on a state to pay monetary reparation in cases of damage suffered on the surface of the Earth or to an aircraft in flight caused by the state's space object.⁹¹ This provision adopts an objective strict liability approach, under which it is not necessary to establish fault in order to oblige a state to provide unlimited monetary compensation.⁹² Currently, however, compensation is measured in the light of principles of justice and equity rather than a fixed legal mechanism for regulating such recoveries.⁹³ Such 'abandonment of wrongfulness as a liability generating condition'⁹⁴ likens the liability regime used at space to that used at sea.⁹⁵ Nonetheless, some consider this standard to be a trendsetting innovation in international space law.⁹⁶

Article III of the Liability Convention relates to damage not occurring on the Earth's surface but caused by persons, space objects, or other property of a launching state. Unlike the strict liability standard for damage caused on the surface of the Earth, the standard for damage not taking place on the surface of the Earth is a fault-based subjective standard and, like Article II, there are no limitations on monetary compensation.⁹⁷ Both of these concepts of liability differ from the liability provided for under Article VI of the OST. Under the OST, states are responsible for all activities in outer space, but under Liability Convention, states will only become responsible if the activities in outer space cause damage.

90. The three languages that Tronchetti refers to are French ('responsibilite'), Spanish ('responsibilidad'), and Russian ('ОТВЕТСТВЕННОСТЬ'). Fabio Tronchetti, *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies: A Proposal for a Legal Regime* (Martinus Nijhoff Publishers 2009) 37.

91. Liability Convention (n 64) Article II; See also, Ricky J Lee, 'The Convention on International Liability for Damage Caused by Space Objects and the Domestic Regulatory Responses to its Implications' (2006) 31 *Annals of Air and Space Law* 351, para II.A.2.3. There is ambiguity concerning whether the seabed could be considered as part of the surface of the Earth under Article II of the Liability Convention.

92. Kerrest, 'Liability for Damage Caused by Space Activities' (n 65) 96.

93. Julian Hermida, 'International Law' <www.julianhermida.com/algoma/intlawreadingsss-pacelaw.pdf> accessed 10 November 2011.

94. René Lefeber, *Transboundary Environmental Interference and the Origin of State Liability* (Martinus Nijhoff Publishers 1996) 148.

95. Geneva Convention on the High Seas 1958, Article 22(3).

96. See example, Malanczuk (n 68) 205.

97. *ibid.*

Despite some positive features of the Convention, such as its provisions relating to exoneration⁹⁸ and dispute resolution,⁹⁹ its overall effect obliges states to authorise and supervise private entities to ensure that their conduct does not render the state liable for their actions. This can be unfair since states, in certain scenarios, may not be directly involved in the offending activities and may not be benefiting from them. This is further hampered by the Convention's failure to cap the amount of compensation.¹⁰⁰ The seemingly unlimited compensation can have a chilling effect on the development of private space programmes, as the state will likely seek reimbursement from private entities for any loss suffered.¹⁰¹ Moreover, this can also affect the development of national programmes because the states themselves may be fearful of the associated financial risks. This results in the need for states to closely monitor their authorisation of private activities on a case-by-case basis and requires the states to evaluate the private operator's technical capabilities, stability, solidity, and financial capacity.

If states continue to allow private entities to perform private space endeavours, they may impose strict rules and regulations upon their authorisation.¹⁰² Payments of compensation, therefore, may be heavily regulated which could encourage private entities to launch from a state that is incapable or unwilling to control and supervise their activities. Ultimately this may lead to victims of the same type of accident receiving different compensation and thus, forum-shopping.¹⁰³ The absence of uniformity in such situations leads to insecurity in international law.¹⁰⁴ As Beck notes, '[t]he Liability Convention's complete failure to hold private entities accountable poses problems for all commercial space developments.'¹⁰⁵

Accordingly, some commentators and specialists contend that a new liability regime is needed and that the creation of a new convention or treaty would offer a solution to the inadequacies of the current regime.¹⁰⁶ The Warsaw Convention has been suggested as a suitable model for this form of development.¹⁰⁷ Under such a model, private entities would be liable as well

98. Liability Convention (n 64) Article VI.

99. *ibid* Article XIV.

100. Bin Cheng, 'International Responsibility and Liability for Launch Activities' in Chia-Jui Cheng (ed), *The Use of Air and Outer Space Cooperation and Competition* (Kluwer Law International 1998) 159, 189.

101. Kerrest, 'Liability for Damage Caused by Space Activities' (n 65) 100.

102. Michael Wollersheim, 'Considerations towards the Legal Framework of Space Tourism' (Proceedings of the 2nd International Symposium on Space Tourism, Bremen, April 1999) para 3.2.

103. Hanqin (n 77) 32.

104. Lucien Rapp (ed), *Telecommunications and Space Journal 1995: Law-Economics-Public Policy* (vol 2, Routledge 1995) 165.

105. Beck (n 20) 36.

106. Yun (n 21) 964.

107. S Kaiser and M Mejía-Kaiser, 'Space Passenger Liability' (Proceedings of the Forty-Eight Colloquium on the Law of Outer Space, Fukuoka, October 2005) 207, 207.

as launching states.¹⁰⁸ Moreover, such advancement would help create a clear and coherent legal regime and would also eliminate issues such as forum-shopping and any unbalanced compensation levels.¹⁰⁹ Finally, this approach would regulate and provide a remedy for direct private claims in a sufficient and effective manner.¹¹⁰

Others contend that the current international liability framework is sufficient and instead maintain that there is a need to implement national legislation to work side-by-side with the current international regime. For instance, Professor Armel Kerrest affirms that the treaties ‘have shown that they maintain a good international legal framework’¹¹¹ and emphasises that it is important to facilitate the implementation of the current liability regime on a domestic level.¹¹² Dr Julian Hermida suggests that in order for states to protect themselves they must consider two solutions. Firstly, states should create new domestic legislation to minimise the risk posed by the space activities conducted by their nationals.¹¹³ Secondly, states should establish legal measures that enable them to recover, at the very least, a portion of any compensation paid by the countries on behalf of their nationals.¹¹⁴ In other words, a risk distribution suitable for the state must be made available.

iii. Parallel Domestic Regimes

In accordance with the discussion above, this section will evaluate whether national legislation can complement international law and cure the inadequacies resulting from the international liability regime. It will also evaluate whether national legislation aids in the development of commercial space activities. It will do so by primarily evaluating the systems in the United Kingdom and the United States due to their well-established regimes.

