

Balancing the Development and Governance of Space Capabilities: An Analysis of Australia's Space Object Regulation for the Awareness of Established and Young Space States

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Abstract

The Australian government's reaction to the increasing demand for NewSpace launch services allows insight into how a government may effectively regulate that industry. By addressing some advantages and the challenges under the Australian model of regulating NewSpace launch, this paper suggests governments seeking to control those activities are most effective when they demonstrate an appreciation of regulation's effect on progress generally and an awareness of the various domains and nuances associated with launch activities before forming a policy position. The analysis to this point also suggests that a slow start in proactively regulating NewSpace launch is, alone, no inhibitor to a government revising its approach and improving its regulatory frameworks.

1. Introduction and Methodology

1.1. Overview

Australia has a strong heritage in civil launch capability, albeit with a prolonged hiatus since the 1970s.¹ Today its society experiences a little renaissance with civil launch capability, being home to several launch service providers established to meet the increasing global demand for affordable,

Disclosures: The author is in the employment of SouthernLaunch.Space Pty Ltd, a non-governmental launch services provider operating within Australia.

1 See part 4 herein.

reliable and flexible access to space. This global demand is met by the phenomenon often referred to as “NewSpace”: society’s increased efforts to access space without public resources and predominately by harnessing the miniaturization and greater capabilities of technology.² The present paper employs the term “next generation launch services” to refer to launch activities in the context of NewSpace. The present paper seeks to illustrate how Australia’s circumstances regarding space launch regulation provide lessons which state actors may consider as they seek to develop or refine laws governing next generation launch services.

1.2. Significance of the Analysis

States regulating space objects typically impose a vast set of requirements upon members of society who seek to launch and operate space objects. So launches may take place safely and with best practices, it is imperative the regulatory frameworks embodying those requirements do not impose unjustified complexities or ambiguities upon those carrying out those activities. If so, the government has brought about an unnecessary risk of increasing the costs of the launch activity, increasing the likelihood of launches causing harm or damage, or of preventing the launch activities from taking place at all.

Next generation launch services exist to fulfil, or are sustainable by virtue of fulfilling, either a societal demand or a need of the state. Accordingly, if regulation increases the costs of conducting, or entirely prevents certain missions concerning, next generation launch services, the end user of the market or the state is at a disadvantage in addition to the particular actor seeking to carry out the launch activity. In other words, it is not the rocket manufacturer or operator harmed in the case of counterproductive regulation but, instead, both the intended and indirect beneficiaries of the rocket having been operated. The present paper considers how regulatory frameworks can best see the possible benefits afforded from next generation launch services reaching society.

1.3. Methodology

The analysis herein begins by identifying select theoretical justifications for law and, particularly regulation and in doing so illustrates the possible complications which can arise in the drafting and implementation of a regulatory framework. The purpose and function of regulation is then considered in the context of launch activities before describing how the concept of production structure shows launch activities are affected by other regulated industries. A background of Australia’s history of regulating space objects then gives proper context when identifying certain particulars of

2 See, eg, Masson-Zwaan in Chris Johnson, *Handbook for New Actors in Space* (Secure World Foundation, 2017) 2.

Australia's current regulatory framework governing next generation launch services. These particulars illustrate the challenges which may arise when states do not consider the theoretical aspects discussed beforehand and give way to identifying solutions to avoid such circumstances.

2. Considerations on Launch Regulation Generally: Purpose and Function

2.1 The Rationale of Regulation

Dismissing, or taking for granted the rationales for law generally can lead to unsubstantiated motivations for implementing regulation which, in turn, can result in harm to society rather than improving the conditions within society. The justifications for law are many but each generally comes about in response to the reality that in almost all societies law is developed and imposed by a minority of people upon a majority. Accordingly, the rationale of law is a moral question which is to ask what the is the just motivation for controlling the activities of individuals or organizations. The following four of the many examples illustrate the diversity in addressing this question:

- 1) Mengzi (372 BCE – 289 BCE): laws are moral when they inspire people to better themselves;³
- 2) Rousseau (1712 - 1778): legal authority is moral when government distils different individual preferences into one common will;⁴
- 3) Bastiat (1801 - 1850): laws are moral when they protect everyone's personality, liberty and property rights and nothing more;⁵ and
- 4) Hayek (1899 - 1992): prescribed laws are moral when they reflect the observed behavior already existing within a community.⁶

In the context of regulation, complications arise when separate divisions of government lean towards one rationale not held by another division of government. This may result in incoherent drafting of legal framework and in its inconsistent application, even where all parties involved have the best intentions. As regulation is a tool to give effect to law, governments seeking to create regulation may be transparent in their particular philosophy as to how the regulation contributes to the government's ultimate intention in imposing the power of law upon individuals or groups within society. This is no less relevant for the regulation of space objects than of any other activity in society governed by law.

