The Use of Space Technology Export Controls as a Bargaining Solution for Sustainability

A Chicago Convention Model of Space Governance

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1. Introduction

With the increase in space debris and space traffic, there is growing awareness that sustainable use of outer space requires improvements in global space governance, yet no binding international treaty has been concluded for almost four decades. Since 1979, we have only seen the development of non-binding measures and statements of principle; so called soft law, which States may ignore with little consequence. The lack of political appetite to enter into new treaty regimes may have to do with the fact that there is little national incentive for countries to enter into binding instruments that may impose limits on their freedom of action. Key issues such as space debris and space traffic management may not immediately threaten national interest. However, they threaten the collective interest in the long term, and the question is how to incentivize States towards creating new space governance instruments to ensure sustainable use of space.

Successful international treaties can be described as striking of a "bargain", whereby States accept limits on their behavior in exchange for the cooperation of other States. Examples of these include the *Treaty on the Non-Proliferation of Nuclear Weapons (*NPT*)*,[1] the *Convention on the Prohibition of the Development, Production, Stockpiling and Use of*

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1 *Treaty on the Non-Proliferation of Nuclear Weapons*, opened for signature on 1 July 1968 in London, Moscow and Washington, D.C., 729 UNTS 161, 7 ILM 8809 (1968), 21 UST 483, (entered into force 5 March 1970). *[NPT]*.

Chemical Weapons and on Their Destruction (CWC),[2] and the *Convention on International Civil Aviation* (Chicago Convention).[3] It is argued here that the last of these, the Chicago Convention, may provide a comparable model for a new binding agreement for the long-term sustainability of outer space, since it provides the necessary flexibility for States to want to enter into it, as well as the requisite "bargaining chip" to incentivize States to comply over time. The Chicago Convention contains a key mechanism of standards and recommended practices (SARPs), which are detailed in technical annexes, allowing the instrument to adapt continuously to technologies while also providing significant short-term economic incentives for State compliance: State Parties agree to comply with the SARPs for safety and efficiency of air navigation, in exchange for the cooperation of other States, which is needed in order for the commercial airlines under the jurisdiction of each State to be able to operate in other States' airspace. Importantly, the SARPs are not part of the Convention itself, and can be amended according to an established formula, without requiring full ratification of changes to the treaty. This permits them to keep pace with emerging technologies and applications as required.

This paper proposes a similar model for a new international convention for civil and commercial space activities, which would incorporate SARPs for safety and sustainability in outer space. SARPs would address issues such as debris mitigation and traffic management. Since cooperation in space activities and exchange or export of technology is vital to the commercial space sector, access to such cooperation can he be used by States to incentivize compliance. In this model, States could refuse to export space technologies to, or to cooperate with, non-compliant States. Thus, the "bargain" mechanism would ensure State compliance with long-term sustainability interests based on the short-term national incentive of access to space technology and cooperation.

2. The Problem: Long-Term Safety and Sustainability of Outer Space

Safety of space operations and the sustainability of outer space activities are in jeopardy due to the ever-increasing quantity of space objects and the lack of regimes to control debris generation, or manage the increasing number of satellites. Space congestion and debris is arguably the most urgent problem facing space operations. Being able to orbit freely without obstruction is the

2 *Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction,* opened for signature on 13 January 1993 in New York, 1974 UNTS 45, 32 ILM 800 (1993), (entered into force on 29 April 1997). [*CWC*].

3 *Convention on International Civil Aviation*, opened for signature on 7 December 1944, 15 UNTS 295, (entered into force on 4 April 1947) [*Chicago Convention*].

foundational requirement for any space application. What makes space debris a particularly intractable and urgent problem is that there are, as of yet, no technologically and economically feasible methods for removing objects from orbit. Related to the problem of space debris, as well as to the problem of congestion of operational space objects in the most useful orbits, the notion of space traffic management is a relatively new discussion area for space governance. However, recent developments are increasing the importance and urgency of the development of an international space traffic management regime. One driver is the emergence of projects for large constellations of satellites to provide worldwide broadband services for mobile users. For example, the One Web project will consist of 648 satellites in LEO,[4] Space-X is proposing a constellation of 4425 satellites in LEO, while Boeing has proposed to develop a network of up to 2956 satellites.[5] [6]
Notably, in recent domestic legislation, the United States recognized that space traffic may have to be managed in the future. In the 2015 *Spurring Private Aerospace Competitiveness and Entrepreneurship Act* (SPACE Act), Congress expressed the sense that "*an improved framework may be necessary for space traffic management of United States Government…assets and United States private sector assets in outer space and orbital debris mitigation*."[7] This law initiated a study on orbital traffic management conducted by the Science Applications International Corporation (SAIC) on behalf of NASA.[8] The report favors a United States civil agency for a national traffic management framework as a solution which "*best balances the needs for safety, national security, and economic interest*".[9] The report is very informative, but the establishment of a United States civil agency for space traffic management and debris mitigation will not solve the global problem. Even if the agency results in a framework that is more prescriptive than current processes, it will still only be a national system with no jurisdiction over other space faring nations