In the United Kingdom, space activities undertaken by nationals or national organisations are regulated by the Outer Space Act 1986 (‘OSA’).

108. Isabella Henrietta Philepina Diederiks-Verschoor and Vladimír Kopal, *An Introduction to Space Law* (Kluwer Law International 2008) 16.

109. Kerrest, ‘Liability for Damage Caused by Space Activities’ (n 65) 106.

110. Freeland, ‘Up, Up and ... Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space’ (n 36) 17.

111. Kerrest, ‘The need to implement the Outer Space Treaty in national law in the light of current and foreseeable space activities’ (n 72) 9.

112. *ibid.*

113. See further, Julian Hermida, ‘Law Reform and National Space Law: A Participatory Approach to Space Law Making in Developing Countries’ (2009) 39 *Annals of Air and Space Law* 845.

114. Julian Hermida, *Legal Basis for a National Space Legislation* (Kluwer International Publishers 2004) 27.

115. ‘The Outer Space Act 1986’ (*UK Space Agency*) <www.bis.gov.uk/ukspaceagency/what-we-do/space-and-the-growth-agenda/helping-the-UK-space-sector/the-outer-space-act-1986> accessed 3 November 2010.

The Act is aimed at ensuring compliance with the UK's obligations under international treaties and principles covering the use of outer space, the registration of objects, and the liability for damage caused by space objects.¹¹⁵ It gives the British Government jurisdiction over the launch, procurement of a launch, operation of a space object, or any other space activity in the United Kingdom.¹¹⁶ Moreover, section 10 of the Act ensures that the United Kingdom is indemnified by private citizens against any liability imposed on it by any space treaty claim.¹¹⁷ Furthermore, section 10 also provides no limit on the amount of monetary compensation.¹¹⁸ This indemnification provision, which is unique to the United Kingdom, has a detrimental effect on national space companies within the United Kingdom as they are at a comparative disadvantage to space companies in other countries.¹¹⁹ Furthermore, the UK Secretary of State may require that the licensee must be insured in order to ensure that the state is able to retrieve any funds owed by the licensee as a result of the indemnification.¹²⁰

For the United Kingdom to overcome its competitive disadvantage, it must provide a similar legal framework to that of the United States discussed below. This could be done by eradicating section 10 of the OSA and reinstating a capped liability. Joanne Wheeler, a legal expert in the field, supports this resolution and believes that 'the UK space industry has much to offer but it needs a supportive regulatory framework, which creates a level playing field, to encourage growth and investment'.¹²¹ The UK's Minister of Science, David Willetts, foresees a growth of the space tourism industry in the United Kingdom and advocates for a sum of £10 million to be invested in the sector.¹²² He confirms that the OSA is currently under review and, accordingly, officials are working towards an adjustment.¹²³ While the amount of the indemnification cap has not been verified, it is understood that the sum of both the liability limit and the third party insurance will be around £47 million.¹²⁴

116. Outer Space Act 1986, section 1; See generally, Teresa Fuentes Camacho, *The International Dimensions of Cyberspace Law* (Ashgate 2000) 138 (noting that this complete list of space activities is subject to a licensing obligation under section 3 of the Act).

117. Outer Space Act 1986, section 10; See further, Bender (n 67) 39.

118. Outer Space Act 1986, section 10(1).

119. Science and Technology Committee, *2007: A Space Policy* (HC 2006-07) <<http://www.publications.parliament.uk/pa/cm200607/cmselect/cmsctech/66/66i.pdf>> accessed 6 June 2012, para 331.

120. OSA (n 118) section 5(2)(f); See further, HL van Traa-Engelman, *Commercial Utilization of Outer Space* (Martinus Nijhoff Publishers 1993) 307.

121. Joanne Wheeler, 'Budget Boost for the UK Space Industry' (*Mondaq*, 5 April 2011) <<http://www.mondaq.com/article.asp?articleid=128302>> accessed 30 September 2011.

122. Richard Tyler, 'Budget 2011: UK "will be Europe's Space Tourist Capital"' (*The Telegraph*, 24 March 2011) <www.telegraph.co.uk/finance/budget/8402330/Budget-2011-UK-will-be-Europes-space-tourist-capital.html> accessed 1 October 2011.

123. HC Deb 29 June 2011, vol 179, col 841W.

124. Wheeler (n 121).

The US regulation differs from UK regulation since the creation of the 2004 Commercial Space Launch Amendments Act. This Act has set variable total limits of compensation in order to protect the progress of commercial space activities and ease the development of the industry within the United States. The first key provision is outlined in section 70112(a)1 of the Act, and stipulates that liability insurance — capped at \$500 million¹²⁵ — must be acquired by the licensee in relation to claims by third parties. The situation is the same for damage or loss caused to the government,¹²⁶ except the cap is set at \$100 million in such circumstances.¹²⁷ Nevertheless, insurance companies might be reluctant to provide services to such costly and risky activities. If the amount is less than \$100 million, then the maximum liability insurance available ‘on the world market at reasonable cost’ will be owed.¹²⁸ Moreover, with regard to any death, personal injury, or damage to property as a result of an activity under the licence, the licensee is required to provide a reciprocal waiver of claims from their employees, contractors, and customers.¹²⁹ This waiver of liability is of great significance to spaceports that provide commercial activities through federal launch facilities.¹³⁰

The second key provision is found in section 70113 of the Act, and concerns government indemnification of any excess third party liability. Congress can allocate roughly \$1.5 billion to indemnify launch participants and any other persons related to the launch from third party liability,¹³¹ except in cases of wilful misconduct.¹³² This figure varies in line with inflation and must be calculated at the time of the claim.¹³³ In 2011, the figure was calculated at approximately \$2.9 billion.¹³⁴

The Act was put forward by Congress in order to address the lack of capacity in the world insurance market for the provision of sufficient insurance

125. Commercial Space Launch Amendments Act of 2004, 49 USC 70112(a)(3)(A)(i).

126. *ibid* 70112(a)(1)(B).

127. *ibid* 70112(a)(3)(A)(ii).

128. *ibid* 70112(a)(3)(B).

129. *ibid* 70112(b)(1).

