

Thailand's Smaller-State Space Power Amid Great-Power Competition in the Space Domain

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Abstract: After a brief discussion on the transition from the first to second space age, which witnessed the move from defensive to offensive military use of weapons by great-powers in the space domain, the article explains that such strategies must not limit small-state space powers solely to soft power approaches but should contrarily hold diversified approaches to enhance their military power. Thailand, having historically and contemporaneously adopted a smaller-state space power approach, still does not hold a truly independent, unitary space domain concept, does not interpret the space domain as a war-fighting domain, does not possess a strategic or operational protocol towards space hybrid provocations or operations, does not maintain a space power concept, and still lacks a space deterrence concept. Now needing to reassess its strategic and operational approach to keep pace with the developments prompted by great-power states, the article proposes four recommendations that Thailand should adopt for the medium-to-long term, ranging from enhancing partnerships with key actors through Track 1.5 and Track 2 networks, ameliorating its infrastructure resiliency, and operating satellites outfitted with “dual-use” purpose technology.

Introduction

On the 16th of December, 2020, the Minister of Higher Education, Sciences, Research and Innovation (MHEIS), Anek Laothamatas, announced at a press conference summarising the year 2020³ that Thailand will inaugurate its new space program on the 13th of January,⁴ officially entering into the attested “second space race.”⁵ The program aims within five years to acquire domestically-built satellites weighing 50-100 kilogram and, within seven years, to domestically-build and launch a spacecraft for the purpose to orbit and explore the Moon.⁶ Arriving shortly after the successful return to Earth of the People's Republic of China Chang'e 5 twenty-three day sampling expedition of the Moon,⁷ the Minister's announcement added that the new space

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³ Staff, “‘Anek’ reveals the progress of the spacecraft project, how much is the budget? Hoping to lead Thailand out of the middle income trap,” *World Today News*, Dec. 25, 2020.

⁴ Rédaction Thaïlande, “Le projet de programme spatial thaïlandais sous le feu des critiques,” *Toutelathailande*, Dec. 16, 2020.

⁵ Rajeswari Pillai Rajagopalan, “China extends terrestrial rivalries into orbit with new space race,” *Nikkei Asia*, Aug. 23, 2019.

⁶ Maya Taylor, “Minister says Thailand plans to build spacecraft to orbit the moon within 7 years,” *The Thaiger*, Dec. 15, 2020.

⁷ Andrew Jones, “China's Chang'e 5 enters lunar orbit for historic attempt to return moon samples,” *Space.com*, Nov. 28, 2020.

program will follow in the footsteps of four other states in the Indo-Pacific region—China, India, Japan and South Korea—in an effort to escape the “middle-income trap” and transition Thailand from a developing country to a developed country.⁸ Some observers remain sceptical not only about the negative impact of diverting limited resources away from a domestic economy already weakened by a dearth of tourists due to the Covid-19 global pandemic, but, also, about whether the adopted approach and projected capabilities can actually compete against great-powers already active in the space domain on “only a three billion baht budget.”⁹ Others, perhaps those same who took to twitter during the “online meme wars” between Chinese, Taiwanese, Hongkongers and Thai netizens,¹⁰ moved beyond scepticism into outright criticism of the announcement on social media.¹¹

This article is formed in response to this announcement and subsequent scepticism or criticism within Thai intelligentsia or populace. After a short review of the historical and contemporaneous military use of the space domain by both great and smaller-state space powers, this article seeks to answer the underpinning question that buttresses the scepticism or criticism: How will Thailand’s nascent space program compete amid a context where great-powers are weaponising the space domain? Towards answering that query, the article discusses whether Thailand should be treated as a middle or smaller-state space power. The article, then, provides five positions that arise from Thailand’s space strategic and operational thought. Lastly, the article offers four recommendations for the medium-to-long term towards ameliorating Thailand’s military use of the space domain at the strategic and operational levels.

Militarisation of the Space Domain

Outer space has been part of discussions around national security considerations since the early beginnings of the “first space age.”¹² The drive during the early years of the Cold War to place objects in orbit stimulated space research and started the “space race” in the late 1950s.¹³ At the earliest with Sputnik 1—launched by the Union of Soviet Socialist Republics (Soviet Union) on the 4th of October, 1957—the militarisation of space began with the “employment of space-based capabilities for terrestrial military purposes, including use of force.”¹⁴ The two original space powers, the United States of America and the Soviet Union, recognised early on the potential intelligence and military benefits of increasing their operational manoeuvrability in this new domain and strategic environment. Restricted by a list of compelling treaties and agreements though, notably the Outer Space Treaty (1967), states were to respect the use of space exclusively for peaceful, non-military purposes by placing strict limits on weapons deployment on celestial

⁸ Joseph O’Connor, “Thailand to launch a moon space programme to boost efforts to become a high-income economy,” *Thai Examiner*, Dec. 27, 2020; Staff, “อีก 7 ปี! ไทยตั้งเป้าสร้างยานอวกาศบินโคจรรอบดวงจันทร์,” *Thai PBS*, Dec. 15, 2020.