The lack of an international space traffic management regime poses an enormous risk to current and future space operations, whether of importance

4 One Web, http://oneweb.world/#technology.
5 *SpaceX just asked permission to launch 4,425 satellites – more than orbit Earth today*, Business Insider, Nov. 16, 2016, online: www.businessinsider.com/spacex-internet-satellite-constellation-2016-11.
6 *Boeing proposes big satellite constellations in V- and C-bands*, Space News, June 23, 2016, online: http://spacenews.com/boeing-proposes-big-satellite-constellations-in-v-and-c-bands/
7 Pub.L. 114-90, Nov. 25, 2015, Section 109.
8 Brown, O., et al, *Report on Space Traffic Management Assessments, Frameworks and Recommendation*, produced by SAIC, 21 November 2016. online: www.spacepolicyonline.com/pages/images/stories/Orbital%20Traffic%20Mgmt%20report%20from%20SAIC.pdf.
9 *Ibid*., at Executive Summary (page v).

for national security or for commercial purposes. The problem will only increase in severity if the status quo is maintained.

3. Insufficiency of Soft Law Approaches

In 2001, the Inter-Agency Debris Committee (IADC) issued guidelines for space debris mitigation, which were revised in 2007.[10] That same year, the United Nations General Assembly adopted a set of space debris mitigation guidelines, prepared by the Committee on the Peaceful Uses of Outer Space (UNCOPUOS), which were almost identical to those of IADC.[11] Although some States have implemented these guidelines into national legislation, mostly for the purposes of licensing, the guidelines themselves remain non-binding and the number of objects in Earth orbit, and the correlative risk of collision, is still growing on an annual basis.

Furthermore, since the Guidelines are non-binding, there is no mechanism for enforcing or even incentivizing compliance with them; it is an entirely voluntary regime. This is evidenced by the fact that the number of tracked objects in space continues to increase. According to Holger Krag, head of the European Space Agency's Space Debris Office, only 60 percent of all missions currently end with a successful disposal of the satellite in line with the UNCOPUOS orbital debris mitigation guidelines.[12]

The UNCOPUOS forum is unlikely to be able to adequately solve this problem, since it operates on consensus-based decision-making, leaving no room for negotiations on a regime which would in any way limit the competitive operations of States in the space sector. In 2016, UNCOPUOS issued a first set of *Guidelines for the long-term sustainability of outer space activities,* and work on expanding these guidelines continues at a steady, if rather slow, pace.[13] These Guidelines, too, are of a non-binding nature, and it is uncertain if they will radically alter national behaviour; they present no definitive national incentive for States to comply, nor any repercussions for non-compliance. As such, States may continue to behave according to their own national imperatives, which are not necessarily in line with long-term sustainability goals. States are invariably motivated by self-interest, therefore what is often required are immediate, and hence direct, short-term national incentives in order to positively influence the behavior of many States.

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10 *IADC Space Debris Mitigation Guidelines*, Issued by Steering Group and Working Group 4, IADC-02-01, Revision 1, September 2007.

11 *Report of the Committee on the Peaceful Uses of Outer Space*, UNCOPUS, 62nd Sess., Supp No 20, UN Doc A/62/20 (2007), Annex.

12 *Experts call for legislation and improved tracking to deal with orbital debris*, SpaceNews.com, online: http://spacenews.com/experts-call-for-legislation-and-improved-tracking-to-deal-with-orbital-debris/

13 Report of the Committee on the Peaceful Uses of Outer Space, UNGA 71st Session, 8 – 17 June 2016, Supplement 20, A/71/20, at Annex.

The recent stalemate of the International Code of Conduct (ICoC)[14] is another example of the limits of the soft law approach for outer space governance. Even though the ICoC, like the Debris Mitigation Guidelines, is intended to be a non-binding instrument, negotiations still hit a wall when there was disagreement over both the process and the content.[15] While the soft-law approach has been useful in the past, there are limits on the extent to which we can depend on this approach to protect space from further congestion and space debris. There is often nothing for States to gain by agreeing to a non-binding instrument, and some States even see non-binding instruments as limiting their freedom of action regarding future activities, without providing any direct national benefit. For instance, although the United States was a long-time proponent of the ICoC, there was an about-turn at the negotiations in 2015, due in part to concerns about whether the right to use force in self-defence in outer space would be included in the Code, and, as some have suggested, concern that the voluntary provision of tracking data by USSTRATCOM could become a more burdensome international expectation.[16]

Thus, even non-binding instruments are seen as creating expectations and norms of behaviour, which can be limiting politically, if not legally. On the other hand, States often lose nothing by rejecting non-binding instruments. Therefore, this paper argues for the development of a binding instrument. However it is clear that for States to be willing to take part in any new treaty arrangement, it would have to allow for sufficient flexibility with respect to developing technologies, and at the same time provide enough short-term gain and benefit for States signing on, while creating a disadvantage for those who do not sign on, or do not comply. This is a difficult construct to imagine, however there are pre-existing models in other areas of law which can provide an excellent basis.