3 See, Bryan W van Norden (trans), *The Essential Mengzi* (Hackett Publishing Company, 2009).

4 Jean-Jacques Rousseau, *The Social Contract* << *Du Contract Social* >> (1762).

5 Frederick Bastiat *The Law* << *La Loi* >> (1850) (see, G.P. Putnams & Sons, 1874).

6 Friedrich Hayek, *Law, Legislation and Liberty* (Routledge and Kegan Paul, 1973).

2.2. The Purpose of Regulation: A Solution to a Problem in Society

Distinct to the rationale of law, the “purpose” of regulation refers to the actual benefit legislation gives to society. In the context of space objects, international compliance is the most directly relevant purpose for regulating on the domestic level. Outside of such prescribed purposes, such as when government communicates that a particular regulation is needed for public safety or national security, the government must also communicate how the regulation intends to protect public safety or national security.⁷

Answers to the following “purpose questions” yield a clear justification for why any particular regulation exists:⁸

- 1) what is the problem identified in society?
- 2) why is regulation the most appropriate solution to that problem?
- 3) what is required for the regulation to ensure it solves the problem?

When legislators or advocates for a particular regulation who answer all three, and do so consistently, it may be a fair indication the regulation is likely to be effective.

2.3. The Function of Regulation in the Control on Space Objects

Regulation as applied to space objects fulfills its purpose by establishing a prohibition and a presumption against society. This is by way of establishing economic controls – how the government restricts society’s engagement in certain activities or restricts certain people from engaging or carrying out certain activities – and social controls – when the government influences how activities are carried out.

In order to establish an economic control, regulation must prohibit people from engaging in certain activities. To enable a social control the regulation must provide exceptions to that prohibition. In the context of launch activities, the prohibitions are in the form of offences for launching a space object and the exception to the prohibition is in the form of an official authorization from the government usually in the form of a license or permit. The pairing of a prohibition on a certain activity (economic control) and the exception to the prohibition (social control) is what defines the technical nature of regulation.

The prohibitive nature of regulation’s economic control brings about a second and equally important consideration. Not only does a regulation establish a ban on an activity, but, typically and certainly the case with regulation concerning next generation launch services, regulation places a presumption on society that anyone seeking to participate in the prohibited activity will cause the problem the regulation is seeking to solve. The effect of

⁷ See part 6.

⁸ See, e.g. regulatory impact guidelines in Australia.

this presumption is that the members of society seeking to carry out the launch of a space object must show cause to the state that they are not going to, or are not likely to, cause the problem which the regulation seeks to solve. The onus here is upon the member of society to disprove this presumption to the regulator. There may be no obligation for the regulator to make its case out to the member of society as to how the reasonable suspicion that the member of society is likely to, or will, cause or contribute to the problem the regulation is seeking to solve.⁹ For this reason, it is imperative that governments take informed and considered approaches to the drafting and implementation or regulation controlling space objects.

3. Societal Considerations in Regulation

3.1. The Service-Support Principle

Regulation of space objects is not isolated to frameworks exclusively governing the launch activity or satellite operation. The production structure of a good demonstrates how a series of inputs and environmental circumstances outside of the launch activity itself enable the launch to take place. These inputs and circumstances are referred to as “factors”. A loaf of bread, for instance, is not only comprised of flour, yeast, water and salt. Those ingredients are worthless without other necessary factors which lead to the baker being able to produce the bread in the first place, such as the kitchen equipment and the farm infrastructure from where the wheat was grown.¹⁰ This is a very crude example of how the factors of production used in baking bread form the bread’s production structure.