130. Michael C Mineiro, ‘Law and Regulation Governing U.S. Commercial Spaceports: Licensing, Liability, and Legal Challenges’ (2008) 73 *Journal of Air Law and Commerce* 759, 795.

131. CSLAA (n 125) section 70113(a)(1)(B); See further, Recent Developments, ‘Commercialization of Space Commercial Space Launch Amendments Act of 2004’ (2004) 17 *Harvard Journal of Law and Technology* 619, 629.

132. JA Vedda, ‘Study of the Liability Risk-Sharing Regime in the United States for Commercial Space Transportation’ [2006] <[http://www.faa.gov/about/office_org/headquarters_offices/ast/reports_studies/media/Risk_Study\(final\).pdf](http://www.faa.gov/about/office_org/headquarters_offices/ast/reports_studies/media/Risk_Study(final).pdf)> accessed 23 March 2011, 2.

133. Timothy J Brennan, Carloyn Kousky, and Molly Macauley, ‘More than a Wing and a Prayer: Government Indemnification of the Commercial Space Launch’ [2009] Resources for the Future Discussion Paper 09-38 <<http://www.rff.org/rff/Documents/RFF-DP-09-38.pdf>> accessed 21 March 2011, 9.

134. The inflation between 1988 and 2011 is approximately 87%: \$1.5 billion in 1988 is roughly equivalent to \$2,880,258,259 in 2011.

policies against catastrophic events.¹³⁵ This provision was due to expire on 31 December, 2009, but was extended to 31 December, 2012, by the House of Representatives.¹³⁶ This extension was based on consideration of whether commercial space launch companies could afford to independently bear insurance costs¹³⁷ and indicates Congress' continued intention to 'create a more level playing field', by protecting both the federal government and the commercial space launch participants.¹³⁸

This concept of operator liability has also been established in other countries, but the amount of the cap varies.¹³⁹ In Australia, insurance prerequisites are required in order to obtain a launch permit.¹⁴⁰ Regulation 7.02 of the Australian Space Activities Regulations provides the method to calculate maximum probable loss for different types of damage. Moreover, section 48 of Australia's Space Activities Act 1998 sets insurance requirements and provides that insurance for the benefit of the Commonwealth is required by the holder of authorisation.¹⁴¹ Another example is in Russia, where a variable amount of insurance is required by any private commercial entity using governmental facilities.¹⁴² The Russian Government will provide

135. See further, Pamela L Meredith, 'Commercial Space Transportation: Liability and Insurance' (Air Transport, Air & Space Law and Regulation, Abu Dhabi, April 2009) <http://www.mcgill.ca/files/iasl/Session_7_Meredith.pdf> accessed 23 February 2011; Commercial Space Launch Act Amendments 1988 (Report of the Senate Committee on Commerce, Science, and Transportation on HR 4399, October 1988) S Rep No 100-593, 9.

136. CSLAA (n 125) section 70113(f); See also, PJ Blount 'H.R. 3819: To extend the commercial space transportation liability regime' (*Res Communis*, 19 October 2009) <<http://rescommunis.wordpress.com/2009/10/19/h-r-3819-to-extend-the-commercial-space-transportation-liability-regime/>> accessed 24 February 2011.

137. Marcia S Smith, 'House Approves Extension of Third Party Liability Indemnification for Commercial Launch Companies' (*Space Policy Online*, 20 October 2011) <<http://www.spacepolicyonline.com/news/house-approves-extension-of-third-party-liability-indemnification-for-commercial-launch-companies>> accessed 23 February 2011.

138. Timothy Robert Hughes and Esta Rosenberg, 'Space Travel Law (and Politics): The Evolution of the Commercial Space Launch Amendments Act of 2004' (2005) 31 *Journal of Space Law* 1, 16-17.

139. Lyall, *Space Law: A Treatise* (n 23) 115. Other examples include: section 14 of the South African Space Affairs Act 1994 and section 3 of the Swedish Act on Space Activities (1982:963).

140. United Nations Legal Subcommittee, 'Schematic Overview of National Regulatory Frameworks for Space Activities' (Committee on the Peaceful Uses of Outer Space Forty-Ninth Session, London, March 2010) <http://www.oosa.unvienna.org/pdf/limited/c2/AC105_C2_2010_CRP12E.pdf> accessed 19 January 2011, 2.

141. *ibid.*

142. Article 25.1 of the Russian Federation Law on Space Activities 1993 provides as follows:

[t]he organizations and citizens, which exploit space technics or to whose order the creation and use of space technics in scientific and national-economy purpose is carried out, shall take compulsory insurance coverage in the amount set by legislation of Russian Federation.

guaranteed compensation,¹⁴³ but only for direct damages.¹⁴⁴ It is important to note that both Russian and Australian private operators will be responsible for any damages caused by their space activities to the state and its citizens.¹⁴⁵

The above examples show that the regulation of liability under national legislation can function in conjunction with international legislation to protect the state and the space tourism industry from the legal inadequacies of the OST and the Liability Convention. This ultimately protects the public's interest in the development of commercial space activities. Nevertheless, the creation of adequate and universal domestic space legislation across all spacefaring countries is a demanding task with uncertain results, particularly in such a complex, risky, and innovative enterprise. Thus, the formulation of a new international convention is clearly a more realistic and practical solution to the inadequacies of the current regime.

B. International Space Station

Space activities related to the ISS are also becoming more commercial in nature and raise various legal considerations. Therefore, issues of damage and fault regarding the ISS have become important within the corpus of international private law.¹⁴⁶ The objective of this section is to outline the ISS's current liability structure and analyse the consequences of damage caused by space tourists.

As noted at the outset of this paper, the starting point of the commercial use of the ISS was the orbital journey of Russian national Dennis Tito on the Soyuz Capsule in 2001. This journey raised several legal considerations relating to the ISS. Tito's visit was of concern to the other ISS partners as

Compulsory insurance shall be affected against damage to the life and health of the cosmonauts and the personnel at the ground and other objects of space infrastructure, as well as against property damage to third parties.

Compulsory insurance premiums shall be transferred to the Russian Space Fund or other insurance companies which have obtained a license for the insurance of space activity, and shall be used to compensate for damage as a result of accidents while carrying out space activity on the basis of contracts of insurance with organizations and citizens carrying out such activity.

