

**PORTIA BAINE**

**NEW SPACE – OLD RULES:  
THE LIABILITY REGIME FOR DAMAGE CAUSED BY  
SPACE OBJECTS AND THE NEED TO CONNECT  
PRIVATE OPERATORS WITH INTERNATIONAL  
LIABILITY FOR ULTRAHAZARDOUS ACTIVITIES**

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**Abstract**

*From SpaceX launching astronauts to the International Space Station for the United States Government to Rocket Lab operating out of a private launch site in Mahia Peninsula of New Zealand, the "New Space" era has seen private operators increasingly provide and control services which were once exclusively the purview of states. Yet space launching remains an ultrahazardous activity, where, although the chance of damage is low, the consequences may be catastrophic if damage does eventuate. Thus, considering the state-centric international liability regime, the question arises as to where the risk ought to fall. Although some risk-absorbing states may be willing to underwrite operator liability through domestic regulation, ultimately it is their citizens who will unfairly bear the cost of an international claim. This paper argues that exclusive state liability under the Liability Convention unduly separates risk and benefit by removing private operators who control and financially benefit from space activities from the corresponding burden of international liability. Patching this regulatory hole will require operator liability to be built into the international liability regime, in line with other international regimes regulating ultrahazardous commercial activities.*

**Keywords:** *"Liability Convention", "Space Launching", "Private Launch Operators", "Outer Space and High-altitude Activities Act 2017", "State Liability"*

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## *I Introduction*

*The advent of private enterprise has led to astonishing leaps in technological application while simultaneously complicating issues of liability and responsibility.<sup>1</sup>*

The emergence of private actors in space – often dubbed as the "New Space" era – has been described as "a fast-paced, competitive, and innovative sector reliant upon pockets of significant wealth, high-value early investment, highly skilled individuals, and the shouldering of risk."<sup>2</sup> The problem which this paper addresses is on whose shoulders this risk ought to rest.

Space launching has become a critical aspect of modern life – forming the basis of satellite-based services such as navigation, communication, direct broadcast TV, internet and weather monitoring.<sup>3</sup> While previously these activities were the exclusive area of governments, today such launch services have become increasingly privatised in a global commercial market. From SpaceX launching astronauts to the International Space Station for the United States Government<sup>4</sup> to Rocket Lab operating out of a private launch site in Mahia Peninsula of New Zealand in a bid to "democratise" space,<sup>5</sup> private launch operators are increasingly overlapping with areas which were historically the exclusive purview of states. As a high-tech activity, few states have the technical expertise and capacity to be able to instigate all aspects of a space launch: designing and developing launch equipment, funding the technology and carrying out the launch.<sup>6</sup> Increasingly, industry is not just overlapping with state functions, but in fact enabling activities beyond those of which states

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<sup>1</sup> Tjaco T van den Hout *Proceedings: United Nations/International Institute of Air and Space Law Workshop on Capacity Building in Space Law* UN Doc ST/SPACE/14 (18 – 21 November 2003) at 3.

<sup>2</sup> Deloitte Access Economics *New Zealand Space Economy: Its Value, Scope and Structure* (Ministry of Business, Innovation & Employment, November 2019) at 10.

<sup>3</sup> Peter van Fenema "Legal Aspects of Launch Services and Space Transportation" in Frans von der Dunk (ed) *Handbook of Space Law* (Edward Elgar, Cheltenham, 2015) 382 at 382.

<sup>4</sup> NASA "NASA Astronauts Launch from America in Historic Test Flight of SpaceX Crew Dragon" (press release, 31 May 2020).

<sup>5</sup> Rocket Lab "About Us" <[www.rocketlabusa.com](http://www.rocketlabusa.com)>.

<sup>6</sup> Van Fenema, above n 3, at 383.

are capable.<sup>7</sup> Yet despite the expanding role of private operators, "New Space" is ultimately subject to old rules in international law: where the international liability regime for damage caused by space objects places liability for loss exclusively on states. In the context of an activity which is classified as ultra-hazardous and high risk,<sup>8</sup> this state-centricity creates a significant regulatory hole where launch operators are separated from the consequences of their actions.

This paper argues that exclusive state liability under the international liability regime creates an unjustifiable disconnect between private operators who control and benefit from these ultrahazardous activities, and the states who are held liable. Reconciling risk and benefit will require writing operators into the regime – re-orienting towards a system regulating an ultrahazardous commercial activity. At present, launching states are relatively aligned in their commitment to requiring some level of indemnity and insurance from launch operators. Cementing this informal consensus with a formal instrument will require building the liability of operators into the international regime. The international space regime was a series of incredibly proactive instruments. This proactive ethic must now be re-invoked in order to reconcile the liability regime with the reality of modern space activities.

This paper proceeds in four parts: bookended by a discussion of the current law and the law as it could be. Sections II and III together provide a conceptual background: covering the ultrahazardous nature of space activities and the state-centric approach which the current treaty regime took to the allocation of loss and liability in the 70's. Section IV then

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<sup>7</sup> Robert Zimmerman *Capitalism in Space: Private Enterprise and Competition Reshape the Global Aerospace Launch Industry* (Center for a New American Security, Washington DC, 2017) at 18 – 21. Zimmerman links SpaceX's Falcon 9 launch pricing in 2014 to an opening of the market to new launch companies, all directed towards creating a similar commercial edge through innovation. He views this increasing access as having a cascade effect, where "[a]n increased customer base fuels a larger, more innovative launch industry able to charge less per launch, which in turn encourages more new satellite companies. The cycle then repeats, becoming a catalyst for creating new wealth and greater capabilities".

<sup>8</sup> *First report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities, by Mr Pemmaraju Sreenivasa Rao, Special Rapporteur* UN Doc A/CN.4/531 (21 March 2003) at [107].

compares New Zealand's risk-averse and Australia's risk-absorbing domestic regulatory regimes as exemplifying how states can differ in their approaches to underwriting operator liability into domestic laws. Section V discusses how this approach to liability – which previously internalised risk where the only launch operators were states – is out of step with the emergence of private actors in space. In the context of the privatisation of space activities, private operators who both benefit from and control space activities, are unjustifiably divorced from liability for their actions. A greater assumption of risk by the state on behalf of the operator may result in citizens being made to pay for the actions of operators. Conversely, too risk-averse of an approach may stifle innovation and, by extension, the market. Recognising the need to place consistent liability requirements on operators, section VI concludes with a discussion of how operator liability could be written into a new liability framework. This aligns with the principle that the entity which primarily controls and benefits from a hazardous activity should internalise the cost of the risk and any loss arising.<sup>9</sup> This section assesses the potential of both a fund regime similar to that in the regulation of oil pollution, and a tiered liability system similar to that regulating nuclear energy. It also presents the need for consensus building in the interim: where states wishing to reconcile risk and benefit in the current launching market can proactively build a standard approach to operator liability through bilateral engagement and soft law.

## *II The Ultrahazardous Nature of Space Launching*

The case of the Cosmos 954 crash remains the dominant example of the type of damage which can arise from space launching – notwithstanding that space launching is not in itself prohibited under international law. In that case, the Cosmos 954 – a Soviet launched satellite – descended uncontrolled into Canadian airspace causing debris to crash onto Canadian territory.<sup>10</sup> Canada subsequently sued the Soviet Union for CAD 6 million in

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<sup>9</sup> Caroline Foster "The ILC Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising out of Hazardous Activities: Privatizing Risk?" (2005) 14 RECIEL 265 at 266.

<sup>10</sup> Alexander F Cohen "Cosmos 954: The International Law of Satellite Accidents" in W Michael Reisman and Andrew R Willard (eds) *International Incidents: The Law That Counts in World Politics* (Princeton University Press, New Jersey, 2016) 68 at 70 – 71.

clean-up costs.<sup>11</sup> In the end, the Soviet Union paid CAD 3 million to Canada in what they stated to be "full and final settlement of all matters."<sup>12</sup> If the Cosmos 594 had crashed into an occupied area, the figure for compensation can be expected to have been significantly higher. It is still unclear what would have occurred had the Cosmos 594 been a privately operated satellite. However, as it stands, the Cosmos remains the sole example of a large international claim for damage caused by a space object.

Groups such as the International Law Commission (ILC) have consistently classified space launching as an "ultrahazardous activity".<sup>13</sup> Jenks describes ultrahazardous activities as those in which:<sup>14</sup>

The consequences in the exceptional and perhaps quite improbable event of the hazard materializing may be so far-reaching that special rules concerning the liability for such consequences are necessary if serious injustice and hardship are to be avoided. ... making the burden of insurance or the provision of other security for compensation in the event of misadventure a cost of the adventure, and eliminating a burden of proof which, in view of the nature of the risk, the victim cannot reasonably be expected to discharge...

This is admittedly a long definition, but one which forms the basis of much international thinking on this subject.<sup>15</sup> Space launching, similar to other ultrahazardous activities, does not often cause damage – particularly on earth as the single case of the Cosmos shows. However, the consequences to the victim in the event that damage does arise may be so severe that exceptional liability rules are required. This means that from an insurer's perspective, space launching is a risky business. In a market where USD 750 million currently covers only 50 launches on average, a small series of accidents could cause huge

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<sup>11</sup> At 71.

<sup>12</sup> At 71.

<sup>13</sup> See for example *First report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities*, above n 8, at [107].

<sup>14</sup> Wilfred C Jenks "Liability for Ultra-Hazardous Activities in International Law" (1966) 117 *Recueil des cours de l'Academie de droit international de La Haye* 99 at 107.

<sup>15</sup> *First report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities*, above n 8, at n 53.

losses.<sup>16</sup> Although such accidents are quite rare, as an ultra-hazardous activity losses are "for the most part catastrophic".<sup>17</sup>

Although actionable damage is currently rare, with the volume of space activities (and orbital debris) increasing, the risk of damage is only becoming greater. When launching near or flying over occupied land, explosions of launch vehicles carry a high fatality risk and risk of damage to property.<sup>18</sup> Van Fenema records that over the past 16 years an average of five per cent of all launches have failed.<sup>19</sup> On the ground, early failures associated with toxic propellants of launch mechanisms can result in catastrophe for the launching crew. Once beyond the atmosphere, if objects fall out of orbit, then the risks to the area in which they fall is self-evident: especially if populated. While it is true that the chance of falling space debris causing damage to persons is low,<sup>20</sup> the toxicity of falling objects also create a significant risk to the environment.<sup>21</sup> As a recent example, in just 2012, it was recorded that a Russian probe "Phobos-Grunt" landed in the Pacific Ocean – weighing 14.9 tons and carrying 12 tons of toxic fuel which is now sunk in the ocean.<sup>22</sup>

Linked to the hazardous nature of outer space activities insofar as it increases the risk of damage is the issue of orbital debris. The reality of a polluted space is that only a small percentage of objects currently in orbit are functional – as objects do not immediately de-orbit once they have broken down.<sup>23</sup> As more and more items are launched, increasing

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<sup>16</sup> Robert Williams and Kevin Walsh "Covering the Increased Liability of New Launch Markets" (paper presented to the 32nd Space Symposium, Colorado, April 2016) at 6.