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14 Draft International Code of Conduct for Outer Space Activities (31 March 2014): www.eeas.europa.eu/non-proliferation-and-disarmament/pdf/space_code_conduct_draft_vers_31-march-2014_en.pdf.

15 Beard, Jack M., *Soft Law's Failure on the Horizon: The International Code of Conduct for Outer Space Activities,* University of Pennsylvania Journal of International Law, Vol. 38, No. 2, 335; Meyer, Paul, *Star Crossed: An International Code of Conduct for Outer Space?,* Open Canada, 31 August 2015, https://www.opencanada.org/features/star-crossed-an-international-code-of-conduct-for-outer-space/; Steer, Cassandra, *Global Commons, Cosmic Commons: The Implications of Military Activities in Outer Space,* Georgetown Journal of International Law, Vol 18, No. 1, 9 at p. 14.

16 Chair's Summary, Multilateral Negotiations on an International Code of Conduct for Outer Space Activities, New York, 27-31 July 2015, online: https://papersmart.unmeetings.org/media2/7650931/chairs-summary-corrected-1-.pdf; Listner, Michael, *The International Code of Conduct: Comments on changes in the latest draft and post-mortem thoughts,* The Space Review, 26 October 2015, **www.thespacereview.com/article/2851/1**.

4. Historical Models: National Incentives in Non-Space International Conventions

Models of national incentives for international governance can be found in a number of successful international conventions. In these conventions, States have agreed to certain limits on their freedom of action in exchange for the cooperation of other States. Having determined that the advantages gained by cooperation outweighed the benefits that were relinquished, participating in each of these treaty regimes has been assessed by States as a net gain. In each of the examples discussed here, there are national incentives at play for States party. In most cases the incentives can be immediate even if the international goals of the convention are long term, which is exactly the kind of model that we would need for long-term protection of outer space.

4.1 Non-Proliferation Treaty

The Non-Proliferation Treaty (NPT)[17] illustrates the principle elaborated in this paper: national incentives for States to relinquish certain rights in exchange for cooperation with other States.

In summary, the broad thrust of the treaty is to divide the State Parties into two groups: nuclear weapons States and non-weapons States. The weapons States are permitted to continue possessing nuclear weapons while the non-weapons States renounce the goal of developing weapons, in exchange for which they can receive nuclear technology for peaceful purposes, under a verification regime. The fundamental elements of this bargain are found in Articles I, II and V of the treaty.

Article I specifies that each nuclear-weapon State Party agrees not to transfer nuclear weapons or provide nuclear weapon technological assistance, in any form, to any non-weapon State.[18] Article II specifies that each non-weapon State Party agrees not to receive nuclear weapons and not to develop or manufacture such weapons.[19] Article V essentially completes the bargain by specifying that each State agrees to make available, on a "non-discriminatory basis" and under a verification regime, nuclear technology for peaceful purposes to other State Parties.[20]

The purpose of the NPT, as clearly enunciated in the preamble, is to avert the danger of a nuclear war by means of limiting the proliferation of nuclear weapons.[21] Seen from a global security perspective, this is, without question, a laudable goal that is generally in the collective security interests of all States. However, the view from an individual State may be different. An individual State may feel that its security is enhanced by the deterrent effect of possessing

17 NPT *supra* note 1.
18 *Ibid.*, at art. I.
19 *Ibid.*, at art. I.
20 *Ibid.*, at art. V.
21 *Ibid.*, at preamble.

nuclear weapons thereby reducing the probability of aggression against it. As well, some non-nuclear States benefit from extended nuclear protection. For example, Australia and Japan are both non-nuclear States party to the NPT, and they both benefit from a bi-lateral agreement with the U.S. that if their territory were to be threatened or attacked with nuclear weapons, the U.S. would use its nuclear arsenal as an act of deterrence or retaliation.[22]

The NPT "bargain" is clear. Non-weapon States renounce nuclear weapons in return for which they can receive technology for peaceful purposes. It is in the national interest of Sates to agree to the restriction on nuclear weapons because they will then receive cooperation for peaceful nuclear applications.

There is a weakness in the regime, which is particular to the highly contentious issue it regulates. Those States which benefit from extended nuclear deterrence may also have an interest in working against the obligation under the treaty to "to pursue negotiations in good faith" on complete nuclear disarmament – at least as long as their potential adversaries are not disarming, or not themselves pursuing negotiations in good faith towards disarmament. Nonetheless, while it is not perfect, the NPT is generally considered to be a successful treaty. It currently has 191 State Parties, and recognizes only five weapon states. Since coming into force, only four additional countries have developed nuclear weapons (India, Pakistan, Israel, North Korea), three of which were never State Parties and one (North Korea) which withdrew.[23] Although it cannot be known with any certainty how many States would have opted for weapons, it has been estimated that as many as 22 States possess the technological potential to produce nuclear weapons, while these States have not taken the step to develop such weapons.[24]