This principle is equally applicable to services within an economy as it is to the production of goods. When an actor seeks to provide a service, one cannot do so effectively without supporting activities having had successfully taken place. This concept is referred to herein as the “service-support principle”.

3.2 Service-Support in Launch Operations

Next generation launch services depend on several service-support activities without which the launch may not occur safely or at all. Support-service activities for launch services go beyond the direct technical expertise – such as engineering and education – required to launch a space object. In the case of operating a space launch, ten examples form a non-exhaustive list to

9 Cf with criminal laws in common law jurisdictions and jurisdictions of the EU member states.

10 Note also, all those aforementioned goods used to produce the bread also have factors in their production.

demonstrate the range of activities outside of rocket operation which are required for a successful launch:

- 1) capital acquisition and financing
- 2) organizational management
- 3) site design and construction
- 4) environmental protection
- 5) traffic controls or monitoring (air, land and sea)
- 6) stakeholder engagement
- 7) insurance acquisition
- 8) emergency planning
- 9) physical security
- 10) logistics.

The significance of acknowledging the support services for next generation launch activities is to note that, in most cases, the service-support activities for next generation launch services also face economic and social controls. A dedicated space object regulation allows states to directly address certain international obligations¹¹ or to mitigate the flight risks caused by space operations. This means the launch of a space object is controlled not only by one, space object-dedicated, regulation, but by various regulatory instruments. Regulators unaware how particular economic and social controls upon service-support activities affect next generation launch activities causes complications and unnecessarily limits those activities taking place.

4. Background to Australia's Regulation of Launch Activities

4.1. A First Time Failure

In response to the interest of some foreign private organizations seeking to establish launch operations from Australia during the 1990s,¹² the federal government established a regulatory framework titled the Space Activities Act 1998 (Cth) ("the 1998 Act"), the purpose being two-fold:¹³

- 1) to "enable Australia to attract investment by commercial interests"; and
- 2) to uphold its national interests generally and the state's obligations under the United Nations space treaties.

11 For a collection of these instruments, see United Nations Office for Outer Space Affairs, *International Space Law: United Nations Instruments* (UNOOSA, 2017).

12 *Ibid.*

13 *Explanatory Memorandum to the Space Activities Bill 1998* (Cth), 3.

The 1998 Act did indicate liability must be dealt with to accord with the United Nations space treaties. However, there was no rationale as to why launch activities are, or are assumed to be, of inherent risk to safety. In fact, the explanatory materials to the 1998 Act do not address the risks to safety at all yet do note generally how a risk to safety can bring the government into liability. As there was no demonstrated understanding or appreciation of the nature of launch activities when the government developed the 1998 Act, the state had dismissed the need to communicate the purpose of the legislation as discussed in part 2.2 above. For the 20 years while the 1998 Act was in force, there were no commercial launch providers carrying out space launches from Australia.

4.2. Revision without Reflection

In 2015 the federal government gave attention to the public's concerns of the 1998 Act by considering how the regulation could help Australians tap into global supply chains.¹⁴ Such a determination was to be made through a formal review intended to help ensure the space sector was keeping up with international changes and technological developments.¹⁵ In 2017 changes were proposed to the 1998 Act as the government sought to address the "changing landscape of the space industry".¹⁶ The proposed changes to the 1998 Act became the basis for Australia's current space object regulation, the Space (Launches and Returns) Act 2018 (Cth) ("the 2018 Framework"). The 2018 Framework supersedes the 1998 Act and establishes prohibitions on, among several other activities, the launches of space objects and the operation of facilities from where space objects are launched.¹⁷ These economic controls are supplemented by social controls through an authorization process under which members of society may apply to the government to overcome those prohibitions.¹⁸

Beyond compliance with international obligations under the United Nations space treaties, the apparent objective for these prohibitions are to "ensure safe industry participation, and encourage investment and innovation through legislative simplification."¹⁹ However, this objective says nothing as to how the regulation is addressing an identified problem, other than to

14 Minister for Industry, Innovation and Science, *Atmosphere is Right for a Review of Our Space Activities* (media release, 24 October 2015) << <https://www.pyneonline.com.au/media-centre/media-releases/atmosphere-is-right-for-a-review-of-our-space-activities> >> (accessed on 1 September 2022).