<sup>17</sup> At 6.

<sup>18</sup> Timothy J Brennan, Carolyn Kousky and Molly Macauley "Public-Private Coproduction of Risk: Government Indemnification of the Commercial Space Launch Industry" (2010) 1 RHCPP 114 at 123.

<sup>19</sup> Van Fenema, above n 3, at 383 – 384; and Brennan, Kousky and Macauley, above n 18, at 121.

<sup>20</sup> See for example Traci Watson "Space Debris: Five Unexpected Objects that Fell to Earth" *National Geographic Daily News* (online ed, Washington DC, 9 September 2011). Notwithstanding that damage is rare, Watson cites NASA as stating that in 2010 "one object a day, on average, made an unshepherded dive into the atmosphere".

<sup>21</sup> Anel Ferreira-Snyman "The Environmental Responsibility for Space Debris and the Implications for Developing Countries in Africa" (2013) 46 CILSA 19 at 27.

<sup>22</sup> At 27.

<sup>23</sup> Louis de Gouyon Matigon "The Legal Status of Space Debris" (23 June 2019) *Space Legal Issues* <[www.spacelegalissues.com](http://www.spacelegalissues.com)>.



space debris poses a serious threat to spacecraft and satellite in orbit.<sup>24</sup> Space debris refers to "all non-functional, man-made objects, including elements thereof in Earth orbit and those re-entering the Earth's atmosphere" collectively forming orbital waste.<sup>25</sup> The Kessler Syndrome describes the cascading effect of orbital debris.<sup>26</sup> In this effect, with increasing amounts of material being launched into orbit, the probability of collision between any two objects increases. Each collision will produce fragments: which are themselves capable of creating further collisions, and more fragments. Ultimately, a tipping point will be reached where space will be physically (and economically) unusable as the risk of collision for any one object with a piece of debris becomes inevitable.<sup>27</sup>

Importantly, even small pieces of debris pose huge risks for other objects in orbit: individual pieces of debris being capable of reaching speeds of 54, 000 kilometres per hour. As Sundahl records "[a]t this speed, a fragment the size of a bullet could torpedo a space station or destroy a satellite".<sup>28</sup> The astronauts aboard the International Space Station already routinely carries out "avoidance manoeuvre[s]" to prevent damage from space junk.<sup>29</sup> Debris also presents risk on the ground, as debris falling out of orbit may affect people and property upon re-entry. Thus, with increasing debris come increased risk both in space and on the earth.

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<sup>24</sup> Ferreira-Snyman, above n 21, at 26.

<sup>25</sup> Stella Tkatchova "Commercialization Lessons" in Stella Tkatchova (ed) *Emerging Space Markets* (Springer-Verlag, Berlin, 2018) 35 at 93.

<sup>26</sup> Donald J Kessler and Burton G Cour-Palais "Collision Frequency of Artificial Satellites: The Creation of a Debris Belt" (1978) 83 *J Geophys Res* 2637.

<sup>27</sup> Nodir Adilov, Peter J Alexander and Brendan M Cunningham "An Economic 'Kessler Syndrome': A Dynamic Model of Earth Orbit Debris" (2018) 166 *Economics Letters* 79 at 81.

<sup>28</sup> Mark J Sundahl "Unidentified Orbital Debris: The Case for a Market-Share Liability Regime" (2000) 24 *Hastings Int'L & Comp L Rev* 125 at 129.

<sup>29</sup> Agence France-Presse "ISS forced to move to avoid space debris" *The Guardian* (online ed, London, 23 September 2020).

### *III Liability and Allocation of Loss Under the Current Framework*

Responding to the launch of Sputnik-1 in 1957 and the ensuing United States – Soviet Union space race,<sup>30</sup> states were immediately cognisant of the ultra-hazardous nature of space launching and the need for the rapid development of a liability framework. In response, the concept of state liability was introduced in the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies 1967 (the Outer Space Treaty)<sup>31</sup> – a framework convention – and developed into an elaborate regime under the Convention on International Liability for Damage Caused by Space Objects 1972 (the Liability Convention).<sup>32</sup>

Despite the forward-looking nature of the space treaty regime developed in the 1960's and 1970's, the inclusion of exclusive state liability necessarily reflected the historical context in which the Liability Convention was concluded. States generally agreed that the dangers posed by space objects – notwithstanding the benefits which humankind stood to gain from the use of space – necessitated a liability scheme in order to appropriately compensate victims even if there was no wrongdoing on the part of the launching state.<sup>33</sup> As a result, liability under international law for damage caused by space objects is a regime of strict liability for damage caused by acts which are not internationally wrongful in and of themselves. In contrast to the general rules on state responsibility,<sup>34</sup> the Outer Space Treaty and accompanying Liability Convention together create a *lex specialis* governing such

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<sup>30</sup> Frans von der Dunk (ed) *Handbook of Space Law* (Edward Elgar, Cheltenham, 2015) at 35.

<sup>31</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies 610 UNTS 206 (opened for signature 27 January 1967, entered into force 10 October 1967) [Outer Space Treaty], art VII.

<sup>32</sup> Convention on the International Liability for Damage Caused by Space Objects 961 UNTS 187 (opened for signature 29 March 1972, entered into force 1 September 1972) [Liability Convention].

<sup>33</sup> Bruce A Hurwitz *State Liability for Outer Space Activities: in Accordance With the 1972 Convention on International Liability for Damage Caused by Space Objects* (Martinus Nijhoff Publishers, Leiden, 1992) at 3.

<sup>34</sup> See generally International Law Commission *Report of the International Law Commission on the work of its fifty-third session* UN Doc A/56/10 chapter IV(E) (23 April–1 June and 2 July–10 August 2001) [Draft Articles on Responsibility of States for Internationally Wrongful Acts].

circumstances.<sup>35</sup> The Outer Space Treaty first establishes that state responsibility extends to outer space, and that parties bear international responsibility for national activities therein regardless of whether the actor is a governmental or non-governmental entity.<sup>36</sup> Article VII then refers to liability, requiring that a state party which launches or procures the launching of an object into outer space, or from whose territory such an object is launched, is internationally liable for any arising damage. It is important to note here that while responsibility under art VI requires the breach of an international obligation,<sup>37</sup> liability does not necessarily require any wrongdoing.<sup>38</sup> In an elaboration of art VII,<sup>39</sup> the Liability Convention was created to create a more detailed regime for liability under the Outer Space Treaty.<sup>40</sup>

#### *A The Liability Convention*

The Liability Convention sought to create a framework which, while acknowledging the value in using and exploring space, ensured "a full and equitable measure of compensation to victims of such damage".<sup>41</sup> To do so, the Liability Convention takes a somewhat sweeping approach to both damage and the definition of a launching state. Damage caused by a space object is defined as:<sup>42</sup>

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<sup>35</sup> Manfred Lachs *The Law of Outer Space: An Experience in Contemporary Law-Making* (Reissued on the occasion of the 50th Anniversary of the International Institute of Space Law, Martinus Nijhoff Publishers, Leiden, 2010) at 114.

<sup>36</sup> Outer Space Treaty, above n 31, art VI.

<sup>37</sup> For an overview of state responsibility see Alberto Costi and Conor Donohue "State Responsibility" in Alberto Costi (ed) *Public International Law: A New Zealand Perspective* (LexisNexis NZ Limited, Wellington, 2020) 509.

<sup>38</sup> Von der Dunk, above n 30, at 50. Von der Dunk critiques the use of two concepts of accountability in a single treaty as creating "large potential for confusion".

<sup>39</sup> Outer Space Treaty, above n 31, art VII.

<sup>40</sup> Liability Convention, above n 32, preamble.

<sup>41</sup> Liability Convention, above n 32, preamble.

<sup>42</sup> Liability Convention, above n 32, art I.

loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations.

Under art I(c) of the Liability Convention the "launching state" which might be liable is essentially defined with reference to one or more of four criteria:<sup>43</sup>

1. A state which launches a space object;
2. A state which procures the launching of a space object;
3. A state from whose territory a space object is launched; or
4. A state from whose facility a space object is launched.

Notably, the notion of a launching state does not require any minimum level of control or ownership over a space object on the part of the state. Thus, in line with art VII of the Outer Space Treaty, any category of launching state would be liable for damage caused by their space object even if exclusively owned and operated by a private entity. As Von der Dunk records, this constitutes a considerable "extension of state-centricity as compared to more traditional public international law."<sup>44</sup>

The Liability Convention then creates different liability standards for damage based on where the damage by a space object physically occurs. In contrast to the elaborate definitions given of a launching state and damage, "Space Object" is not defined under the Convention, except to clarify that the term "includes component parts of a space object as well as its launch vehicle".<sup>45</sup> Where damage occurs on the earth's surface or to aircraft in flight, a launching state is absolutely liable to pay compensation for damage under art II.<sup>46</sup> As Hurwitz recognises, this imposition of absolute liability was accepted on the basis that the ultrahazardous nature of space launching required compensation without need for fault,

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<sup>43</sup> See generally I H Ph Diederiks-Verschoor and V Kopal *An Introduction to Space Law* (3rd ed, Kluwer Law International, Alphen aan den Rijn, 2008) at 35 – 36.

<sup>44</sup> Von der Dunk, above n 30, at 47.

<sup>45</sup> Liability Convention, above n 32, art I(d).

<sup>46</sup> Liability Convention, above n 32, art II.

in order to balance the risk which the activities presented to society with the benefit which they brought.<sup>47</sup>

In contrast to art II, art III sets up fault-based liability for damage caused elsewhere than the surface of the earth – such as a satellite being destroyed in orbit after collision with space debris.<sup>48</sup> A recent example of where this article could be invoked (but was not in practice) was the collision in 2009 between an active United States communications satellite and a defunct Russian satellite.<sup>49</sup> In such cases, a launching state will only be liable for damage caused to another state's space object where the damage is "due to its fault or the fault of persons for whom it is responsible".<sup>50</sup> Thus, in addition to the requirement of causation under art II, art III also requires an additional element of fault in order for a victim to be able to claim compensation. "Fault" is not defined in the Convention (nor is "persons for whom it is responsible"), meaning there is still some uncertainty as to exactly what standard "fault" imposes.<sup>51</sup> In fact, criticism of the drafting of the fault principle has been fairly consistent among space law academics – with Firestone claiming that without a defined standard of conduct "the concept of fault is meaningless".<sup>52</sup> Although it is beyond the scope of this essay to attempt to address that question, it is clear that some "blameworthy psychological attitude of the actor" would be required.<sup>53</sup>

Supplementing these absolute liability and fault liability requirements, the Liability Convention then sets out a system of joint and several liability where two or more States

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<sup>47</sup> Hurwitz, above n 33, at 28; and see also W F Foster "The Convention on International Liability for Damage Caused by Space Objects" (1972) 10 *Can Y B Int'l L* 137 at 151.