143. *ibid* Article 30.1.

144. Ricky J Lee, 'The Convention on International Liability for Damage Caused by Space Objects and the Domestic Regulatory Responses to its Implications' (2006) 31 *Annals of Air and Space Law* 351, para II.A.2.3.

145. Michael Gerhard and Kai-Uwe Schrogl, 'Report of the Project 2001 Working Group on National Space Legislation: Need and Prospects for National Space Legislation' (Proceedings of the Workshop of Project 2001 Plus, Cologne, January 2004) 18.

146. von der Dunk, 'Space Law in the Age of the International Space Station' (n 47) 163.

Tito might cause damage to their module of the ISS. In the case of America, under the previously existing liability regimes, NASA would have been unable to impose liability on Russia or their space agency for any damage Tito may have caused.¹⁴⁷ It is no surprise, therefore, that Tito's visit to the ISS was subject to approval by the Multilateral Coordination Board, which requested that Tito assume personal liability for monetary compensation resulting from any damage caused by him on the ISS.¹⁴⁸ Tito was also under pressure from the partners, particularly NASA, not to claim in the event of any personal injury suffered by him on the ISS.¹⁴⁹ Satisfied by the successful result of Tito's trip to the ISS, NASA has since become more supportive of such commercial journeys.¹⁵⁰

The IGA and the MCOP Agreement regulate the requirements for space tourists intending to visit the ISS and provide a code of conduct which tourists must adhere to.¹⁵¹ Associated activities are regulated on an inter-state level by the IGA which serves as a binding guide to space agencies, contractors, subcontractors, and even customers.¹⁵² It establishes a crucial risk management system which, through a cross-waiver of liability, allocates the risks and responsibilities for all parties involved.¹⁵³ The main premise of such a waiver is to provide a limitation for launch-related claims and insurance.¹⁵⁴

Waivers of liability and insurance are considered simultaneously when dealing with any costs and liabilities of accidents that arise in relation to the ISS's space ventures.¹⁵⁵ Article 16 of the IGA provides for a cross-waiver of liability which applies to the partner states and is aimed at 'encouraging participation in the exploration, exploitation, and use of outer space through the Space Station'.¹⁵⁶ The cross-waiver will only apply if a person, entity, or property causes damage 'by virtue of its involvement in Protected Space

147. Frans G von der Dunk, 'Passing the Buck to Rogers: International Liability Issues in Private Spaceflight' (2007) 86 *Nebraska Law Review* 400, 415-16.

148. NASA HQ, 'Decision Paper on Rosaviakosmos request of exemption to fly Mr. Dennis Tito' (*SpaceRef*, 24 April 2001) <<http://www.spaceref.com/news/viewpr.html?pid=4604>> accessed 14 April 2011. The Multilateral Coordination Board consists of representatives from each of the partner states' agencies and has established panels responsible for the long-range strategic coordination of the ISS.

149. Michael van Pelt, *Space Tourism: Adventures in Earth's Orbit and Beyond* (Praxis Publishing 2005) 7.

150. Freeland, 'Up, Up and ... Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space' (n 36) 3.

151. 'International Space Station Legal Framework' (*European Space Agency*, 24 October 2008) <http://www.esa.int/esaHS/ESAH7OoVMOC_iss_2.html> accessed 7 April 2011.

152. von der Dunk, 'A Sleeping Beauty Awakens: The 1968 Rescue Agreement after Forty Years' (n 50) 414.

153. Hermida, *Legal Basis for a National Space Legislation* (n 114) 20.

154. Julian Hermida, 'Risk Management in Arianespace space launch agreements' (2000) 25 *Annals of Air and Space Law* 143, 146.

155. Smith, 'Legal Parameters of Space Tourism' (n 41) 3.

156. IGA (n 42) Article 16(1).

Operations'.¹⁵⁷ This protection acts against any other partner states, their related entities, and employees of the entities or related entities of another partner state.¹⁵⁸ The activities covered by the cross-waiver of liability are activities which fall under the definition of 'Protected Space Operations' and include all activities relating to the launch, the space station, and the payload.¹⁵⁹ Also included within the scope of these protected operations are 'all activities related to ground support, test [sic], training, simulation, or guidance and control equipment and related facilities or services'.¹⁶⁰ Moreover, any activities which concern the development of the Space Station as provided in Article 14 of the IGA are also protected.¹⁶¹ Nevertheless, Article 16(2)(f) of the IGA directly excludes any 'activities on Earth which are conducted on return from the Space Station to develop further a payload's product or process for use other than for Space Station related activities in implementation of this Agreement'.¹⁶²

The cross-waiver of liability by virtue of the IGA does not apply to: any claims between the partner state and its own entities or related entities; any claims by natural persons and their estate for death, damage, or impairment of health; any claims for damage caused by wilful misconduct; any intellectual property claims; or any claims for damage resulting from a failure of a partner state to extend the cross-waiver of liability to its related entities.¹⁶³

To avoid any complications resulting from such scenarios, insurance is a necessity for all stakeholders. However, obtaining insurance to cover actions such as wilful misconduct may prove to be quite difficult and would drastically increase premiums.¹⁶⁴ Moreover, in relation to international third party liability, Article 17 of the IGA provides that the liability regime under the Liability Convention is applicable, rendering partner states and the European Space Agency internationally liable in case of such damage. As this does not conflict with the cross-waiver of liability, states would still be protected in the event of any damage caused by a tourist or any other related entity.¹⁶⁵

In legal practice, this aspect of the IGA means that any person intending to use the ISS will be required to contractually agree to waive inter-party

157. *ibid* Article 16(3)(a).

158. *ibid*.

159. *ibid* Article 16(2)(f). 'Activity' in this context is defined as 'research, design, development, test, manufacture, assembly, integration, operation or use'. *ibid* Article 16(f)(1).

160. *ibid* Article 16(2)(f)(2).

161. *ibid* Article 16(2)(f).

162. *ibid*.

163. *ibid* Article 16(3)(d).