15 S. Freeland, *Analysis Report: Public Submissions into the Australian Government's Review of the Space Activities Act 1998* (Commonwealth of Australia, 2016) ("Freeland Report") 41, 42 (see also 124).

16 *Space Activities Amendment (Launches and Returns) Bill 2018* (Cth).

17 Space (Launches and Returns) Act 2018 (Cth), ss 11, 12.

18 *Explanatory Memorandum to the Space Activities Bill 1998* (Cth), 4.

19 *Ibid.*, 1.

alleviate complications imposed by a preceding regulation. It was, therefore, not apparent the government had considered, much less communicated to the public answers to the three purpose questions:

- 1) what the problem identified in society is;
- 2) why new regulation is the most appropriate solution to that problem; and
- 3) what is required for the regulation to ensure it solves the problem.

Thus, there was a lack of identification of the problem in society, lack of alternative considerations and lack of measurable metrics for monitoring the effectiveness of regulation. The drafting of the regulation, the explanatory materials to the regulation and the transcripts of parliamentarians' speeches concerning the regulation do not provide any sound response to either of these three questions.

The response to purpose question one was to the extent that regulation is required for safe industry participation, implying that without the regulation there will be unsafe participation. Yet, albeit perhaps obvious, there was no justification or reasoning for this basis. In other words, although it may well be that inherently risky activities will be occurring, this alone is no reason to dismiss the nuances of how the risky aspects of those activities arise. Regarding the response to the second purpose question, there is no explanation provided by the Australian government as to why the regulation is the best, or the only, method for solving the problem that launch activities will be unsafe. The third question deserves further attention and is the subject of discussion under part 4.3 below.

4.3. Australia's Policies on Space Objects

The policy on space activities which followed the decreased civil launch activity from the 1970s did not identify Australia as a suitable nation to facilitate or provide launch services.²⁰ At the time the 1998 Act came into force there was no policy position on Australia's approach to engage within the launch services market. Much less was there any demonstration from the government that it understood the realities of launch technologies, space missions or the benefits of the space economy. The lack of informed personnel in charge of and influential to regulation suggest it need not be surprising that a framework governing the activity in that context would be a failure.²¹

²⁰ See, e.g., R. Madigan et al, *A Space Policy for Australia* (Australian Academy of Technological Sciences, 1985).

²¹ S. Freeland, *Analysis Report: Public Submissions into the Australian Government's Review of the Space Activities Act 1998* (Commonwealth of Australia, 2016) ("Freeland Report") 24.

In fact, Australian government's definitive policy position on launch services during this time of the 1998 Act was that launch was not "an essential element" to secure Australia's critical space-enabled services.²² Moreover, this policy explicitly stated that foreign operators seeking to provide launch services in Australia would not be afforded any state support. These positions were reproduced in policy materials during 2013 and remained in place during the 2015 review of the 1998 Act and during the development of the 2018 Framework.²³

What flows is that, the revised regulation of the 2018 Framework was passed by the federal parliament without the Australian government having demonstrated an understanding of the significance or nuances of the nature of launching space objects. It wasn't until 2019 when the government released a space policy paper which considered access to space as a priority for Australia to consider when developing space-related industry capabilities, noting:²⁴

There are emerging opportunities for Australia to leverage international space missions and commercial launch activities from Australian territory to support industry growth. Protecting national safety and meeting our international obligations will be critical before domestic launch can occur.

Thus, since 2019 the Australian society and the international launch space market have a clear validation that Australia is interested in facilitating launch operations. However, this policy position existed without the government demonstrating an understanding of how Australian society can best support a launch service capability. Moreover, the policy was announced after the creation of the regulatory framework controlling launch services came into effect. This means the regulation was drafted and entered into force before a policy position was established, and neither was done so with an understanding made clear to the public of the relevant activity. This timeline is significant in explaining why the 2018 Framework, although an improvement to the 1998 Act, gave rise to some curiosities.