<sup>48</sup> Liability Convention, above n 32, art III.

<sup>49</sup> Scott Kerr "Liability for Space Debris Collisions and the Kessler Syndrome (part 1)" *The Space Review* (11 December 2017) <thespacereview.com>.

<sup>50</sup> Liability Convention, above n 32, art III. Note also that falling debris could possibly cause both sorts of damage if it initially collided with another space object while in space, then caused damage to persons or property on earth if it fell out of orbit towards earth.

<sup>51</sup> See generally Joel A Dennerley "State Liability for Space Object Collisions: The Proper Interpretation of 'Fault' for the Purposes of International Space Law" (2018) 29(1) *EJIL* 281.

<sup>52</sup> Marc S Firestone "Problems in the Resolution of Disputes Concerning Damage Caused in Outer Space" (1984 – 1985) 59 *Tul L Rev* 701 at 767; and see also P Lampertius "The Need for an Effective Liability Régime for Damage Caused by Debris in Outer Space" (1992) 13 *Mich J Int'l L* 447 at 455 – 457.

<sup>53</sup> See Dennerley, above n 51, at 288.

jointly launch a space object.<sup>54</sup> States from whose territory the object is launched are automatically regarded as a joint participant.<sup>55</sup> Apportionment arrangements between the joint launching states based on fault, while encouraged under art IV(2), do not affect the right of the injured State to seek the whole compensation from any or all launching states.<sup>56</sup>

### ***B State-centricity***

Central to the framework set in place by the Outer Space Treaty and Liability Convention is the notion that only states will be liable for damage caused by space objects at international law. Considering the context of which these two treaties were concluded in 1967 and 1972 respectively this state-centricity is not surprising. In those decades, going to space was "astronomically expensive", with the United States Apollo programme having "employed 400, 000 people, cost more than \$110 billion in today's dollars, and resulted in the death of three skilled astronauts".<sup>57</sup> State liability under the two treaties operated on the basis that only states would be carrying out outer space activities. In the years leading up to negotiations, scholars such as Jenks had considered the problem of private entities in space a non-issue.<sup>58</sup> In his view at the time:<sup>59</sup>

The scale of the capital investment involved, the considerable area necessary for a launching station, the degree of preparation required, the need for a substantial measure of public regulation on grounds of public safety alone, and the possible military implications of such developments all combine to make it probable that only States, and perhaps only large States or specially constituted international bodies established by States, will be in a position to undertake the exploration or exploitation of the resources of space.

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<sup>54</sup> Article V.

<sup>55</sup> Article V(3).

<sup>56</sup> Article IV(2).

<sup>57</sup> Dave Baiocchi and William Welser "The Democratization of Space: New Actors Need New Rules" (2015) 94 Foreign Affairs 98 at 98.

<sup>58</sup> C Wilfred Jenks *The Common Law of Mankind* (Steven and Sons Limited, London, 1958) at 390.

<sup>59</sup> At 391.

This appears to be the prevalent attitude of delegates at the time the suite of five space treaties were negotiated and concluded – with a compromise reached between delegates whereby the possibility of private activity in space was not excluded "on the condition that such activity would be subject to the control of the appropriate State, and the State would bear international responsibility for it."<sup>60</sup> Thus, the possibility of private operators providing functions was entertained, but only on the basis that any such operators would be providing a supportive or secondary function.

As a result, art VI of the Outer Space Treaty does not exclude the actions of private entities in space but does place the burden of liability for the actions of such actors directly on the state. The Liability Convention similarly highlights the strict focus on states as the relevant accountable actors. Article II imputes ownership of a space object to the launching state when stating that "a launching State shall be absolutely liable ... for damage caused by *its* space object".<sup>61</sup> Rather than creating responsibility for objects launched from a territory, even if those objects were launched by other actors, this provision conceptually places direct ownership on the state for any space object launched. This equation of launching activities with the state presumes a context in which states have a monopoly over space launches.

Thus, except to the extent that it places liability solely on states, the regime does not meaningfully interact with the idea of private operators engaging in space activities. In contrast to the general maxim that "in all great matters relating to commerce, legislators have copied, not dictated", in this case commerce has followed in the wake of a pre-existing treaty regime governing such activities. This has resulted in a state-centric treaty regime, fundamentally divorced from the regulation of non-governmental entities. Unfortunately, the "golden age" of space law treaty making ended before it could adapt to the expanding role of commercial operators.<sup>62</sup> While art VI was quite forward looking insofar as it

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<sup>60</sup> *Committee on the Peaceful Uses of Outer Space: Verbatim Record of the Twenty-Second Meeting* UN Doc A/AC.105/PV.22 (13 September 1963) at 23; and see Paul Stephen Dempsey "National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement" (2016) 36 *Nw J Int'l L & Bus* 1 at 6.

<sup>61</sup> Liability Convention, above n 32, art II. (emphasis added)

<sup>62</sup> Von der Dunk, above n 30, at 40.

envisioned that states may need to be liable for the actions of private entities, it did not look forward to a future where private entities were carrying out the functions which had previously only belonged to states.<sup>63</sup> As will be explored in the following section, the emergence of private operators has meant that this regime is now fundamentally out of step with modern space activities.

#### *IV Private Launch Operators*

Despite the term "new space" which appears to have attached itself to private activities in outer space,<sup>64</sup> the present era of private outer space actors is not a wholly novel development. At the heart of the space race, companies such as McDonnell Aircraft and North American Aviation were providing technical support to NASA's Apollo programme.<sup>65</sup> In fact, Tkatchova describes the commercialisation of space technology occurring as early as the 1980s.<sup>66</sup> In the United States, NASA was driven by cost-cutting needs, with commercial operators innovating and providing cheaper alternatives in a commercialised market. In the Soviet Union, Roscosmos was motivated by cost recovery for their exceptionally high operating costs.<sup>67</sup> Yet, in these early stages, commercial operators were providing only a supportive function for government. In this context, exclusive state liability under the Liability Convention was still coherent. Yet the context changed when the launch of Conestoga 1 in 1982 (the first privately funded rocket to reach space) marked the emergence of largely autonomous private actors in space.<sup>68</sup> By 2000, commercial activity had become increasingly self-propelled "ranging from garage-based start-ups to billionaire-funded corporations".<sup>69</sup>

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<sup>63</sup> SpaceX "Space Station" (2020) <[www.spacex.com](http://www.spacex.com)>. SpaceX, for example, has been servicing the International Space Station by sending cargo since 2012 – a function which previously belonged to NASA.

<sup>64</sup> See for example Louis de Gouyon Matigon "Space Law and the New Space" (26 June 2019) Space Legal Issues <[www.spacelegalissues.com](http://www.spacelegalissues.com)>; and R S Jakhu and J N Pelton (eds) *Global Space Governance: An International Study* (Springer, Berlin, 2017) at 114.

<sup>65</sup> Jakhu and Pelton, above n 64, at 113.

<sup>66</sup> Tkatchova, above n 25, at 35.

<sup>67</sup> At 35 – 36.

<sup>68</sup> Jakhu and Pelton, above n 64, at 114.

<sup>69</sup> At 114.



Nowadays a shift has occurred, where private operators – having carved out their own market – are providing far beyond merely a supportive function for states. Kehrer reports that in 2017 private investors invested approximately USD 3.9 billion into commercial space companies, while commercial rockets are generally seen as more efficient than those designed and run by states.<sup>70</sup> Going forward, private investment in space (already representing 80 per cent of the global space market) is predicted to increase by 3.5 per cent annually.<sup>71</sup> This privatisation of space has led to a situation where more objects are being sent into space in an environment where it is difficult for states or international bodies to monitor the increasing volume. The registration index created by the United Nations Office for Outer Space Affairs (UNOOSA) shows that between 1 February 2020 and 31 March 2020 over 130 unregistered space objects were launched from the United States alone.<sup>72</sup> Moreover, these are only those objects of which the UNOOSA has knowledge. Many of these may have been tied to the United States government; many may well have been private actors. In an environment in which the barriers to entering space have become lower due to technological advances, and technology is being driven more and more by private industry, to view outer space as a place regulated by states is no longer realistic.

In this vein, governments are increasingly employing private operators to carry out what were previously state services. The United States in particular has incentivised private initiatives in order to tap into cost-effective space launches.<sup>73</sup> Expanding from the three companies which had provided commercial space launch services prior to 21st century, the United States Federal Aviation Administration projected that 12 companies would be able to provide launch services to the United States by 2020.<sup>74</sup> Even space flight appears to be shifting into commercial hands – with SpaceX launching astronauts into orbit in May 2020

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<sup>70</sup> Trevor Kehrer "Closing the Liability Loophole: The Liability Convention and the Future of Conflict in Space" (2019) 20(1) *Chi J Int Law* 178 at 189.

<sup>71</sup> Deloitte Access Economics, above n 2, at 10.

<sup>72</sup> United Nations Office for Outer Space Affairs "Online Index of Objects Launched into Outer Space" <[www.unoosa.org](http://www.unoosa.org)>.

<sup>73</sup> Jakhu and Pelton, above n 64, at 115.

<sup>74</sup> Moon J Kim "The Potential Speculative Bubble in the U.S. Commercial Space Launch Industry and the Implications to the United States" (2018) 6 *New Space* 156 at 156.

a decade after the American government closed its own space shuttle capacity.<sup>75</sup> While the balance of space is shifting from states to industry, the ultrahazardous nature of the activities remains.

*V Australia and New Zealand: How low can you go? Writing Private Operator Liability into Domestic Frameworks*

In any commercial launch there can be seen to be three key stakeholders: the launching state(s); launch operators; and potential victims of damage. In order to manage the risk, and obligations under the space treaties, states generally recognise that they must incorporate these obligations into domestic legislation to create a coherent regulatory framework.<sup>76</sup> In the case of minimising risk and mitigating liability, states tend to legislate for indemnity, insurance and debris mitigation – all typically handled through licences.<sup>77</sup> With only states held liable under the international regime – notwithstanding the increasing presence of commercial actors described in the previous section – states are given free rein to determine how to manage their own liability in relation to operators.