The NPT stands as an example of States agreeing to restrict their behavior in return for cooperation. The restrictions were self-imposed, and over time they have regulated behavior within the national sovereign territory of many States. By comparison, if the international project to halt proliferation had been dependent on a non-binding UN General Assembly Resolution, stating

22 See e.g. "Defending Australia in the Asia Pacific Century: Force 2030. Defence White Paper 2009", www.defence.gov.au/whitepaper/2009/docs/defence_white_paper_2009.pdf; Hoey, Fintan, *Japan and Extended Nuclear Deterrence: Security and Non-proliferation,* Journal of Strategic Studies, Vol 39, Issue 4, April 2016, 484-501; Lyon, Rob, "Australia, Extended Nuclear Deterrence, and What Comes After", The Strategist, 2 June 2017, https://www.aspistrategist.org.au/australia-extended-nuclear-deterrence-comes/.

23 "North Korea Withdraws From Nuclear Treaty", The Guardian, 10 January 2003, https://www.theguardian.com/world/2003/jan/10/northkorea1; "Chronology of U.S.-North Korean Nuclear and Missile Diplomacy", Fact Sheet, Arms Control Association (updated August 2017), https://www.armscontrol.org/factsheets/dprkchron.

24 "Nuclear Capabilities And Potential Around The World", NPR, online: www.npr.org/templates/story/story.php?storyId=125898396.

that States should refrain from developing nuclear weapons, it is unlikely that the world would look the same today.

4.2 Chemical Warfare Convention

The Chemical Warfare Convention (CWC) was signed in 1993 for the purpose of abolishing the development, stockpiling and use of chemical weapons.[25] The convention has 192 State Parties, making it a nearly universal regime, and therefore leading to its key provisions becoming customary international law. Although it is a long and complex treaty with several technical annexes regarding chemicals, research and production facilities, the fundamental principles underlying the treaty are straightforward and can be summarized in the following way. State Parties agree to:

- declare their chemical weapons, production facilities and their plans for their destruction (Article III),
- destroy their chemical weapons (Article IV)
- destroy their chemical weapons production facilities (Article V),
- allow international verification (Article IV) and
- facilitate cooperation for peaceful applications (Article XI).[26]

In an agreement very similar to the NPT, States agree to renounce the possession of chemical weapons, which may have been used as a deterrent to external aggression. In exchange, as a result of the reciprocal obligations *erga omnes,* the State Parties benefit from for the increased security of other States doing the same. Similar to the NPT, the incentive provided for States who might otherwise see value in stockpiling chemical weapons as a deterrent or protective measure, is the prospect of cooperation for peaceful chemistry applications. This benefit is spelled out in Article XI (Economic and Technological Development) Section 2 b & c.[27] This national incentive is for a State to participate in a regime that limits its activities in return for access to technology and cooperation is what forms the common thread among all of the treaty regimes compared here, and is the key to a treaty to protect access to and use of space long term.

4.3 Chicago Convention

The Convention on International Civil Aviation of 1944 (Chicago Convention), is widely acknowledged as the regulatory pillar enabling the very large international civil aviation industry. It offers an excellent example of a successful international treaty in which States relinquish some rights to gain the cooperation of other States in return.[28]

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25 CWC *supra* note 2.
26 *Ibid.*
27 *Ibid.*, at art. XI.
28 Chicago Convention *supra* note 3.

The Chicago Convention is a complex and comprehensive treaty, which addresses many issues including the foundation of ICAO. This paper will focus on only a few articles, but they represent one of the essential elements of the treaty, namely the fundamental "bargain" where State Parties accept certain limits to their sovereign rights in exchange for cooperation by other State Parties, both technological and with respect to granting access to their respective sovereign territories. It is this "bargain" which is at the core of the success of the treaty and has enabled the growth of the international aviation industry for 7 decades. In more concrete terms, Article 33 provides that States Party shall agree to recognize aviation licenses and airworthiness certificates issued by other States, provided that they meet or exceed the mandated standards.[29] In effect, this amounts to relinquishing one aspect of the otherwise unfettered sovereign control and regulation over one's own sovereign air territory. But in order to have their own licenses and certificates recognized, a State must adhere to uniform standards and recommended practices (SARPs).[30] Thus, the bargain amounts to limiting independent control over sovereign airspace, in return for access to the sovereign airspace of other States, all of which is dependent upon compliance with the SARPs: the long-term goal of ensuring safety and international standardization of the civil aviation industry is secured due to the short-term incentive States have to want to participate in an international regime which grants them access to other States' airspace and guarantees recognition of their own licencing procedures. It is precisely this kind of model that the authors argue could be highly beneficial with respect to space traffic management.