5. Particulars of Australia's Launch Regulation

5.1. Select Peculiarities of the 2018 Framework

The initial 2018 Framework imposed relatively significant costs for assessing applications to overcome the regulatory prohibitions on launching space

22 Australian Government, *Principles for a National Space Industry Policy* (Commonwealth of Australia, 2011), 4, 5.

23 Department of Industry, Innovation, Science, Research and Tertiary Education, *Australia's Satellite Utilisation Policy* (Commonwealth of Australia, 2013), 2, 7, 11.

24 Australian Space Agency, *Advancing Space: Australian Civil Space Strategy 2019-2029* (Commonwealth of Australia, 2019).

objects. These fees, which are since removed from the framework, were grossly disproportionate to comparative jurisdictions with civil launch capabilities, which placed Australia at a potential disadvantage, particularly when the launches of those space objects were extremely low cost. For instance, to execute a proof of concept suborbital launch might under the initial framework may been at a cost too great to the launch provider than taking place outside of Australia.

A second curiosity in the initial framework was the requirement that persons performing a risk hazard analysis are to be “not a related party” to the launch permit holder. In effect, this meant neither the launch vehicle developer, the launch vehicle operator, any contractors of the launch vehicle developers or operators, or the launch site operator could perform a risk hazard analysis on the vehicle for any proposed mission. The implication of this requirement was not only an increase in costs and time in sourcing third parties to perform the analysis, but that the parties with the most amount of experience or familiarity with the safety aspects of vehicle and mission were strictly prohibited from contributing to the formal launch authorization process. In 2022 the government began the process to remove the requirement for a third party to perform such safety-critical analysis.

Another curiosity under the 2018 Framework is that the government must commission an investigation when there is any damage to any property (third party or otherwise) or when the launch vehicle is destroyed. As investigations have significant implications to time and credibility to launch providers, declaring an accident and conducting an investigation when no third party damage has occurred and no one is harmed or dead as a result of the launch activity, does not at all facilitate the developmental nature of next generation launch services, which by their very nature rely on technological failures in order to improve and refine the final product which will eventually go into orbit.

5.2. Answerable to One’s Own Doing

The challenges discussed in part 5.1 above exist in Australia’s space object regulation because the drafters and administrators of the regulation had a limited understanding of the nature of launch services. There is no publicly available evidence that when it developed the 1998 Act the government held or applied any understanding of the technological realities or possibilities of launch, of how missions are developed or of what the economic motivations for launch services are.

The fact that Australia didn’t formally have a policy position on launch at all until 13 years after the initial regulation came into force, and that the policy was explicitly not supportive of launch services, suggests the state lacked and understanding of the significance and realities of launch services. While Australia had a rough start to space object regulation, it has, in the last several years, demonstrated how a state may overcome such challenges. The

solution is to follow three principles in sequence when seeking to create or implement regulation. This allows government to coherently understand an activity, develop a policy and apply the understanding to establish a regulation which facilitates the policy position. This timeline approach is slowly being employed by the Australian government and it is paired with more effectively control of next generation launch services.

6. Lessons from Australia: Improvement from Challenging Beginnings

6.1. Understanding

In 2020 the government announced a parliamentary inquiry into developing Australia's space capabilities, the purpose being to consider how the government can support the development of the space capabilities while preserving and protecting the space environment.²⁵ The inquiry came about as the government determined, despite establishing a dedicated office for space affairs in 2018, more could be done to capitalize on Australia's innovation, research and development in space activities.²⁶

Extensive stakeholder consultations were held over six months and were open to anyone seeking to offer comment or suggestions. A large component of the government's attempt to understand space was focused on launch services, upon which the government recognized:

- a) the launch industry enables investment and development of several upstream and downstream industries;²⁷ and
- b) Australia has several advantages compared to other jurisdictions which can better facilitate launch infrastructure, launch timelines and logistical costs for carrying out a launch operation.²⁸

In the inquiry's report, published in December 2021, the government spent a majority of the discussion concerning launch services considering regulation. The report considered several challenges, including those identified herein. These considerations led to the inquiry recommending the government continue reforming the 2018 Framework and to do so in consultation with industry.²⁹ The inquiry report also recommended the government consider policies on launch, an element discussed below.

25 Committee to Inquire into and Report on Developing Australia's Space Industry, *Terms of Reference to the Committee*, 10 December 2020.

26 Pat Conaghan in House of Representatives Standing Committee on industry, Innovation, Science and Resources, *The Now Frontier* (Commonwealth of Australia, 2021) iv.