In order to illuminate some of the issues which might arise, the section engages in a comparison of New Zealand and Australia's approaches to operator liability domestically to show the different approaches which states can take to legislating these obligations. This section compares the *risk-averse* approach of New Zealand's Outer Space and High-altitude Activities Act 2017 with the *risk-absorbing* approach of the Australian Space (Launches and Returns) Act 2018. The comparison shows the ways in which the discretion given to states to underwrite risk under the international space regime means that domestic laws directed towards the same goal, can still significantly diverge. Both states have ratified the

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<sup>75</sup> NASA, above n 4.

<sup>76</sup> Steven Freeland "A Delicate Balance: Regulating Micro Satellite Technology" (2014) 18 U W Sydney L Rev 1 at 6.

<sup>77</sup> Van Fenema, above n 3, at 404.

Outer Space Treaty and Liability Convention.<sup>78</sup> Thus the international legal framework of liability which binds the two states is identical.

### *A General Approaches to Regulation of Private Operators*

New Zealand occupies a unique niche among space-faring states,<sup>79</sup> as the first example of a launching state driven solely by commercial activity.<sup>80</sup> New Zealand's introduction to the commercial launch industry came about through direct engagement with industry, when Rocket Lab sought to launch from its newly built launch site in Mahia in 2016.<sup>81</sup> In a remarkably rapid period of institutional creation, in little under five years New Zealand entirely re-positioned its relationship to space and launch activities. Firstly, New Zealand engaged with Rocket Lab as a contracting partner by concluding an interim contract to enable Rocket Lab to engage in early launches.<sup>82</sup> With this interim arrangement in place, Cabinet approval was gained to develop domestic legislation in order to manage the risks associated with space launching.<sup>83</sup> In parallel, New Zealand was engaging bilaterally with the United States. In June 2016, the Agreement between the Government of New Zealand and the Government of the United States of America on Technology Safeguards Associated with United States Participation in Space Launches from New Zealand was signed – entering into force only five months later – to enable launch technology sharing after

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<sup>78</sup> United Nations Office for Outer Space Affairs "Status of International Agreements Relating to Activities in Outer Space as at 1 January 2020" <[www.unoosa.org](http://www.unoosa.org)>.

<sup>79</sup> Cassandra Steer "Who Has the Power? A Critical Perspective on Space Governance and New Entrants to the Space Sector" (2020) 48 Ga J Int'l & Comp L 751 at 753. Today there are 14 states with independent launch capabilities, with Australia placed to join this list next.

<sup>80</sup> Deloitte Access Economics, above n 2, at 11.

<sup>81</sup> Rocket Lab "About Us: History" <[www.rocketlabusa.com](http://www.rocketlabusa.com)>. The company has since moved its headquarters and place of incorporation to California.

<sup>82</sup> Steven Freeland, Kirsty Hutchison and Val Sim "How Technology Drives Space Law Down Under: the Australian and New Zealand Experience" (2018) 43(2) Air & Space Law 129 at 130.

<sup>83</sup> Cabinet Paper "Contract Between the New Zealand Government and Rocket Lab" (10 August 2016) (obtained under Official Information Act 1982, electronically released by the Ministry of Business, Innovation & Employment) at [10].

Rocket Lab become incorporated in America.<sup>84</sup> With New Zealand Space Agency created in 2016,<sup>85</sup> that same year New Zealand became a member of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS).<sup>86</sup> To conclude this domestic framework building, New Zealand enacted the Outer Space and High-altitude Activities Act 2017 which came into force on the 21 December 2017.<sup>87</sup> Nowadays, Rocket Labs regularly launches payloads from their privately owned launch site in Mahia Peninsula under licences gained through this Act.<sup>88</sup> The Act operates as a means of mitigating the liability for launch activities, which New Zealand accepts as a party to the Liability Convention.

In contrast, Australia had engaged "with vigour and enthusiasm" in the early development of the international space regime: proactively creating a regime for space launches in 1998<sup>89</sup> and becoming a founding member of UNCOPUOS.<sup>90</sup> More recent years have seen a revitalisation of this engagement, directed toward commercial operators. In a 2018 review of the previous legislation, it was recorded that the Space Activities Act 1998 "had an unnecessary level of inflexibility" and "a high level of insurance/financial requirements in relation to other space-faring nations".<sup>91</sup> In response, entering into force on 31 August 2019, the Space (Launches and Returns) Act 2018 established a system of regulation for space activities. This is supplemented by three sets of rules: the Space (Launches and Returns) (General) Rules 2019; the Space (Launches and Returns) (High Power Rockets) Rules 2019; and the Space (Launches and Returns) (Insurance) Rules 2019.

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<sup>84</sup> Agreement between the Government of New Zealand and the Government of the United States of America on Technology Safeguards Associated with United States Participation in Space Launches from New Zealand [2016] NZTS 14 (signed 16 June 2016, entered into force 12 December 2016).

<sup>85</sup> Ministry of Business, Innovation & Employment "New Zealand Space Agency" <[www.mbie.govt.nz](http://www.mbie.govt.nz)>.

<sup>86</sup> United Nations Office for Outer Space Affairs "Committee on the Peaceful Uses of Outer Space: Membership Evolution" <[www.unoosa.org](http://www.unoosa.org)>.

<sup>87</sup> Outer Space and High-altitude Activities Act 2017, s 2.

<sup>88</sup> Ministry of Business, Innovation and Employment "Payloads approved for launch" <[www.mbie.govt.nz](http://www.mbie.govt.nz)>.

<sup>89</sup> Space Activities Act 1998 (Cth).

<sup>90</sup> Joel Lisk and Melissa de Zwart "Watch this Space: The Development of Commercial Space Law in Australia and New Zealand" (2019) 47(3) Fed Law Rev 444 at 455.

<sup>91</sup> Australian Space Agency *Space (Launches and Returns) Act 2018: Consultation Paper on Draft Rules* (20 May 2019) at 3.

## ***B Liability and Insurance***

As mentioned above, the first area in which states will tend to legislate domestic requirements for in the case of space launching is liability and insurance. These requirements are directly tied to the ability of the state to recover loss of damage and to shift their own liability under the Liability Convention on to operators. However, how much a state is willing to claim from an operator depends on their approach to the market. Central to the comparison of these laws carried out in the following subsection, is the recognition that Australia does not currently have launch capacity from their own territory.<sup>92</sup> This has resulted in diverging approaches to private industry. As Borroz recognises, New Zealand's approach to space law is one of *facilitation* of the space market rather than *cultivation* of it.<sup>93</sup> So while New Zealand does not provide significant incentive schemes for launchers,<sup>94</sup> it does provide facilitative support through mechanisms like the recognition of overseas licences and technology transfer.<sup>95</sup> In contrast, Australia approaches space with the philosophy of building and cultivating a market. This has manifested in lucrative incentive schemes like the AUD 150 million "Moon to Mars" investment<sup>96</sup> and AUD 19.5 million "Space Infrastructure Fund" – directed towards tripling the size of the space sector by 2030.<sup>97</sup> Thus, New Zealand and Australia take differing approaches to their relationship to private operators where Australia is more directed towards actively growing industry.

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<sup>92</sup> Cassandra Steer "SpaceX's historic launch gives Australia's booming space industry more room to fly" *The Conversation* (online ed, Melbourne, 2 June 2020). Australia's first spaceport is due to open in 2021.

<sup>93</sup> Nicholas Borroz "Australia should beware of space industry subsidies" (13 July 2020) *The Strategist: Australian Strategic Policy Institute* <[www.aspistrategist.org.au](http://www.aspistrategist.org.au)>.

<sup>94</sup> Ministry of Business, Innovation & Employment "Catalyst: Strategic – Space 2019" (17 April 2019) <[www.mbie.govt.nz](http://www.mbie.govt.nz)>. New Zealand has provided limited funding in instances like the Catalyst project, where six projects were selected for a share of a NZD 3 million. However, this is limited in comparison with Australia's financial incentives.

<sup>95</sup> See Agreement between the Government of New Zealand and the Government of the United States of America on Technology Safeguards Associated with United States Participation in Space Launches from New Zealand, above n 84.

<sup>96</sup> Australian Government: Department of Industry, Science, Energy and Resources "Moon to Mars program design" (5 February 2020) <[www.industry.gov.au](http://www.industry.gov.au)>.

<sup>97</sup> Australian Government: Department of Industry, Science, Energy and Resources "Supporting space infrastructure growth" (30 June 2020) <[www.industry.gov.au](http://www.industry.gov.au)>.

## 1 *New Zealand*

In New Zealand, the Outer Space and High-altitude Activities Act 2017 creates broad discretionary powers for the Minister to impose limitations and indemnification conditions on launching companies. Section 10(1)(i) provides open-ended powers for the Minister (subject to judicial review) to impose conditions which the licensee must comply with. Namely:<sup>98</sup>

any other conditions imposed by the Minister including, without limitation, any conditions that the Minister considers necessary or desirable in order to—

- (i) give effect to New Zealand's international obligations; or
- ...
- (vi) manage New Zealand's potential liability under international law (including under the Liability Convention and the Outer Space Treaty).

Under s 10(3), the Minister may also require a licensee to indemnify the Crown in whole or in part against claims against the Crown under the Liability Convention or the Outer Space Treaty.<sup>99</sup>

New Zealand's approach to insurance requirements exemplifies a state which takes a risk-averse approach to liability and insurance. The lack of a defined sum required by launch operators gives the Minister discretion to impose (theoretically at least) any level of indemnity. Interestingly, although there is no upper cap for indemnity and insurance, there is also no mandatory requirement on the decision-maker to include such conditions in the licence.<sup>100</sup> The Minister has full discretion not only to decide the amount, but also whether to require any insurance or indemnity of a launch operator at all.

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<sup>98</sup> Outer Space and High-altitude Activities Act 2017, s 10(1)(i).

<sup>99</sup> Section 10(3).

<sup>100</sup> Frans G von der Dunk "Kiwis in Space: New Zealand's "Outer Space and High-Altitude Activities Act" (2017) Space, Cyber, and Telecommunications Law Program Faculty Publications 107 at 6.

It is worth noting that this approach has received industry push-back. In an ultimately unsuccessful select committee submission for the Outer Space and High-altitude Activities Bill, Rocket Lab warned that that the:<sup>101</sup>

An uncapped potential liability insurance requirement could be expected to increase the financial risk of developing a vehicle in New Zealand to unacceptable levels and drive innovation overseas.