164. Smith, 'Legal Parameters of Space Tourism' (n 41) 11 en 46.

165. Mary Catherine Devlin and William G Schmidt, 'Legal Issues Continue to Surround the International Space Station' (1998) 8 US Air Force Academy Journal Legal Studies 237, 246.

liability with the relevant space agency.¹⁶⁶ However, the parties to the contract are able to choose applicable law should any legal issues arise.¹⁶⁷ Disputes are settled by the Arbitration Tribunal, which normally sits in the country where the customer has their legal seat or the place where the contract is executed.¹⁶⁸ By limiting liabilities imposed on states, the cross-waiver allows commercial persons or entities to enjoy reduced insurance costs.¹⁶⁹ Moreover, fault liability under the Liability Convention could only be imposed on states if damage is caused to the ISS or its crew. Nevertheless, it has been stated that there is room to develop further umbrella insurance provisions that might tackle liability in such situations.¹⁷⁰ Other commentators are of the opinion that such disagreements should instead be settled by adhering to the already-established framework of international law and international legal dispute settlement.¹⁷¹

To conclude, the liability framework underpinning the ISS certainly presents an important development in the context of liability in outer space. The development, however, did not alter the previously existing liability situation under Article 16 of the IGA or even under the Liability Convention when dealing with third party liability.¹⁷² Consequently, in the event of liability resulting from damage caused on the ISS by a space tourist, the cross-waiver may prevent the space tourist's state from seeking reparation or compensation. Nevertheless, this does not necessarily negate the possibility of the space tourist being held personally responsible if their actions harm ISS personnel or property.

C. Damage Caused to Space Tourists

Due to the number of risks associated with space travel, there is a need to consider the implications of damage and injury that space tourists participating in commercial space activities could suffer. As discussed in Part II, the legal status of space tourists is still uncertain. Unless space tourists are given the status of an astronaut, the current space law regime does not provide

166. European Space Agency (n 151).

167. European Space Agency, 'European Users guide to Low Gravity Platforms' [2001] UIC-ESA-UM-0001 Issue 2 <http://wsn.spaceflight.esa.int/docs/EuropeanUserGuide/chapter_7_iss.pdf> accessed 9 May 2011, para 7.10.2.3.

168. *ibid.*

169. Smith, 'Legal Parameters of Space Tourism' (n 41) 7.

170. *ibid.*

171. Katherine M Gorove, 'Settlement of Space Law Disputes' (1993) 21(1) *Journal of Space Law* 64, 65.

172. Alessandro Farand, 'Jurisdiction and Liability Issues in Carrying out Commercial Activities in the International Space Station (ISS) Programme' in FG von der Dunk and MMTA Brus (eds), *The International Space Station: Commercial Utilisation from a European Legal Perspective* (Martinus Nijhoff Publishers 2006) 87, 92.

sufficient regulation in relation to their rights and obligations.¹⁷³ Nonetheless, it should be appreciated that in practice, it is a customary principle that governments are able to claim on behalf of their national corporations or individuals who are injured in space.¹⁷⁴ Such claims must be brought forward through diplomatic channels within a year of the occurrence of the damage.¹⁷⁵ In the event that a resolution is not achieved through diplomatic channels, the process will need to operate under Article XIV of the Liability Convention, which provides that the matter shall continue via a Claims Commission established at the request of either party related to the conflict. This Claims Commission has the power to decide on both the procedure and the amount of the reparation¹⁷⁶ on a majoritarian basis.¹⁷⁷ The Commission's decisions are reached and made public within a year of its establishment and are 'final and binding' in nature.¹⁷⁸

It is important to note, however, that despite the custom described above, no permanent dispute resolution forums have been established within the space law regime set by either the OST or the Liability Convention.¹⁷⁹ Instead, Article III of the OST enables participants to operate dispute resolution methods via international law, including through the method prescribed in the Charter of the United Nations.¹⁸⁰ Accordingly, Article 33 of the Charter of the United Nations provides that in circumstances of personal injury and property damage, the parties should 'seek a solution by negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means'.¹⁸¹ If this is ineffective

173. See further, Freeland, 'Up, Up and ... Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space' (n 36) 16.

174. cf Nottebohm Case (*Liechtenstein v Guatemala*) [1955] ICJ Rep 4 (illustrating this custom in the context of an action brought by Liechtenstein forcing Guatemala to recognise an individual as a Liechtensteinian national); Freeland, 'Up, Up and ... Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space' (n 36) 16.

175. Liability Convention (n 64) Article X.

176. *ibid* Article XVIII; See further, Nandasiri Jasentuliyana, *International Space Law and the United Nations* (Kluwer Law International 1999) 35-36.

177. 'Except in the case of decisions and awards by a single-member Commission, all decisions and awards of the Commission shall be by majority vote'. Liability Convention (n 64) Article XVI(5).

178. *ibid* Article XIX.

179. Bender (n 67) 306.

180. OST (n 10) Article III:

States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security promoting international cooperation and understanding.

181. Charter of the United Nations, Article 33; Donald Rothwell and others, *International Law: Cases and Materials with Australian Perspectives* (Cambridge University Press 2010) 660.

in resolving the dispute, the conflict must be referred to the United Nations Security Council.¹⁸² The Security Council will have to assess whether the issue affects the ‘maintenance of international peace and security’. If it does, then referral to Article 36 is required.¹⁸³ Article 36 says such ‘legal disputes should as a general rule be referred ... to the International Court of Justice’ for a final solution.¹⁸⁴

Like air travel, significant insurance coverage will be required for space passenger services, transport, and accommodation.¹⁸⁵ Moreover, in the same way as with any new aircraft, there is a need to encourage the confidence of insurance companies regarding the extent of the risks involved with the new services. This confidence is generally achieved through the establishment of agreed standards. Nevertheless, at the beginning of these commercial space flights, insurance quotes were difficult to calculate due to the size of the potential market and the limited statistical information available. This resulted in the incorporation of liability caps.¹⁸⁶ However, while there remains a degree of uncertainty surrounding the accuracy of the estimations, it appears that the objective risks are likely to be smaller than in cases of aviation.¹⁸⁷ After all, as expert in the field Patrick Collins notes, ‘a scenario involving tens of flights per day, and hundreds of thousands of passengers per year is still much smaller than other existing travel industries’.¹⁸⁸

As the space tourism industry grows considerably, placing limits on liability for the owners and operators is becoming of indispensable substance.¹⁸⁹ To this effect, liability limitations are generally incorporated as warnings on tickets or as exclusion clauses in contracts and booking forms. For example, the space tourist operator Space Adventures provides a clause in their reservation agreement stating that ‘Space Adventures acts only to represent the space vehicle owners and masters, so there is no liability in case of damage suffered by passengers or their properties’.¹⁹⁰ In other words, space tourists travelling with agents such as Space Adventures are not eligible for full

182. Charter of the United Nations, Article 37(1).

183. *ibid* Article 37(2).