SARPs are adopted by the ICAO Council.[31] The SARPs are not in themselves part of the Chicago Convention treaty, rather they are contained in Annexes to the treaty and can be regularly updated by the ICAO Council. This procedure does not require the unanimous approval of State Parties nor does it require formal ratification by any State.[32] Article 38 of the Convention requires a State to give notification to the ICAO whenever it finds that it is "impracticable" to comply in all respects with a standard, or to bring its own regulations or practices into full accord with a standard. However, in these cases other States may choose to not recognize certificates or licenses impacted by the non-compliance. Thus, although the SARPs themselves are not binding, there is an obligation to comply or notify, thereby ensuring the greatest degree of standardization possible. The incentive for States to fulfil this requirement remains based upon the "bargain" described above. The SARP annexes have been continually updated, and new annexes added, in response to technological developments. Without this structure, and the

29 *Ibid*., art. 33.
30 *Ibid*., art. 37.
31 *Ibid*., art. 54(l).
32 *Ibid*., arts. 50 and 52.

flexibility to continually adapt to technology, the Chicago Convention would have risked obsolescence due to the highly technical aviation environment that continually changed the operational environment.
The space environment is similar to the aviation environment in the sense that it is a highly technical environment where advances and new applications are continually being brought forward. These advances enable the performance of certain activities differently and more efficiently than in the past, and also enable new types of activities which had not been envisioned a decade or two ago.
The Chicago Convention, therefore, provides an excellent model for outer space governance in two ways. Firstly, as a structure for keeping pace with new technological developments and, secondly, as a model for national incentives within an international convention.

5. The Solution: Proposal for a New International Space Convention Based on National Incentives

Although the current regulatory regime for outer space has been useful in establishing fundamental principles (OST) and best practices standards (Debris Mitigation Standards), it is now failing to meet the current challenges. The OST is mostly a statement of principles and lacks specificity, particularly with regards to the numerous new technologies and applications that have been developed since 1967. Soft law measures remain non-binding instruments and States may ignore them without consequence.
For several decades, the OST was sufficient. There were only a few outer space actors, mostly nation States, and the limitations of non-binding instruments could be safely ignored. Each actor was free to engage in space activities as they chose and there was little risk of interfering with the activities of others. However, in a 21st century context, there are many more States with launch capacity which compete for business, and many more government and commercial players in space, who own, operate and benefit from space technologies. The OST remains the most important framework treaty, but in order to ensure and protect the long-term sustainable access to and use of space, an additional, flexible binding instrument is needed.
As discussed above, there is currently little national incentive for countries to enter into binding instruments that may impose limits on their freedom of action. Key issues such as space debris and space traffic management may not appear to policy makers as immediate threats to national interest. However, increased congestion and competition, and lack of standardized practices and transparency regarding space operations are indeed factors of immediate concern. Moreover, space debris and space traffic management threaten the collective interest in the long term. The question is, *how to incentivize States to accept a new binding space governance instrument, which will ensure sustainable use of space?*

This paper proposes two possibilities for introducing a binding outer space regulatory instrument. The first possibility would be to draft a new treaty, modelled on the Chicago Convention, which would allow the continued adoption of Annexes which can be updated to keep pace with changing technology and the development of new standards. The second possibility would be to introduce an Additional Protocol to the existing OST, with a similar system of Annexes that can be attached. The latter could be modelled on the two Additional Protocols to the Geneva Conventions on the law of armed conflict, which were drafted in the 1970s, following international recognition of significant developments in the ways in which modern conflicts were being fought.[33] Although these are "opt-in" protocols, in that all States are free to decide whether to sign them, regardless of whether they had signed the original Geneva Conventions, today, the key provisions of these Additional Protocols are recognized to be customary international law. In this sense, they can be considered a highly successful innovation, where there was an unwillingness to open up the original conventions to new negotiations, for fear of undoing their most important elements.

In either case, whether a new treaty with a system of flexible Annexes, or an Additional Protocol to the OST with the same flexible system attached, the instruments would be applicable to only civil and commercial space activity. Military and national security satellites would be exempt, since it is anticipated that States would be much less willing to come to an agreement if they were included. The instrument would reinforce the main principles of the OST and establish principles for some of the new issues that have since emerged. The two innovations and key features of the proposed convention or protocol are Standards and Recommended Practices (SARPs) for outer space activities; and national incentives for compliance (and/or disincentives for non-compliance) with the SARPs.

5.1 Standards and Recommended Practices (SARPs) for Outer Space Activities

To ensure safety and sustainability of space activities, SARPs will be beneficial in a number of areas, particularly:

- Space Debris Mitigation Standards
- Space Traffic Management
- Orbital Servicing
- Active Debris Removal

33 *Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, 8 June 1977, 1125 UNTS 3 (entered into force 7 December 1978) [Additional Protocol I]; *Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of Non-International Armed Conflicts* [Additional Protocol II], 8 June 1977, 1125 UNTS 609 (entered into force 7 December 1978).

- Passenger Services & Spaceports
- Registration Requirements for Civil Spacecraft

Communities of experts, or expert working groups, should develop SARPs for outer space activities. Using communities of experts avoids the difficulties of national consensus decision-making, which currently hampers the UN body that is otherwise occupied with these issues, namely UNCOPUOS. The Air Navigation Commission of ICAO is an excellent model for a group of experts dedicated to the safety of civil aviation.[34] A similar construct can be foreseen for outer space activities.