States that mishandle the liability obligations of launch operators by overestimating the third party liability costs of accidents, applying an excessively high upper limit on the launch operator insurance requirement, or set no upper limit on the launch operator insurance requirement *face the real risk of losing their space industry*. (Emphasis added)

The Ministry of Business, Innovation & Employment's departmental response to this warning (read: threat) was to suggest that any potential regulatory burden on private operators, imposed by liability requirements with no upper limit, would be mitigated by the reality that the Minister would have to take facilitation of the industry into account when setting the conditions of a licence.<sup>102</sup>

## 2 *Australia*

On the other hand, the Australian State takes a risk-absorbing approach to operators' space activities. The Space (Launches and Returns) Act 2018 imposes mandatory insurance and liability requirements on launch operators as a pre-requisite for and condition of a launch permit.<sup>103</sup> Yet these requirements differ based on the location of the launch, and place liability caps on the amount which a single operator can be held liable for.

For launches authorised by an Australian Launch permit or returns to a location within Australian territory, the holder must insure themselves for any liability to third parties, and

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<sup>101</sup> Rocket Lab "Submission to the Foreign Affairs, Defence and Trade Select Committee on the Outer Space and High-altitude Activities Bill" at [2.6].

<sup>102</sup> Ministry of Business, Innovation & Employment "The Outer Space and High-altitude Activities Bill: Departmental Report to the Foreign Affairs, Defence and Trade Select Committee" at 14.

<sup>103</sup> Sections 28 and 30(d).

insure the Commonwealth against any liability it may incur under the Liability Convention.<sup>104</sup> The amount required is whichever is the lesser of AUD 100 million<sup>105</sup> or the amount determined by the Maximum Probable Loss Methodology.<sup>106</sup> The Maximum Probable Loss Methodology sets out a risk-based analysis methodology to ascertain the greatest probable loss which can be reasonably expected to arise from launch activities.<sup>107</sup> This then can be used as the insured amount under s 48(a) of the Space (Launches and Returns) Act 2018 if it is less than AUD 100 million. In contrast, for launches authorised by overseas permits or returns to a territory outside Australia, the holder of the permit must insure only the Commonwealth, with *no* minimum insurance requirement.<sup>108</sup> In the alternative, the launch operator can also satisfy the financial requirements without needing to take out insurance by showing direct financial responsibility for the amount payable under subs 48(4) for the launch.<sup>109</sup>

Limitations are further placed on a permit holder's liability, where the permit holder "is not liable to pay compensation for the damage to the extent that the amount of compensation would exceed the insured amount".<sup>110</sup> So if a launch operator was obliged to take out the minimum AUD 100 million in insurance for a domestic launch, then it would not be liable for any compensation over that sum.<sup>111</sup> More strikingly, this means that if a national launches overseas and was only required to take out AUD 0 as insurance under the Rules,<sup>112</sup> then they would not be liable to pay any compensation at all. The whole cost of

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<sup>104</sup> Space (Launches and Returns) Act 2018 (Cth), s 48(1).

<sup>105</sup> Space (Launches and Returns) Act 2018 (Cth), s 48(4)(a); and Space (Launches and Returns) (Insurance) Rules 2019 (Cth), r 6.

<sup>106</sup> Space (Launches and Returns) Act 2018 (Cth), s 48(4)(b); Space (Launches and Returns) (Insurance) Rules 2019 (Cth), r 7; and Australian Space Agency *Maximum Probably Loss Methodology* (August 2019).

<sup>107</sup> Australian Space Agency, above n 106, at 5.

<sup>108</sup> Space (Launches and Returns) Act 2018 (Cth), s 48(4)(a) – (b); and Space (Launches and Returns) (Insurance) Rules 2019 (Cth), r 6. Rule 6 specifies that the amount of insurance required under s 48(4)(a) is AUD 0.

<sup>109</sup> Space (Launches and Returns) Act 2018 (Cth), s 48(4); Space (Launches and Returns) (Insurance) Rules 2019 (Cth), r 7; and Australian Space Agency, above n 106.

<sup>110</sup> Space (Launches and Returns) Act 2018 (Cth), s 69(3).

<sup>111</sup> Space (Launches and Returns) Act 2018, s 48(4)(a) – (b); and Space (Launches and Returns) (Insurance) Rules 2019 (Cth), r 6.

<sup>112</sup> Space (Launches and Returns) (Insurance) Rules 2019 (Cth), r 6.



an international claim – assuming Australia was determined to be a launching state – would be placed on the Australian State.<sup>113</sup> Moreover, the Commonwealth commits itself to paying compensation for damage to Australian nationals beyond that AUD 100 million up to the value of AUD 3 billion.<sup>114</sup>

The accumulative effect of these provisions is to create a scheme where the Australian State is willing to underwrite much of an operator's liability. Although insurance requirements are mandatory, liability is subject to limits beyond which the state commits to paying any additional compensation for damage. Noting the earlier discussion of Australia's approach to creation, rather than facilitation, of a market,<sup>115</sup> such an approach is consistent with the willingness to attract operators. Yet it also means that there is a real risk that the Australian state – and by extension the taxpayers – will have to pay in the event of damage occurring to another state.

### ***C Orbital Debris***

As a final note to the comparison, it is worthwhile recognising that both states both have a broadly consistent approach to orbital debris caused by launch operators. Both Australia and New Zealand have regulations covering orbital debris, despite this not being legally required under the international space regime. Both states require a satisfactory debris mitigation plan as a pre-requisite for a launch licence: Australia with reference to international standards such as the Space Debris Mitigation Guidelines<sup>116</sup> and New Zealand with a detailed list of requirements including minimisation of collisions and

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<sup>113</sup> Space (Launches and Returns) Act 2018, s 48(4)(a) – (b); and Space (Launches and Returns) (Insurance) Rules 2019 (Cth), r 6.

<sup>114</sup> Space (Launches and Returns) Act 2018 (Cth), s 69(4).

<sup>115</sup> Borroz, above n 93.

<sup>116</sup> United Nations Office for Outer Space Affairs *Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space* (January 2010); Space (Launches and Returns) Act 2018 (Cth), s 34(2); and Space (Launches and Returns) (General) Rules 2019 (Cth), r 54. The 2019 Rules elaborate on the requirements of the debris mitigation plan mentioned under s 34(2) of the Act.

breakups.<sup>117</sup> Interestingly, prior to the 2018 reforms, Australia's Space Activities Act 1998 (including amendments up to 2016) had no reference to debris at all. The granting of space licences under s 18 did require that "an adequate environmental plan has been made for the construction and operation of the launch facility"<sup>118</sup> but this plainly only extended to the ground operation of a launch site and not the outer space environmental impacts of any launched objects or payloads. This change in attitude and relative harmony between New Zealand and Australia's laws – at least with regard to debris mitigation – indicates that states at least are cognisant of the potential liability and access problems which can arise from increasing concentrations of debris. However, ultimately both states still retain a high degree of discretion to decide what is effective debris mitigation. The risk exists that other launching states may not be so proactive in their legislating to minimise such debris.

## *VI Liability Problems in "New Space"*

While the Liability Regime has remained ossified in time, in the interim the scope and types of space activities have changed beyond recognition as discussed in the previous section. This leaves several aspects of the Liability Regime fundamentally out of step with a commercialised space – with states such as Australia and New Zealand having to determine their own domestic approaches to exclusive state liability at international law. This following part distils some of the issues arising from the continued operation of the now out of date liability regime in this modern “New Space” context.

### *A How to Classify a "Launching State" in the Context of a Private Launch?*

First, where liability for damage falls when private operators are involved is somewhat unclear. Launching states as defined under art I(c) of the Liability Convention will be liable for private operators with no necessary element of control.<sup>119</sup> But where private operators

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<sup>117</sup> Outer Space and High-altitude Activities (Licences and Permits) Regulations 2017, r 13.

<sup>118</sup> Space Activities Act 1998 (Cth), s 18(b).

<sup>119</sup> Liability Convention, above n 32, art I(c).

are involved, the initial classification of a launching state is much more difficult. Evidently, the state from whose territory an object is launched will be liable, but classifications such as states who "launch" or "procure a launch" remain undefined in relation to private launchers.<sup>120</sup> For example, where a private operator is incorporated in one country, but launches out of the territory of another it is unclear whether the state of incorporation would be liable.<sup>121</sup> In response to this uncertainty as to which state will be held liable, and to the imputation of liability for private activities, states will typically attach insurance and indemnity requirements to launch licences. However, such requirements are crafted on a state's own volition and there is no international obligation to domestically legislate for such conditions. This means that the way operators are regulated can vary widely from jurisdiction to jurisdiction: a concerning fact in light of the ultrahazardous nature of space activities. While the risk of damage remains the same by nature of the activities themselves, there is no requirement for consistency in national regulation.

As a result of this international ambiguity, the analysis above of New Zealand and Australia's launch laws shows the way in which different interpretations of the scope of "launching state" result in different domestic regulation. New Zealand and Australia take opposite approaches to the question of foreign launches conducted by nationals. Australia's domestic laws – and the absence of minimum insurance requirements for overseas launch permits –<sup>122</sup> reveal that the Australian state does not consider its liability under the Liability Convention<sup>123</sup> to extend to instances where an Australian national launches overseas. Thus, if an Australian company launched a rocket from Kenya for example, which then caused damage, Australia would not consider itself to be a "launching state" for the purpose of the Liability Convention.<sup>124</sup> In contrast, New Zealand's law recognises that it may be internationally liable for objects which were launched by a New Zealand company overseas on a launch licence, and requires identical licencing requirements for

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<sup>120</sup> See Von der Dunk, above n 30, at 83 – 84.

<sup>121</sup> Diederiks-Verschoor and Kopal, above n 43, at 37.

<sup>122</sup> See Space (Launches and Returns) Act 2018 (Cth), s 48(4)(a) – (b); and Space (Launches and Returns) (Insurance) Rules 2019 (Cth), r 6.

<sup>123</sup> Liability Convention, above n 32.

<sup>124</sup> Liability Convention, above n 32, art I.

both on-shore and off-shore launches.<sup>125</sup> For a launch operator deciding where to incorporate their company, this may be critical commercial difference. Companies wishing to launch from more than one location would be more attracted to Australia's laws, as they allow off-shore launching with an insurance requirement of AUD 0.<sup>126</sup>

### ***B Identifying an Owner***

Second, damage under arts II and III of the Liability Convention requires that the owner of the space object be identified.<sup>127</sup> Yet, with space becoming increasingly crowded with a growing mass of orbital debris, tracking an object – which may only be a small fragment of an original launch – and attributing it to an owner could be practically impossible. This is particularly problematic when a metal fragment "the size of a cherry carries the explosive power of a grenade when in orbit".<sup>128</sup> In this context, a functional liability system presumes either a large tracking capacity (and honesty) from the launch state, or consistent registration with the UNOOSA to enable them to track the launch. In reality, the UNOOSA's "Online Index of Objects launched into Outer Space" seems to suggest that adherence with registration requirements is slipping in recent years.<sup>129</sup> In 2017, 8.8 per cent of the total 456 recorded objects launched that year were unregistered.<sup>130</sup> Yet, in 2019 this number increased to 44 per cent, with 257 objects unregistered out of a total 580.<sup>131</sup> In 2020 the outlook is even direr for registration, with 359 of the 583 objects launched between January and July being unregistered – over 60 per cent.<sup>132</sup> It is evident that states are becoming increasingly reluctant to register launches, or viewing the exercise merely as

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<sup>125</sup> Outer Space and High-altitude activities Act 2017, s 23. Overseas launches of launch vehicles by New Zealand nationals require a launch licence granted under the Act unless there is an overseas launch licence.