27 House of Representatives Standing Committee on industry, Innovation, Science and Resources, *The Now Frontier* (Commonwealth of Australia, 2021) 88.

28 *Ibid*, 88, 90-91.

29 *Ibid*, 109-110.

6.2. Develop

The inquiry report recommended the government consider a national plan regarding launch activities to best facilitate the development of next generation launch services from Australia.³⁰ In 2019 the government released a motherhood policy document which, as mentioned in part above, identified seven priority areas upon which for the nation to focus.³¹ Since 2021, the government has began producing policy positions on each of those seven priority areas, which go into further depth and demonstrate greater understanding on the nature of those areas. These policy positions are referred to as “roadmaps”.

The roadmap for the priority area concerning launch services, that is titled “access to space” under the 2019 policy, is not yet produced at the time of writing. This particular roadmap may determine to what extent the government has a comprehensive understanding on the nature of launch services, including from the technical, mission and economic perspectives. Moreover, in mid-2022 the government commenced the development of a National Plan for Space. This initiative seeks to consider how the roadmaps of the seven priority areas speak to various “elements of the space ecosystem” which include society, leadership, international activities, policy, regulation, research, innovation and technology, workforce and investment.³² Such policy initiatives demonstrate the government is making effort to incorporate its learnings through efforts such as the 2020-2021 inquiry into official policy positions. This process of bringing an understanding into a policy allows the government to better see the domestic capability in a proper context, that is in consideration of technology, space activities and economics than if it purely creates a policy out of ideals alone. By first understanding the activity upon which a policy is focusing, the government can develop that understanding into a national interest. Only when this is determined can a regulation be least destructive.

6.3. Apply

Shortly after society began conveying to government the challenges which remained in the 2018 Framework, the government set out to remedy this lack of understanding. The 2020-2021 inquiry demonstrates the increased effort to produce policy positions based on a sound understanding of the launch market and technologies. The application of the government’s understanding into policies is evident in the various announcements and actions the government has produced concerning regulatory reform since the 2018 Framework was enforced. One example comes from the government abolishing the fees originally sought from applicants applying for launch-related authorizations.

30 *Ibid*, 109.

31 Australian Space Agency, *Advancing Space: Australian Civil Space Strategy 2019-2029* (Commonwealth of Australia, 2019).

32 Nous, *Discussion Paper – National Plan for Space* (1 July 2022) 2.

Furthermore, the government has committed to streamlining the regulatory requirements to overcome the regulatory prohibitions generally, such as identifying redundant barriers caused by the regulation.³³ This all demonstrates that a more informed regulatory frameworks offers immense facilitation of the activity which those frameworks control, in this case launch operations, and at no detriment to international obligations or to safety, and in some cases further securing those interests.

However, the application of the government's understanding and policy position into a regulation may be greatly enhanced should the it make clear to the public three aspects addressed in this paper:

- 1) what is the government's rationale for law generally (per which philosophy);
- 2) what is the government's answers to the three purpose questions; and
- 3) how it the government addressing regulatory complexities of service-support activities to launch?

7. Conclusion

In the history of Australia's space object regulation, the unnecessary complications and ambiguities came about due to the politicians, legislators and administering bureaucrats not demonstrating any effort to understand launch technologies, launch economics or space mission development and execution. When these considerations are dismissed during the development or implementation of a regulatory framework which controls next generation launch service, there is an increased chance that regulation will be redundant at best or, at worst, destructive.

To facilitate an understanding, governments may demonstrate to the public the rationales for law generally, states may appreciate that regulation is only justified by identifying a problem in society and articulating why the specific proposed regulation is required to solve that problem. Such is the path Australia is slowly creeping upon since the 2018 Framework came into force. The state's closer coordination with the actors within society carrying out the activities, the regulation governing next generation launch activities is able to incorporate a sound understanding of the activity it is controlling as well as to be in line with informed policy positions aimed to enhance that activity. Such is a preferred model of regulation rather than reactive or top-down controls. Addressing the challenge of the vast regulations governing service-support activities outside of launch may be the next consideration the state takes to ensure it is a leader in next generation launch services.

33 Fast Tracking Space.