Based on these outer space SARPs, States would be required to implement national legislation, which would lead to international harmonization of the legislation regulating the commercial space industry within a relatively short time frame. The urgency of space debris management and reduction, and space traffic management will be addressed in a coordinated way that serves the interests of all nations. The desired positive long-term effects can be achieved due to the short-term incentive of States to participate in such a regime, or risk being shut out of technology sharing and access to the international commercial space market.

5.2 National Incentives for Compliance with the SARPs

The factor that will lead to the success of the proposed model will be the inclusion of national incentives for compliance. This is one facet that has, thus far, been elusive with regards to State behavior in outer space. One of the key provisions of the OST is the guarantee in Article I that outer space "shall be free for exploration and use by all States without discrimination of any kind […]." While this freedom is universal, it should not be read to be absolute. Not only must all activities be in accordance with international law,[35] but in order to guarantee continued freedom of access and use, all States must consider how to mitigate space debris and minimise any further congestion in the long term. In order to do so, there must be a regime in place that incentivizes States to act now.

This paper proposes that cooperation of State Parties with other States be contingent on their compliance with the outer space SARPs. Cooperation includes access to space technology exports, launch services, licensing of space services and ground facility services. Most States already have national laws regulating these activities. For example, technology export controls regulations are well developed in many countries. National regulations could simply be amended to include the ratification of the new outer space

34 International Civil Aviation Organization "Making an ICAO Standard" (1 November 2011), online: www.icao.int/safety/airnavigation/pages/standard.aspx.

35 OST Article III.

convention and compliance with the outer space SARPs as necessary conditions for approval of space technology exports.

5.2.1 Taking Inspiration from Existing International Export Control Mechanisms

There already exists an international basis for incentivising compliance with regulations in the space sector, which could be incorporated into outer space SARPs quite easily. Given the proliferation of dual-use space technologies, which are useful for both civilian and military purposes, many States have had a growing concern over recent decades that technologies developed for government purposes could be shared inadvertently, thus compromising national security. In response to this concern, there has been an increase over time of national restrictions on export licences, and a large block of mostly developed countries have established a number of conventions, or arrangements, to coordinate the control of exports of dual use technologies. The member States then implement export control regimes through national legislation, in order to comply with the terms of their international obligations. Two of these arrangements are relevant to space technologies: the Missile Technology Control Regime (MTCR) for ballistic missile technologies which also addresses the proliferation of the very similar space launch vehicle technologies; and the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies.[36]

The majority of space technology is controlled under the national laws of individual states that are implementing the terms of the Wassenar Arrangement (WA). The WA was established in 1996 with the goal of aligning national export control regimes for conventional weapons and sensitive dual-use goods and technologies. The purpose of the WA is "to contribute to regional and international security and stability, by promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies".[37] It would be a logical and simple step for participating States to build upon this existing regime for the broader purpose of increased co-operation and protection of long-term sustainable use of space.

Another goal of the WA which is of relevance to the proposed model here, is that it promotes transparency among its members on export control policies and activities. The WA now has 41 members, all of whom commit to non-proliferation policies, adhere to relevant non-proliferation regimes and treaties and administer effective export controls, in return for the agreement that other participating States will do the same.

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36 *Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies,* The Hague, 19 December 1995, WA- DOC (17) PUB 001 [*Wassenaar Arrangement*].

37 Wassenar Web Site, www.wassenaar.org.

The WA produces two comprehensive lists of items and technologies, which the member states agree to control: the munitions list and the dual use list. These lists are reviewed periodically and amended as required by advances in technology, in much the same way as the SARPs in the proposed international regime would be.

One particularly useful lesson that could be drawn from the WA model is that members are required to report denials of transfers of certain controlled dual-use items.[38] Denial reporting helps to bring to the attention of members the transfers that may undermine the objectives of the Arrangement. Under the instrument proposed here, if a State were to be denied any form of cooperation due to its lack of compliance with the SARPs, this would be reported to the body managing the international agreement, and all State Parties would be made aware of the recalcitrant States' status, thus ensuring that this State would continue to be denied cooperation from any State party.

There are some weaknesses to the existing WA system, which the proposed international regime of SARPs would seek to address. For example, exports between WA members must also be controlled, however this does not apply within the EU, since the members have concluded a separate arrangement such that transfers of dual use items within the EU do not need licenses. Furthermore, the WA lists do not contain a separate list for space technologies. Rather, various types of space items and technology can be found in various categories.[39] There are therefore multiple regimes for export controls, making it difficult to maintain an overview. A single international regime would ensure international consistency, and would bolster the chilling effects against States which do not comply with the SARPs.

Another weakness of the WA is that, although member states agree on a common list for which they undertake to implement effective export control, there is no common assessment criteria or process. All member States implement their own national regulatory system, on the basis of national discretion. Therefore, the decisions on exports of certain items to specific countries can vary for different members of the WA depending on their own particular strategic interests. With respect to the proposed international regime of SARPs attached to a binding treaty, this situation would only arise vis-a-vis States not participating. Hence, the incentive to take part would be further increased.