<sup>126</sup> Space (Launches and Returns) Act 2018 (Cth), s 48(4)(a) – (b); and Space (Launches and Returns) (Insurance) Rules 2019 (Cth), r 6.

<sup>127</sup> Sundahl, above n 28, at 126.

<sup>128</sup> Matthew Weinzierl "Space, the Final Economic Frontier" (2018) 32 JEP 173 at 186.

<sup>129</sup> United Nations Office for Outer Space Affairs "United Nations Register of Objects Launched into Outer Space: Resources and Reference Material for States & Organizations" <[www.unoosa.org](http://www.unoosa.org)>.

<sup>130</sup> United Nations Office for Outer Space Affairs, above n 129.

<sup>131</sup> United Nations Office for Outer Space Affairs, above n 129.

<sup>132</sup> United Nations Office for Outer Space Affairs, above n 129. As at 30 July 2020.

an unnecessary technicality. However, eschewing good tracking practices means that liability may be unable to be assigned.

### *C Removing Benefit and Control from Risk and Loss in the Context of an Ultrahazardous Activity*

Third – and perhaps most importantly – the state-centric focus of the current liability regime means that there is an unjustifiable distinction made between those who carry out and benefit from ultrahazardous space activities and those who are allocated loss at international law. When situating space launching within the general principles of loss allocation, the ILC's Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising Out of Hazardous Activities (the Draft Principles) are an important point of reference.<sup>133</sup> Although this project as a whole was not free from controversy, central to the Draft Principles is the uncontroversial idea that the entity which primarily controls and benefits from the hazardous activity should internalise the cost of the risk and any loss arising.<sup>134</sup> Or as the ILC put it "that one who created high risks seeking economic benefit must bear the burden of any adverse consequences of controlling the activity".<sup>135</sup> In the case of hazardous activities with a commercial aspect, principle four requires that the state's measures to ensure prompt and adequate compensation to victims "should include the imposition of liability on the operator".<sup>136</sup> Yet, at the time of drafting these principles, the International Law Commission recognised that in direct contrast to

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<sup>133</sup> *Report of the Commission to the General Assembly on the Work of its fifty-eighth session: Text of the Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising Out of Hazardous Activities with Commentaries* [2006] vol 2, pt 2 YILC 59 [Draft Principles].

<sup>134</sup> Foster, above n 9, at 266; and see *First report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities by Mr Pemmaraju Sreenivasa Rao, Special Rapporteur*, above n 8, at 96. This idea is not in itself controversial – having being distilled from the pre-existing regimes governing the allocation of loss from hazardous activities during the ILC's early work on the draft principles.

<sup>135</sup> Draft Principles, above n 133, at 78, at [11].

<sup>136</sup> At 58, at [66].

other hazardous activities, liability and compensation for outer space activities is exclusively state liability as codified in the Liability Convention.<sup>137</sup>

Previously, where outer space activities were the exclusive purview of states, the singling out of outer space activities as a specific category of hazardous activity to which exclusive state liability attached could be justified under this principle. By attaching liability to the state, the cost was appropriately internalised, as the entity which controlled and benefitted from the activity was the state itself. Nowadays, with private launch operators increasingly moving into the role which states once exclusively occupied,<sup>138</sup> this categorical distinction between outer space activities and other hazardous activities is no longer justified.

Aside from the problem of space activities now being out of step with wider principles of regulating ultrahazardous activities, separating out those who carry out and benefit from doing the activities and those who carry the liability for those activities carries several problems in the context of an ultrahazardous activity.

*1 The risk of states underwriting operator's liability: cost being placed on citizens*

First, it means that states have *carte blanche* to underwrite an operator's liability. Regulatory competition may result in states like Australia being willing to absorb more of the cost to be attractive launch sites. As Linden notes, regulatory competition "occurs when states compete with each other, in their capacity as regulators, to attract resources and mobile factors of production".<sup>139</sup> In this phenomenon, states wishing to attract a particular market will enact regulations demanded by the industry – usually maximising profitability.<sup>140</sup> The freedom of states to interpret the wordings of the space treaties and create national legislation in accordance with those subjective interpretations has "led to

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<sup>137</sup> At 60, at [8].

<sup>138</sup> See for example SpaceX, above n 63.

<sup>139</sup> Dimitri Linden "The Impact of National Space Legislation on Private Space Undertakings: A Regulatory Competition Between States?" (Leuven Centre for Global Governance Studies Working Paper No 190, KU Leuven, 2017) at 21.

<sup>140</sup> Linden, above n 139, at 21.

divergent sets of national provisions and solutions taking into account the states' own economic, infrastructural, legal, and technological culture."<sup>141</sup> This means that states can impose liability caps, and loose insurance requirements in order to be more commercially attractive to launchers. Regulatory competition is not necessarily a negative phenomenon when talking generally. Law which responds to market forces makes for more effective commerce; and regulatory competition can drive legal innovation.<sup>142</sup> However, in the context of space launching which has the potential to cause high levels of damage, the practical effect of a state underwriting a private launch operator's liability is to shift the loss onto the citizens who would be funding any international compensation.<sup>143</sup> Although the Liability Convention makes states liable, with damage caused by space events currently a rare event<sup>144</sup> states may see a lack of financial requirements placed on companies to be a risk worth taking in order to nurture innovation.<sup>145</sup> In reality, this is a risk being shifted onto citizens – the ones who will ultimately pay the state's bill – when they have no control of and draw relatively little financial benefit from the space activities.

## *2 Increasing risk of damage*

Second, the notion of internalisation of loss is to make sure that those who stand to benefit most from a hazardous activity act carefully in reaping the benefits as they will also be the ones to carry the burden of loss should damage arise.<sup>146</sup> If states wishing to be financially attractive to launch operators create laws which are favourable to launch operators in the short term (such as attractive indemnity caps or not requiring insurance and indemnity at all) this may in itself increase the risk of damage if it lowers general safety standards. Limitations on liability or co-producing risk between private operators and government

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<sup>141</sup> Dimitri Linden "The Impact of National Space Legislation on Private Space Undertakings: Regulatory Competition vs Harmonization" (2016) 8(1) JSPG 1 at 7.

<sup>142</sup> Linden, above n 139, at 22.

<sup>143</sup> Liability Convention, above n 32, arts II – III. With only states liable under arts II and III of the Liability Convention.

<sup>144</sup> Cohen, above n 10, at 70 – 71. The Case of the Cosmos being one rare example of damage.

<sup>145</sup> Frans G von der Dunk "Towards 'Flags of Convenience' in Space?" [2012] Space, Cyber, and Telecommunications Law Program Faculty Publications 76 at 14.

<sup>146</sup> Liability Convention, above n 32, arts II and III.

generally introduces a risk "by creating a wedge between those taking the risk and those paying for it".<sup>147</sup> Launch companies may be less inclined to take full care if they know that there is an indemnity cap on their end, and governments may be less inclined to deny a launch licence if they think the operator will be liable domestically.<sup>148</sup> A lack of requirements around orbital debris mitigation – if states choose to ignore international best practice –<sup>149</sup> may also result in higher concentrations of debris in the atmosphere, increasing the risk both of damage to objects already in space through collision, and damage on earth if an object is dislocated out of orbit. This is also problematic for insurance, as increasing numbers of operators may cause insurance premiums to rise and average covers to fall as the variability and thus unreliability of the process is correspondingly increased.<sup>150</sup>

### *3 Fairness: those who benefit ought carry the risk*

Finally, from a fairness perspective, it seems fundamentally unjust that where private actors have the benefit of free access to space ensured under the Outer Space Treaty,<sup>151</sup> at the same time they can eschew international accountability under the Liability Convention. Where private launch operators get the benefit, it is also desirable that "they equally have the burden of being globally accountable for said use."<sup>152</sup>

Consider the case of Rocket Lab in New Zealand. Rocket Lab launches from the world's only privately owned launch site; licenced for a launch to occur every 72 hours.<sup>153</sup>

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<sup>147</sup> Brennan, Kousky and Macauley, above n 18, at 119.

<sup>148</sup> At 120.

<sup>149</sup> United Nations Office for Outer Space Affairs, above n 116. The Debris Mitigation Guidelines being the primary standard.

<sup>150</sup> Williams and Walsh, above n 16, at 5.

<sup>151</sup> Outer Space Treaty, above n 31, art I.

<sup>152</sup> Julia Selman Aytay "In Support of Global Accountability for Private Commercial Space Actors" (2020) 48 Ga J Int'l & Comp L 761 at 765.

<sup>153</sup> Rocket Lab "Our Launch Sites" <[www.rocketlabusa.com](http://www.rocketlabusa.com)>.



Although the company operates from New Zealand territory, it is incorporated in America with its headquarters in California,<sup>154</sup> and has the United States government among its list of customers.<sup>155</sup> In addition, its rockets are predominantly self-supplied.<sup>156</sup> In this context, New Zealand realistically has little control of Rocket Lab's operations beyond conditions imposed in the initial launch licence,<sup>157</sup> and does not share directly in the profits of any launches. Despite the national laws which New Zealand has in place, ultimately if damage occurs to another state from a Rocket Labs launch, New Zealand (and its tax paying citizens) will be liable under international law. To place the burden of loss on New Zealand seems to be far from the initial goals of the Liability Convention – negotiated in the time of the United States and Soviet Union space race – when the New Zealand state has little to no practical part in the launch. Evidently, creating a regime which adequately aligns benefit and control with risk and liability will require a re-orientation of the current international framework.

### *VII Addressing the Blind spot: Writing Operators into the Liability Framework and Aligning National Laws*

This section argues that in order to patch this regulatory black hole – where only states are classified as liable space actors – the international regime will need to be re-oriented towards a system which writes the liability of operators directly into the regime. This will require amending or replacing the Liability Convention with a treaty framework similar to those governing liability for damage caused by other ultrahazardous commercial activities: in particular, oil pollution by tankers and nuclear energy. In the interim, states will need to proactively engage in building an informal consensus for treatment of operators among launching states. Importantly, this section does not advocate for doing away with state liability – states still being key launchers and space actors – but simply doing away with

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<sup>154</sup> Rocket Lab "Contact" <[www.rocketlabusa.com](http://www.rocketlabusa.com)>.