184. *ibid* Article 36(3); FB Schick, ‘Council and Court of the United Nations’ (1946) 9 *Modern Law Review* 97, 103.

185. Patrick Collins and Koichi Yonemoto, ‘Legal and Regulatory Issues for Passenger Space Travel’ (Proceedings of the Forty-First Colloquium on the Law of Outer Space, Melbourne, October 1998) 224.

186. *ibid*.

187. *ibid*; See also, Robert Goehlich, ‘Suitability of Future Trans-atmospheric Vehicles for Mass Space Tourism Flights’ (24th International Congress of the Aeronautical Sciences, Yokohama, November 2004).

188. Patrick Collins, ‘Implications of Reduced Launch Costs for Commercial Space Law’ (*Space Future*) <http://www.spacefuture.com/archive/implications_of_reduced_launch_cost_for_commercial_space_law.shtml> accessed 6 June 2012.

189. L Roberts, ‘Space Business Incentives: It’s time to act’ (1996) 8(2) *Ad Astra* 38.

190. Email from Tom Shelley, President at Space Adventures, to author (19 November 2011).

reparation for any losses suffered. Dr Zhao Yun maintains that this will not necessarily deter prospective customers as they have an option to, like in the case of aviation, purchase additional insurance for death and injury.¹⁹¹ Like any industry, the risks of space tourism will be estimated more accurately as it develops. If the risks revolving around space activities are reduced, limitations on liability will not be deemed as necessary and will eventually harmonise to an extent with the consumer.¹⁹²

Exclusion clauses minimising liability, such as the example from Space Adventures above, must adhere to national legislation before they are utilised. For example, under English law, a business is barred from excluding liability for death and personal injury caused by its employees' negligence.¹⁹³ Such principles are also present in aviation law courtesy of the Montreal Convention.¹⁹⁴ The Convention states that a carrier is liable for death or injury both on board, embarking, or disembarking an aircraft.¹⁹⁵ Moreover, Article 26 of the Convention disallows any exclusions of liability in such cases. This position is also supported by European law, as Directive 90/314/EEC¹⁹⁶ prevents travel agencies from excluding liability in cases of death or injury.¹⁹⁷ However, some jurisdictions allow such limitation.¹⁹⁸ This results in lack of uniformity in the *iuris corpus spatialis*, and poses more challenges to the regulation of the commercial space flight industry. In jurisdictions where such exclusion clauses are allowed, it would be appropriate to offer some form of protection to space tourists that renders space carriers unable to avoid liability.¹⁹⁹ It has been suggested that this could be tackled simply by conforming the terms and conditions between passengers and operators with suitable insurance coverage.²⁰⁰

191. Yun (n 21) 968.

192. Collins, 'Implications of Reduced Launch Costs for Commercial Space Law' (n 188).

193. 'A person cannot by reference to any contract term or to a notice given to persons generally or to particular persons exclude or restrict his liability for death or personal injury resulting from negligence'. Unfair Contract Terms Act 1977, section 2(1).

194. The Convention for the Unification of Certain Rules for International Carriage by Air (Montreal, 28 May 1999).

195. *ibid* Article 17(1).

196. Council Directive 90/314/EEC of 13 June 1990 laying down specific provisions for package travel, package holidays, and package tours [1990] OLJ 158/59.

197. See further, AC Ciuera and GB Spírchez, 'The Legal Protection for the Consumer of Package Travel, Package Holidays and Package Tours' (Proceedings of the International Conference BIOATLAS, Transylvania, 2010) 167, 170.

198. Xia Chen, *Limitation of Liability for Maritime Claims: A Study of U.S. Law, Chinese Law and International Conventions* (Kluwer Law International 2001) 30-31.

199. Zeldine O'Brien, 'Fly Me to the Moon, But is My Carrier Liable if I have an Accident?' (2006) 5 Trinity College Journal of Postgraduate Research 20, 21.

200. See further, Steven Freeland, 'Fly Me to the Moon: How Will International Law Cope with Commercial Space Tourism?' (2010) 11 Melbourne Journal of International Law 90, 105-09.

This area of space law does not promote self-regulation and, accordingly, informal methods have been used to provide further protection to operators in terms of exculpation of potential damage suffered by space tourists.²⁰¹ In the United States, federal law requires space tourists to provide a signed waiver for any damage or loss caused during the space flight.²⁰² Moreover, federal law requires the completion of an informed consent form containing a declaration that the space flight participants recognise that risks including death and injury are involved in the journey and that their participation is voluntary.²⁰³ This form of limitation allows the operator to proceed without any legal concerns.²⁰⁴ Tommaso Sgobba, President of the International Association for the Advancement of Space Safety, is of the opinion that informed consent 'favours the operator only'.²⁰⁵ In addition, Professor Peter Haanappel states that informed consent forms are only used in medical law and do not necessarily exculpate operators from all claims, particularly in cases of wilful misconduct.²⁰⁶ Consequently, he has proposed that the informed consent system should be replaced by compulsory insurance.²⁰⁷

201. See further, Rachel A Yates, 'Informal Regulation of Space Activities' (2008) 87 *Nebraska Law Review* 530.

202. Terry L Hardy, 'Risk Perception and Communication in Commercial Reusable Launch Vehicle Operations' (The 1st International Association for the Advancement of Space Safety Conference, Nice, October 2005) <http://systemsafetyskeptic.com/yahoo_site_admin/assets/docs/IAASS_Risk_Perception_Paper_final.26865903.pdf> accessed 12 December 2011, 1.

203. 14 Code of Federal Regulation, section 460.45(f) states that:

[b]efore flight, an operator must provide each space flight participant an opportunity to ask questions orally to acquire a better understanding of the hazards and risks of the mission, and each space flight participant must then provide consent in writing to participate in a launch or reentry. The consent must—

- (1) Identify the specific launch vehicle the consent covers;
- (2) State that the space flight participant understands the risk, and his or her presence on board the launch vehicle is voluntary; and
- (3) Be signed and dated by the space flight participant.