38 *Wassenar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies*, PUBLIC DOCUMENTS, Volume I, Founding Documents, February 2017, at Initial Elements, V, 1.

39 "List of Dual Use Good and Technologies and Munitions List", The Wassenar Arrangement on Export Controls for Conventional Arms and Dual Use Goods and Technologies, WA-List (16) 1, 08-12-2016.

5.2.2 Harmonization of National Export Control Legislation

It could be said that today's international regulation of space technologies is extremely piecemeal, and it is difficult to maintain the overview necessary for the governance of long-term sustainable access to and use of outer space. For example, the U.S. implements two separate, and complementary, export control regimes under different legislation: (1) The Arms Export Control Act (AECA) provides the authority to control the export of defense articles and services.[40] Administration of this is delegated to the Department of State, which developed regulations for its implementation called the International Traffic in Arms Regulations (ITAR);[41] (2) the Export Administration Act of 1979 (EAA), to address the exports of dual use items and technologies.[42] The Department of Commerce developed and administers the implementing regulations: the Export Administration Regulations (EAR), which contains a Commerce Control List.[43] Both of these regimes include space items and technologies, but items to be exported under ITAR face much more scrutiny than under the EAR.

By comparison, in Canada, the Export and Import Permits Act determines that the Minister of Foreign Affairs (MFA) is the issuing authority for licenses.[44] The criteria for deciding on issuing a permit is much broader than the U.S. model and rests mostly on national security and international stability interests.

For further comparison, a general but much more flexible regime exists in Japan, where the Foreign Exchange and Foreign Trade Act provides the legal basis for export controls, though it is clearly a piece of legislation which only deals with space technologies on the periphery.[45]

Thus, there are great differences between existing national regulations and licencing systems. However, there are regional arrangements which can serve as inspiration. For example, as a result of the harmonization of EU export control regulations, the national laws of most European counties are very similar.[46] The Dual-Use Regulation enacted in 2000[47] implements, for the EU,

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40 The Arms Export Control Act of 1976, Title II of Pub. L. 94–329, 90 Stat. 729, enacted June 30, 1976, codified at 22 U.S.C. ch. 39 (AECA).

41 22 CFR § 120-130 (ITAR).

42 50 U.S.C. ch. Appendix – Export Regulations (EAA).

43 15 CFR § 730-774 (EAR).

44 *Export and Import Permits Act,* R.S.C., 1985, c. E-19 (Export and Import Permits Act).

45 Foreign Exchange and Foreign Trade Act, Act No. 228 of December 1, 1949.

46 Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items. This regulation established a regime for the control of exports, transfer, brokering and transit of dual-use items within the EU Community member states. In conjunction, Directive 2009/43/EC created a European general license system for the transfer of defence-related products.

47 Council Regulation (EC) No 1334/2000, 22 June 2000.

internationally agreed dual-use agreements including the WA and the Missile Technology Control Regime (MTCR). National licensing requirements are imposed[48] for the export of dual use items which are listed in Annex I of the regulation, which essentially replicates the Wassenar Dual Use list. Additionally, Article 4 states that member states shall circulate details of their denials and that other member state must consult if they receive an identical request.[49] Ultimately the decision rests with the individual states and may be different, but the process brings pressure to bear for a common view.

The Dual Use Regulation of 2000 was amended in 2009,[50] to simplify the procedures for transfers of defence-related products within the members of the EU. In conjunction, a European general license system was created for the transfer of defence-related products. This has greatly facilitated cooperation and integration within the EU defence and aerospace industry and promoted the growth of multinational space technology enterprises within the EU.

This kind of harmonization for transfer of space technology, could be achieved internationally under the proposed international binding instrument with a system of SARPs. Under the EU system, similar to the harmonization that has been achieved in the civil aviation industry, States are willing to comply in order to gain or maintain access to the international market, and to international cooperation.

6. Creating an Equal Playing Field

For a system like this to work, there must be significant international participation, and it would be dependent upon the major space faring nations taking part. Denial of cooperation only works when the services and technologies needed for access to space is kept, for the most part, within the group of States taking part in an international bargaining regime. It is asserted here that the major space faring nations will be incentivized by this proposal, precisely because they benefit the most from space applications and therefore have the most to lose if outer space does not remain sustainable. Additionally, in the short term, they will be politically incentivized since, due to their expertise and current dominance in outer space, major space faring nations could well have a disproportionate influence on the evolution of the new outer space SARPs, and be in a position to ensure that their interests are promoted and protected.

The flip side of this, of course, is that such disproportionate influence may not be in the short-term interests of less powerful or developing States. In essence, one might have the view that that this is contrary to the spirit of the

48 *Ibid.*, Article 3.
49 *Ibid.*, Article 4.
50 Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items.