<sup>155</sup> See for example "Rocket Lab missions blasts off, US spy agency's satellites deployed" *Stuff* (online ed, Auckland, 13 June 2020).

<sup>156</sup> Deloitte Access Economics, above n 2, at 11.

<sup>157</sup> Outer Space and High-altitude Activities Act 2017, s 7.

*exclusive* state liability. Patching the regulatory "black hole", where operators are not made liable under the current space regime, is as simple as noting their existence and invoking their potential for liability alongside that of states.

### *A Treaty for an Ultra-hazardous Activity*

As discussed up in the previous part, the ILC has described the international space regime as a distinct category of treaty governing ultra-hazardous activities which makes states directly liable for damage.<sup>158</sup> This is contrasted with the usual category of treaty for such activities which "address[es] the question of liability of operators and in some circumstances of States, in terms of both substantive and procedural rules".<sup>159</sup>

Yet, if the underlying principle of loss allocation in the case of ultrahazardous activities is that "the party with the most effective control of the risk at the time of the accident is made primarily liable",<sup>160</sup> then in the "New Space" era, exclusive state liability pushes against this principle. Industry guides government and holds technical expertise in a way which means that "innovative activities or products ... rarely become available to governments in time to legislate before they are ready to emerge".<sup>161</sup> Consider Rocket Lab launching from New Zealand again. The New Zealand government recorded that when Rocket Lab proposed their first launch there was no time to legislate before the planned take-off, and an interim contract was hastily drafted.<sup>162</sup> Recognition of overseas launch licences was later directly built into the Outer Space and High-altitude Activities Act 2017 to recognise that New Zealand would initially have "limited technical competence" and that reliance on

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<sup>158</sup> *Survey of liability regimes relevant to the topic of international liability for injurious consequences arising out of acts not prohibited by international law (international liability in case of loss from transboundary harm arising out of hazardous activities)*, prepared by the Secretariat UN Doc A/CN.4/543 (24 June 2004) at 122.

<sup>159</sup> At 112.

<sup>160</sup> *First report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities by Mr Pemmaraju Sreenivasa Rao, Special Rapporteur*, above n 8, at 96.

<sup>161</sup> Kirsty Hutchison and others "Managing the Opportunities and Risks Associated with Disruptive Technologies: Space Law in New Zealand" (2017) 13(4) PQ 28 at 30.

<sup>162</sup> At 30.

foreign licencing standards would be needed to ensure safety.<sup>163</sup> In such cases, it would be a fiction to believe that the government has more effective control at the time of the accident. In addition, once a licence has been granted, control over the object rests primarily with the operator, although the Minister may vary, revoke or review any licence which has been granted.<sup>164</sup> Thus, removing risk from companies and placing it solely on states creates an unintuitive allocation of loss.

The most effective way to provide assured compensation for victims and financial accountability for industry is to regulate space launching as a *commercial* ultra-hazardous activity, by writing operators into the international liability regime. The following subsections examine two existing approaches to operator liability which may each provide a useful starting point. First, the establishment of an international fund for compensation as exists with oil pollution regimes. Second, the creation of a tiered system of liability where both operators and the states from which they operate can be held liable as in the case of nuclear energy operators. As will be discussed, the later system of tiered liability seems likely to be more effective in the case of space launching. However, in reality, both systems would be an improvement on the current state-centric Liability Convention.

### *1 International Fund for Compensation*

The first promising possibility for writing launch operators into the liability regime is to implement an international fund for compensation as is done in the case of oil pollution by oil tankers: an ultrahazardous activity primarily carried out by commercial operators.

In an example of how disaster drives change, the current system of liability and compensation for oil pollution was created as a direct result of the *Torrey Canyon* disaster in 1967,<sup>165</sup> after states realised that standard liability was insufficient to deal with large

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<sup>163</sup> At 32.

<sup>164</sup> Outer Space and High-altitude Activities Act 2017, s 44.

<sup>165</sup> Michael Faure and Wang Hui "The International Regimes for the Compensation of Oil-Pollution Damage: Are they Effective?" (2003) 12 RECIEL 242 at 243.

scale oil spills.<sup>166</sup> The regime for compensation for oil pollution by tankers rests on the International Convention on Civil Liability for Oil Pollution Damage,<sup>167</sup> which is complemented by the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (the Fund Convention).<sup>168</sup> While the International Convention on Civil Liability for Oil Pollution Damage creates strict liability for ship-owners and compulsory insurance, the Fund Convention sets up "the Fund" as an intergovernmental organisation. The Fund is directed toward making additional compensation available to those victims who suffer damage where liability under the head Convention was inadequate or could not be obtained.<sup>169</sup> This Fund is also designed to protect shipowners, who otherwise may have unlimited liability placed on them.<sup>170</sup>

Under the Fund Convention, the Fund pays compensation to member states suffering pollution damage if they have been unable to gain full compensation under the International Convention on Civil Liability for Oil Pollution Damage – either because no liability arises under that Convention, or because the damage exceeds the maximum amount therein or the owner is financially incapable of meeting their obligations in full.<sup>171</sup> The Fund, however, excludes cover for pollution created with the intent to cause damage or from the negligence of that person.<sup>172</sup> The Fund is financed by placing a levy on oil imports over 150,000 tons in the territory of contracting parties.<sup>173</sup> State parties to the Fund Convention have an obligation to ensure the fulfilment of contributions to the fund within their

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<sup>166</sup> Adam Vaughan "Torrey Canyon disaster – the UK's worst-ever oil spill 50 years on" *The Guardian* (online ed, London, 2017). In the Torrey Canyon disaster, 117,000 tonnes of oil was spilt over hundreds of miles of English coastline, with remnants of the oil still remaining 50 years on in a Guernsey quarry.

<sup>167</sup> International Convention on Civil Liability for Oil Pollution Damage 973 UNTS 3 (opened for signature 29 November 1969, entered into force 19 June 1975).

<sup>168</sup> International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage 1110 UNTS 57 (opened for signature 18 December 1971, entered into force 16 October 1978) [Fund Convention].

<sup>169</sup> See *Survey of liability regimes relevant to the topic of international liability for injurious consequences arising out of acts not prohibited by international law*, above n 158, at 113.

<sup>170</sup> International Maritime Organization "International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND)" <[www.imo.org](http://www.imo.org)>.

<sup>171</sup> Fund Convention, above n 168, art 4.

<sup>172</sup> Article 4(3).

<sup>173</sup> Article 10.

territory.<sup>174</sup> and keep a list of persons within their territory who have received oil above the 150, 000 ton threshold.<sup>175</sup> In practice, this means the implementation of strong domestic laws in accordance with the contributions required at international law. This system has been widely adopted and funded, with 118 states party to the Fund Convention 1992. This success shows that where adverse effects of oil pollution damage can potentially affect all coastal and sea-faring states, there is a common interest in providing compensation.

Transposing this system onto space launching, if international will among states were sufficient, the Liability Convention could be amended to place international liability for damage on operators as well as states. In addition, a complementary convention establishing an international fund for damage caused by space objects (a "space fund") could be negotiated. With the UNOOSA already providing a centralising function for space activities, the UNOOSA could create a body for oversight of the Fund as a subsidiary. Of course, states would have to determine how to allocate liability (and to what sum) but the framework of the oil pollution conventions could theoretically be largely replicated without too much alteration. There would, however, need to be a greater writing in of states into the equation than just operators, given the continued operation of governmental space programmes.

So if the stakeholders in any launch are the launch state, the operator and the potential victims, it can be seen that a space fund would positively benefit all three. Launch states would be able to shift some international liability onto operators.<sup>176</sup> Although operators would have to pay into the fund, they would not necessarily be paying any more than they would under pre-existing insurance requirements of states, assuming of course that domestic regimes would deduct fund contributions from general insurance. Most importantly, victims would have effective compensation available where it is unable to be gained under the pre-existing Liability Convention. For example, such a fund would solve the issue of unidentifiable orbital debris – which currently prevents victims from gaining

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<sup>174</sup> Article 13(2).

<sup>175</sup> Article 15(1).

<sup>176</sup> See B Sandeepa Bhat "Space Liability Insurance: Concerns and Way Forward" (2020) 6(1) AJL 37 at 46.

compensation where ownership cannot be assigned to any one state<sup>177</sup> – as victims could be compensated by the fund notwithstanding that no particular state is liable.

Despite the suitability of a space fund,<sup>178</sup> a few issues do exist which mean such a mechanism might be difficult to implement in relation to space launching. Sundahl makes the point that even if a treaty were immediately negotiated to establish this fund, the cumulative nature of contributions means that the fund would be underfinanced for many years.<sup>179</sup> Thus "if a string of collisions were to occur early on, the fund would be quickly depleted".<sup>180</sup> In practice, such a fund would be difficult to gain international support for, particularly given the small number of states and operators currently engaged in space activities. The launch industry is still in its early stages: with only 45 orbital launch attempts in the first six months of 2020, and only 23 by launch companies.<sup>181</sup> Unlike the oil industry which is more widespread, only a small handful of actors currently have launch industry operating within their borders for a small number of customers. This means that while the assets of a fund would be available to all member states who suffered damage, only a small handful would initially shoulder the burden of filling the coffers. Notwithstanding, if these initial hurdles could be overcome, a regime establishing a space fund would be a desirable mechanism for providing effective compensation.

## *2 Tiered Liability for Operators and States*

If the problems associated with a space fund mean that it cannot be negotiated, the Liability Convention could alternatively be amended in order to create a regime with a tiered approach to liability between launch states and launch operators. This approach has been implemented in instruments such as the Convention on Third Party Liability in the Field of

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<sup>177</sup> Sundahl, above n 28, at 143.

<sup>178</sup> In general support see Bhat, above n 176, at 45.

<sup>179</sup> Sundahl, above n 28, at 138.

<sup>180</sup> At 138.

<sup>181</sup> Jedd Foust "Commercial launch industry off to a slow start in 2020" *Space News* (online ed, Virginia, 2 July 2020).

Nuclear Energy 1960 (and its associated protocols) – which provides a useful starting point for comparison.<sup>182</sup> Although this system does not solve the issue of unidentified debris like a space fund would, it better recognises the liability of both operators and states alongside each other in a graduated scheme.