204. See example, John Brownlee, 'Space tourism industry gets legal insurance with informed consent ruling' (*Geek.com*, 11 March 2010) <www.geek.com/articles/news/space-tourism-industry-gets-legal-insurance-with-informed-consent-ruling-20100311/> accessed 2 April 2011 (noting that '[o]perators like Virgin Galactic have won a legal reprieve against potential litigation by surviving family members in the event of injury or death').

205. International Institute of Air and Space Law, 'Report' (Symposium on the Regulation of Sub-Orbital Flights in the European Context, Leiden, September 2010) <<http://media.leidenuniv.nl/legacy/a.-cartier-final-report-symposium-16-september-2010.pdf>> accessed 19 January 2011, 4.

206. *ibid* 5.

207. *ibid*.

IV. A HYBRID REGIME FOR HYBRID VEHICLES?

In 2004, SpaceShipOne's success in winning the X Prize²⁰⁸ offered an opportunity for further commercial development in the space tourism industry. Dr Aldrin, an Apollo 11 NASA astronaut said, 'I think the [Ansari] X PRIZE should be viewed as the beginning of one giant leap' for the industry.²⁰⁹ In 2009, Virgin Galactic began to provide suborbital commercial journeys after revealing the SpaceShipTwo — renamed the Virgin Space Station — which can carry up to six passengers and two pilots.²¹⁰ This advent in space tourism raises challenges from a legal standpoint because such vehicles are of a hybrid nature: their function uses mechanisms of both aircrafts and space vehicles. Due to the design and purpose of these vehicles, both space law and air law may be applicable to such flights.²¹¹ This leads to uncertainty regarding the operation and application of the two legal regimes when dealing with registration and liability amongst other legal matters related to suborbital commercial flights.²¹² Furthermore, the need to clarify this issue is now of prime importance given that the manufacturing of two-part vehicles has become common for the purposes of space tourism.²¹³ Accordingly, the objective of this section is to outline the current law and its deficiencies in this regard, and to ultimately suggest an adequate approach towards resolving this uncertainty.

A. Aircraft, Space Vehicle, or Both?

The classification of hybrid vehicles, such as the ones modelled after SpaceShipOne, revolves around the terms 'aircraft' and 'space object'. With regard to the former, the International Civil Aviation Organisation defines an aircraft as 'any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface'.²¹⁴

208. See generally, 'Common Expressions: ansari' (*Webster's Online Dictionary*) <<http://www.websters-online-dictionary.org/definitions/ansari>> accessed 18 April 2011 (defining the X Prize as follows: '[t]he Ansari X Prize (formerly the X Prize) was a US\$10,000,000 prize, offered by the X PRIZE Foundation, for the first non-government organization to launch a reusable manned spacecraft into space twice within two weeks'); See also, Jeff Foust, 'Now what?' (*The Space Review*, 7 October 2004) <www.thespacereview.com/article/241/1> accessed 14 April 2011.

209. Buzz Aldrin, 'Ansari X Prize' (*X Prize Foundation*) <<http://space.xprize.org/ansari-x-prize>> accessed 13 April 2011.

210. 'Virgin Galactic unveils SpaceShipTwo, the world's first manned commercial spaceship' (*Virgin Galactic*, 7 December 2009) <www.virgingalactic.com/news/item/virgin-galactic-unveils-spaceshiptwo-the-worlds-first-commercial-manned-spaceship/> accessed 9 December 2011.

211. Diederiks-Verschoor (n 108) 85.

212. Michael Chatzipanagiotis, 'Criminal and Disciplinary Issues Pertaining to Suborbital Space Tourism Flights' (Proceedings of the Fiftieth Colloquium on the Law of Outer Space, Hyderabad, September 2007) 215.

213. Science and Technology Committee (n 119) 398.

There has not, however, been any universally accepted definition of the term 'space object' by international space law or its related texts.²¹⁵ Therefore, any hybrid vehicle which travels in both airspace and outer space may also be included in definitions of the term 'space object'.²¹⁶ Furthermore, a 'space object' generally refers to 'any vehicle intended to be active in outer space'.²¹⁷ The commercial suborbital flights offered by space travel agencies fall under this general classification as the terms they use in their advertisements, such as space tourism, space travel, and space flight, illustrate the obvious purpose of the flight.²¹⁸ Nevertheless, this may be disputed, as the general definition appears to be too narrow. Some believe that the term 'space object' does not refer only to vehicles but also to objects such as aerolites and cosmic dust.²¹⁹

The applicability of either term depends on the particular stage of the journey, as the method of operating the vehicles varies at different phases of a flight. By way of example, SpaceShipOne is lifted to an altitude of 15.24km by its carrier: the mother ship, WhiteKnightOne. At that point the two components detach, the mother ship returns and lands at the spaceport, and SpaceShipOne launches its rocket vertically to an altitude of approximately 100km above sea level.²²⁰ Thus, the vehicle operates as an aircraft for the first stage of the trip as it does in fact 'derive support from the reactions of air'. But, in the other stages of the trip, the vehicle falls under the status of a 'space object' as it can only operate on rocket-mode propulsion.²²¹ Presumably, therefore, air law applies to the space vehicle before detachment and to the mother ship after the separation, and space law applies to the object which operates on rocket-mode propulsion after separation.²²²

214. 'Glossary of Terms' (CAST/ICAO Common Taxonomy Team) <<http://www.intlaviationstandards.org/Glossary.html>> accessed 6 June 2012.

215. US Congress, Office of Technology Assessment, 'Orbiting Debris: A Space Environmental Problem - Background Paper' OTA - BP - ISC -72 (US Government Printing Office 1990) 27; See also, Piradov (n 8) 127.

216. Ogunbunso O Ogunbanwo, *International Law and Outer Space Activities* (Martinus Nijhoff Publishers 1975) 61.

217. Henri A Wassenbergh, *Principles of Outer Space Law in Hindsight* (Martinus Nijhoff Publishers 1991) 52.

218. Hobe, 'Legal Aspects of Space Tourism' (n 15) 444.

219. International Law Association, *Report of the Fifty-Third Conference of the International Law Association* (Buenos Aires, August 1968) 95.

220. Ram S Jakhu, 'Space Tourism in India' (A Report of an Interdisciplinary Research Study by the University of Petroleum and Energy Studies, Dehradun, 2010) <cce.upes.ac.in/CAS/pdf/Research.pdf> accessed 3 February 2011, 18.