OST, that the use of outer space "*shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development…*"[51] Concerns by developing States that the most powerful and affluent States were already creating a monopoly on space technology and on access to valuable orbits, was exactly what led to the 1997 Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (Space Benefits Declaration). This Declaration determines that all forms of international cooperation in the exploration and use of outer space shall be "on an equitable and mutually acceptable basis",[52] and that international cooperation shall take "into particular account the needs of developing countries, should aim, inter alia, at the following goals, considering their need for technical assistance and rational and efficient allocation of financial and technical resources".[53] There may be a risk that if an international binding instrument were to be developed under the influence of the major space faring nations, the interests and needs of developing countries may not be sufficiently taken into account, leading to *de facto* denial of access to space technologies or services.

On the other hand, the SARPs themselves would be adopted in continually evolving Annexes, developed by area experts rather than by States. In this way, such an instrument may in fact be used to increase cooperation with developing States, by ensuring they are able to meet the same standards, in much the same way as in the civil aviation sector.

Furthermore, the very intention of the bargain to be struck in such a regime is that the long-term sustainability of outer space is better protected, due to the fact that States will ensure all players comply with SARPs developed to reduce space debris, improve space traffic management, and standardize a number of current and future types of space activities, for example space tourism. Given the urgency of the situation already today, and given that the major space faring nations are the most active right now, it could be argued that they have a greater responsibility to act. They will likely only do so if they perceive a benefit to their current predominance. If we wish to protect "the province of all mankind" for the long term, we must ensure that the actors who stand the most to gain and the most to lose in the short term are sufficiently incentivized to create a binding international regime. In the end, this will in fact be to the benefit of all States.

51 OST Article I.

52 Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, 4 February 1997, A/RES/51/122, Article 2.

53 *Ibid.*, Article 5.

For commercial entities, too, the proposed regime of a binding international instrument, with SARPs attached to it, could help to create a more even playing field. Currently, national legislation is so piecemeal that commercial entities are likely to go "forum shopping" for the most beneficial national legal regime, which risks a trend towards less regulation, and less concern for long-term effects of increased space activities.

For example, the U.S. has the most complex regime with respect to licencing and export controls, and many U.S.-based companies feel they are over-regulated, leading to a disadvantage in the international commercial space sector. Consequently, there is a strong lobby to relax the legislative regulations for U.S. commercial space activities. While national legislation is the prerogative of every State, a policy such as this would risk turning away from the need for greater oversight of space traffic management and reduction of further space debris, and is not in the interests of long-term sustainable access to and use of space for all States. The answer, therefore, is not to reduce national legislation, but rather to harmonize it internationally. This will create a more even playing field not only for U.S. companies who otherwise feel over-regulated, but also for companies emerging in other States, whether they are already space-faring, or yet to become so. In short, a system of international SARPs under a binding treaty regime has equalizing commercial benefits as well as long-term benefits for the sustainable use of space.

If a State does not wish to ratify the new outer space treaty nor comply with the outer space SARPs, it will find itself unable to access technology and cooperation. This will provide tremendous incentive for compliance.

This type of incentive is similar to that of the Chicago Convention, where Article 33 provides for the recognition of certificates of licenses if *the requirements under which such certificates or licenses were issued or rendered valid are equal to or above the minimum standards which may be established from time to time pursuant to this Convention.*[54] If the standards for the certificates or licenses do not meet the ICAO SARPs, then a State may deny the use of its sovereign airspace. Use of outer space may not be denied, but a State is fully within its legal foreign policy rights to deny cooperation to another State if that state is not compliant with the outer space SARPs.

Space technology cooperation, or denial of it, is the national incentive that should be employed to motivate compliance with SARPs that would ensure safety and sustainability of outer space activities.

54 Chicago Convention *supra* note 3 at art. 33.

7. Conclusion

Over the past few decades, soft law approaches to outer space governance have failed to assure the long-term safety and sustainability of space activities. The past decade has also seen the emergence of a number of new technological applications that have highlighted voids in both international and national space governance. The need for more robust international outer space governance is therefore well established. A governance model based on the highly successful Chicago Convention, and adapted to the space environment, may well offer the solution that is needed in the short term, with the flexibility to ensure it remains relevant and successful over the long-term. Since many States already engage in a series of bi-lateral and multi-lateral recognitions of national export control mechanisms, some of which include space technologies on the margins, the step towards a specific regime is not a large nor unforeseeable one. On the contrary, with the right expertise, the development of such a regime could be realized relatively quickly and smoothly, with immediate pay-offs for States willing to take part. The proposed model provides for a binding instrument, either as an Additional Protocol to the OST, or as a new, stand-alone treaty, either of which would incorporate Annexes containing outer space SARPs. The procedure for updating these Annexes would follow the model of the Chicago Convention closely, whereby experts with the requisite technical knowledge would take the lead, and an appropriate committee would be authorized to adopt them without any consensus required from State Parties. States will be nationally incentivized to comply with the SARPs in order to benefit from cooperation and technology from other States, and to be able to continue to compete commercially in the space sector. Importantly, the major space faring nations will be incentivized since they will have the most to lose if space does not remain sustainable, and this proposal offers them a significant influence on SARPs to protect their interests.