Under this Convention a three-tier system of liability exists. Although this general system of liability has not changed, the Convention has been amended several times to alter the value of the compensation awarded. Under the most recent protocol, compensation in respect of nuclear damage is provided up to 1,500 million euros per single incident.<sup>183</sup> Operators are made liable for at least 700 million euros.<sup>184</sup> (the Convention requires that each Contracting Party create legislation which ensures that the "liability of the operator in respect of nuclear damage caused by any one nuclear incident shall not be less than EUR 700,000,000"<sup>185</sup>). Beyond this, the state where the nuclear activity is based is then liable for the difference up to 1,200 million euro.<sup>186</sup> Finally, member states cover the remaining funds between 1,200 million euro and 1,500 million euro.<sup>187</sup> Importantly, the invocation of such liability is only available to other member states, non-member states with no nuclear installations or non-member states with national nuclear consistent with the convention's scheme.<sup>188</sup>

This tiered system of liability would be relatively easy to transpose, *mutadis mutandis*, on to the space liability system. An amending protocol to, or a new treaty supplanting the

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<sup>182</sup> Convention on Third Party Liability in the Field of Nuclear Energy 956 UNTS 251 (opened for signature 29 July 1960, entered into force 1 April 1968).

<sup>183</sup> Protocol to amend the Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (opened for signature 12 February 2004, not yet in force) [Brussels Supplementary Convention], art 3(a).

<sup>184</sup> Article 3(b)(i).

<sup>185</sup> Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982 (opened for signature 12 February 2004, not yet in force) [Paris Convention], art 7.

<sup>186</sup> Brussels Supplementary Convention, above n 183, art 3(b)(ii).

<sup>187</sup> Article 3(b)(iii).

<sup>188</sup> Paris Convention, above n 185, art 2.

Liability Convention could provide a graduated liability for operators, then states and then all states parties to the new convention in a graduated approach. It is beyond the scope of this paper to engage in an analysis of what financial level of liability might be required under such a treaty. Even so, it is clear that the framework – and the reciprocal interests of states – would support a pivot to this tiered system of liability. States have an interest in such a scheme not only to supplement their own liability with that of the private operator – enforceable by other states at international law – but also to gain access to such compensation from other member states. Practically, such a system would do away with financial variations between domestic launch laws, as an equivalent of art 7 of the Convention on Third Party Liability in the Field of Nuclear Energy 1960 would require minimum domestic legislation imposing liability on operators. All that is required is enough proactive drive from states and interest groups to push for a treaty-level instrument.

### ***B Incentivising Cooperation***

If a treaty-level change to either a space fund framework or tiered liability framework is not able to be negotiated in the near future, there are still options for cooperation outside of legally binding processes in the interim. Specifically, states wishing to reconcile risk and benefit in the current launching market can work to build an international landscape in which a standard approach to domestic operator liability is created. In order to build such a consensus among states, interested states will need to proactively act through both formal and informal mechanisms to build a critical mass of first movers committed to the same shared goals.<sup>189</sup> Although this initial consensus building places higher burdens on first movers, the states which do move first also have the advantage of getting to shape the landscape. In this case, any bar to cooperation is not an insurmountably high one.

Building this consensus can be done in a blended approach of soft and hard law. On the one hand, bilateral or plurilateral recognition or space cooperation agreements can be one

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<sup>189</sup> Thomas Hale "Catalytic Cooperation" (Blavatnik School of Government Working Paper Series No BSG-WP-026, University of Oxford, 2018) at 16.



element. Examples such as the bilateral technological safeguard agreement between New Zealand and the United States of America allowing for the transfer of technology and knowledge, and thus reciprocal recognition of licences,<sup>190</sup> show that a co-ordinated approach to operators is already possible. However, the apparent lack of such an agreement with Australia, New Zealand's closest potential launching partner, shows that states may be unduly selective about who to collaborate with. Building a consensus will require states to look more broadly when considering who to agree treaties with. In addition, soft law is generally recognised as being a key means of maintaining stability in space and adapting behaviour to the newly commercialised era.<sup>191</sup> A proliferation of soft law – whether it be bilateral arrangements or engagement in CUPOUS and the UNOOSA to generate more guidelines and resolutions – will create a landscape of standards which will be more difficult for emerging launch states to deviate from. An example of how successful soft law can be was shown in the comparison between New Zealand and Australia's launch laws – where both states willingly implemented aspects of the *Orbital Debris Guidelines* into their domestic launch laws,<sup>192</sup> despite the guidelines' non-binding nature.

Outside of motivated states, international institutions can also drive consensus by stimulating first-movers to move in a beneficial direction first and to encourage small steps from others. The UNOOSA is well-placed to lead such action, and indeed already appears to be moving into that role. Initiatives such as the "Access to Space for All" programme are targeted towards engaging both non-space faring and emerging space-faring nations in a proactive way regarding providing access to space technologies.<sup>193</sup> Most encouragingly, in November 2019 the "Space Law for New Space Actors: fostering responsible national space activities" project was launched. This directly addresses the needs of national space

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<sup>190</sup> Agreement between the Government of New Zealand and the Government of the United States of America on Technology Safeguards Associated with United States Participation in Space Launches from New Zealand, above n 84.

<sup>191</sup> Jennifer Ann Urban "Soft Law: The Key to Security in a Globalized Outer Space" (2016) 43(1) *Transp L J* 33 at 34; see also Steven Freeland "The Role of 'Soft Law' in Public International Law and Its Relevance to the International Legal Regulation of Outer Space" in Irmgard Marboe *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law* (Bohlau Publishing, Austria, 2012) 14 at 16.

<sup>192</sup> United Nations Office for Outer Space Affairs, above n 116.

<sup>193</sup> United Nations Office for Outer Space Affairs "Access to Space for All" <[www.unoosa.org](http://www.unoosa.org)>.

laws – albeit in a non-binding way – and is a promising step towards becoming a cooperative mechanism in this area.<sup>194</sup> The programme offers support for any requesting Member States for understanding space law fundamentals, drafting or revising national space law and policy in line with the international normative frameworks, and implementing existing treaty frameworks and guidelines.<sup>195</sup> Importantly for the topic of operator liability, this would also touch on standard approaches to domestic operator liability.

This sort of activity encourages state capacity building in a way which means that new actors will have more of an immediate benefit from being within the system than operating outside it.<sup>196</sup> Importantly, the programme exists as a means of "sharing experiences to shape the informational environment".<sup>197</sup> If states can be provided with accurate, relevant and tailored information from an early stage, they will be more likely to act in a way which is consistent with that information. This aligns exactly with the UNCOPUOS's Declaration on the fiftieth anniversary of the Outer Space Treaty in 2017, which requested that the UNOOSA "continue fostering capacity-building in space law and policy for the benefit of all countries and to continue providing assistance to developing countries, at their request, in the development of national space policy and legislation".<sup>198</sup> With such action, standard approaches to operator liability can be formed in a way which means that significant variations in underwriting operator liability may be less likely to occur.

Importantly, none of this cooperation need seek to strictly harmonise laws. Some divergence in laws is necessary and desirable in the area of space launching. Differences in territories such as population density,<sup>199</sup> and the goals of the state in regard to space

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<sup>194</sup> United Nations Office for Outer Space Affairs *Annual Report 2019* (June 2020) at 6.

<sup>195</sup> United Nations Office for Outer Space Affairs "Legal Advisory Project Space law for new space actors: Fostering responsible national space activities" <[www.unoosa.org](http://www.unoosa.org)>.

<sup>196</sup> Hale, above n 189, at 18.

<sup>197</sup> Hale, above n 189, at 18.

<sup>198</sup> *Declaration on the fiftieth anniversary of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* GA Res 72/78 (2017).

<sup>199</sup> Linden, above n 141, at 10.

launching mean that strict harmonisation would be impractical. Such cooperation simply seeks to create a landscape wherein all launch states recognise a minimum set of launch standards which ought to be observed when regulating private launch activities within the states. This might be through genuine belief, practicality or simply peer-pressure – in reality, the motivation is immaterial so long as the practical effect is the same.

## *VIII Conclusion*

Outer space may be the final frontier, but the current international space regime cannot be the final regulation. What was forward-looking in the 1960s and 1970s is now out of step with a modern context in which private operators, alongside states, are increasingly carrying out launch activities. While the Liability Convention dealt with the ultrahazardous nature of space activities by placing strict liability solely on states, this reflected a historical context where private entities were providing only a supportive function to governmental launches. In the "New Space" era, where private operators in many cases are taking on activities once solely carried out by states, the exclusive state liability of the Liability Convention creates an undue distance between operators and loss. This distance means that those who control and benefit from ultrahazardous space activities do not bear the risk of international liability. Although some risk-absorbing states such as Australia may be willing to underwrite operator liability through domestic regulation, ultimately it is their citizens who will unfairly bear the cost of an international claim.

Reconciling benefit and control with risk means re-orientating the system to align with others which regulate ultra-hazardous commercial activities. Practically, this means amending (or terminating and replacing) the current Liability Convention to a framework which builds operator liability into the international regime: either a space fund providing a centralised pool for compensation, or a tiered system of liability similar to that for nuclear energy. With either of these regimes, operators, the launching state and other states parties will all share some burden – reflective of the great risk which is accepted merely by engaging in space activities. In the interim, states such as New Zealand which are both

dependant on private launch activities and wish to uphold responsible standards, are well placed to proactively build an international landscape in which cooperation is incentivised over regulatory competition.

To some it may seem that the window for negotiating multilateral treaties has passed. Kerrest of the European Centre for Space Law has warned that modifying the current liability regime "would be opening a Pandora's box. Instead of improving the current system we would destroy it."<sup>200</sup> However, this is an unduly pessimistic outlook. Space law has always shown a propensity for cooperation beyond state disagreements on earth: a quintessential example being the negotiation of the Outer Space Treaty in the midst of the Cold War. A treaty creating either a space fund or a tiered system of liability is possible – it just needs proactive action. This proactive action will be particularly important for states like New Zealand which have no independent space capabilities beyond facilitation of private operators. While such states can take a risk-averse approach to operator liability domestically, doing so risks losing commercial attractiveness for operators where the state is less willing to swallow the cost. Alternatively, by building operator liability into the international liability regime, states like New Zealand can retain commercial attractiveness and place the burden of loss on the operator in a meaningful way. Getting started earlier rather than later means engaging bilaterally, and bringing this problem of operator liability to the attention of the member states at the next UNCOPOUS. Ultimately, "New Space" will continue to unfold with or without a new legal framework: a reinvigoration of states' long-term vision and motivation is simply needed to keep up.

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<sup>200</sup> Arnel Kerrest *Proceedings: United Nations/International Institute of Air and Space Law Workshop on Capacity Building in Space Law* UN Doc ST/SPACE/14 (18 – 21 November 2003) at 25.

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