221. von der Dunk, 'Passing the Buck to Rogers: International Liability Issues in Private Space-flight' (n 147) 432.

222. Jürgen Cloppenburg, 'Legal Aspects of Space Tourism' in Marietta Benkö and Kai-Uwe Schrogl (eds), *Space Law: Current Problems and Perspectives for Future Regulation* (Eleven International Publishing 2005) 91, 104.

B. Registration

In terms of registration, the approach referred to above requires the space vehicle to register the two components separately according to their classification.²²³ The registration of the component classified as an aircraft needs to conform to the Chicago Convention²²⁴ where, according to Article 17, the aircraft must register with its country of nationality. Such registration must be performed in harmony with national laws and regulations of the relevant state participating in the Chicago Convention.²²⁵ In contrast, the registration of the component classified as a 'space object' should be made under the Convention on the Registration of Launched Objects into Outer Space 1974 ('Registration Convention'). Although in principle, Article II(1) of the Registration Convention imposes registration as an obligation, it offers flexibility of choice in relation to the state exercising jurisdiction and control over the 'space object'. In situations involving more than one launching state, the parties shall 'jointly determine which one of them shall register the object' and agree on terms regarding jurisdiction and control of the objects in question.²²⁶ This must be done in conformity with Article VIII of the OST,²²⁷ which provides that, '[a] State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body'.²²⁸

Some experts maintain that the two systems discussed above can operate simultaneously.²²⁹ Other experts, however, are of the opinion that this approach is unworkable, and argue that both regimes are not compatible as they relate to two separate industries of dissimilar status and nature.²³⁰ This is supported by the fact that the aviation industry, unlike the space industry, is already fully established, regulated, and deals with nominal risks. In order to tackle this incompatibility, it has been suggested that only one registration should be allocated per vehicle under a *de lege ferenda* paradigm of the Chicago Convention.²³¹

223. Hobe, 'The Legal Regime for Private Space Tourism Activities – An Overview' (n 37) 1594.

224. The Convention on International Civil Aviation 1944.

225. *ibid* Article 19.

226. The Convention on Registration of Objects Launched into Outer Space, Article II(2).

227. *ibid*.

228. OST (n 10) Article VIII.

229. von der Dunk, 'Passing the Buck to Rogers: International Liability Issues in Private Space-flight' (n 147) 431-35.

230. Cloppenburg (n 222) 210; See further, Stephan Hobe, Gérardine Meishan Goh, and Julia Neumann, 'Space Tourism Activities – Emerging Challenges to Air and Space Law?' (2007) 33 *Journal of Space Law* 359.

231. Cloppenburg (n 222) 210.

C. Liability

Similarly, in relation to liability, a dual regime does not seem viable because the applicable regime will depend on circumstantial events. The point at which the 'incident' occurs will determine the legal position of the parties involved. This leads to uncertainty and inconsistency as to rights and obligations which could possibly arise during commercial flights on hybrid vehicles.²³² Thus, a more appropriate solution would be to design a complete regime specific to the space tourism industry whilst taking into account the current framework of both air law and space law.

As mentioned in the preceding parts, the rules established by the Liability Convention essentially constitute the space liability regime. Articles I and II of the Liability Convention provide that a country which either launches or procures the launch of a 'space object', or from whose territory a 'space object' is actually launched, shall be considered to be absolutely liable for any damage that is caused by the 'space object' on Earth or to other aircrafts that are already in flight.²³³ Then, with regard to any further damage that is caused anywhere other than the Earth's surface, Article III of the Liability Convention imposes a fault-based subjective standard of liability.²³⁴

In air law, the 1929 Warsaw Convention, as amended by the Montreal Convention, provides the liability framework for the international carriage of persons and property by aircraft. The Montreal Convention provides that a carrier is liable for death or bodily injury²³⁵ of a passenger, loss or damage to property,²³⁶ and damages caused by delay in the carriage.²³⁷ Furthermore, when damage is established, monetary reparation of up to 100,000 Special Drawing Rights can be provided.²³⁸ But, the Convention exonerates the carrier from liability if it can be established that the 'damage was caused or contributed to by the negligence or other wrongful act or omission' of a person other than the carrier.²³⁹

The two regimes address liability in different manners and neither fully nor adequately regulate suborbital flights.²⁴⁰ For instance, in relation to

232. Freeland, 'Up, Up and ... Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space' (n 36) 9.

233. See main text, Part III A(ii), above.

234. *ibid.*

235. Montreal Convention (n 194) Article 17.

236. *ibid* Article 18.

237. *ibid* Article 19.

238. Article 21. 100,000 Special Drawing Rights is currently equivalent to £97,233.70.

239. *ibid* Article 20; George B Tompkins Jr, *Liability Rules Applicable to International Air Transportation as Developed by the Courts in the United States: from Warsaw 1929 to Montreal 1999* (Kluwer Law International 2009) 138.

240. Chatzipanagiotis (n 212) 212-15.

private claims, the air law regime clearly has an advantage for the reason that, unlike space law, direct claims by individuals are possible. Furthermore, claims under the air law regime are preferable as decisions are reached through binding courts under either national tort systems or the international regimes. Nonetheless, the limits provided by the air law regime are not consistent due to the absence of international harmony in this regard.²⁴¹

V. ADVOCATING FOR AN INTERNATIONAL CONVENTION

The current space law regime is unable to bear the burgeoning space tourism industry as ‘the backbone of international space law is too inflexible to be a stable basis for space tourism’.²⁴² This article has outlined the deficiencies of the current framework and has advocated for a new international convention, one which is dedicated solely to the regulation of commercial space travel, thereby eliminating uncertainties. Such a uniform instrument should take into account the provisions of the already-existing air law regime and consider the regime as a model, particularly in regards to issues of liability. The creation of a comprehensive legal policy in this regard is a key element of the overall development of the commercial aspects of space. On this basis, economic activity in space needs to be accompanied by the simultaneous implementation of a legal framework through which these activities will be regulated by an international organisation, with a view to gaining effective endorsement as a unilateral system.

241. David J Bederman, *The Spirit of International Law* (University of Georgia Press 2002) 84.

242. Wollersheim (n 102) para 3.1.