⁹ Post reporters, “Anek sticks to plan for Thailand’s ‘moonshot,’” *Bangkok Post*, Dec. 26, 2020; Staff, “ฮือฮา! ไทยฝัน 7 ปี ส่งยานอวกาศไปดวงจันทร์ จริงหรือหลอก?,” *ThairathTV*, Dec. 16, 2020.

¹⁰ Ting-Hsuan Tseng, “When online meme war transformed into a Pan-Asian alliance: Milk Tea as shared identity of the Youth against authoritarianism,” *Asia Centre*, Nov. 04, 2020.

¹¹ Maya Taylor, “Minister’s insistence Thailand’s moon mission will go ahead sparks social media debate,” *The Thaiger*, Dec. 26, 2020.

¹² Todd Harrison, Zach Cooper, Kaitlyn Johnson and Thomas G. Roberts, “Escalation and Deterrence in the Second Space Age,” *Center for Strategic and International Studies* (Oct. 2017): 1-92.

¹³ David C DeFrieze, “Defining and Regulating the Weaponization of Space,” *ETH Zurich Center for Security Studies*, Aug. 14, 2014.

¹⁴ Wade L. Huntley, “Smaller State Perspectives on the Future of Space Governance,” *Astropolitics* vol. 5, no.3 (2007): 237.

bodies and on the placement of weapons of mass destruction in orbit.¹⁵ The use of space then, was mainly an asset to the state's respective intelligence, attack-warning, communications, and navigation capabilities. Notwithstanding the peaceful use of space, the two superpowers had made early false start attempts to transition the ongoing technological race to a strategic environment favourable for offensive counterspace operations.¹⁶ To deny peer adversaries the use of space during a conflict, anti-satellite weapons (ASATs) were developed. While the United States military planned to conduct additional tests on the weaponry developed in the late 1970s and early 1980s, Congress intervened in 1985 with a ban on additional ASAT tests. The Soviet Union agreed on their own side to terminate testing kinetic ASAT weapons against satellites, "and no other debris-producing tests were conducted by any country"¹⁷ until the "second space age."¹⁸

Great-Powers Weaponising the Space Domain

With the collapse of the Soviet Union and, consequently, the disappearance of one of the main drivers of the first space age, the nature of thought towards the use of space for military purposes changed. The drastic structural transformation in the political landscape from a bipolar to a unipolar superpower—arguably even "hyperpower"¹⁹—international system, accompanied the short-term decrease in the pertinence of counterspace capabilities in the early 1990s and evolved the role of space in military means from a comprehensive strategic environment to a tactical one. Space capabilities would now have a direct impact on the battleground in support of conventional warfighting. This visibly transpired during the North Atlantic Treaty Organisation (NATO) campaign in the Kosovo war in the 1990s, as well as in the Afghanistan and Iraq wars in the 2000s.²⁰

When speaking about the second space age and the weaponisation of the space domain, it is crucial to clearly distinguish it from the militarisation of space during the first space age. The previous section above explained that militarisation commenced after the first communication satellites were launched.²¹ The weaponisation of space however,—the deontological process towards a weaponised space, the latter understood "as the projection of destructive mass or energy forces from, into, or through space"²²—has increasingly become the central issue of concern in the space domain for national security professionals. In as much as the use of space for military purposes was "defensive in its first decades {...} it has now become offensive. We can clearly state that the concept of militarised outer space has been replaced {...}."²³ Simply put, there is a clear historical progression from a defensive use of space in its first iteration towards a more offensive

¹⁵ United Nations Office for Outer Space Affairs, "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies," *United Nations*, (Oct. 1967).

¹⁶ Niall Firth, "How to Fight a War in Space (and Get Away With It)," *MIT Technology Review*, Jun. 26, 2019.

¹⁷ Todd Harrison, Zach Cooper, Kaitlyn Johnson and Thomas G. Roberts, "Escalation and Deterrence in the Second Space Age," *Center for Strategic and International Studies* (Oct. 2017): 4.

¹⁸ Todd Harrison, Zach Cooper, Kaitlyn Johnson and Thomas G. Roberts, "Escalation and Deterrence in the Second Space Age," *Center for Strategic and International Studies* (Oct. 2017): 1-92; Todd Harrison and Nahmyo Thomas, "NASA in the Second Space Age: Exploration, Partnering, and Security," *Strategic Studies Quarterly* vol. 10, no. 4 (2016): 2-13. Todd Harrison asserts that "the defining characteristics of the second space age are that it is more diverse, disruptive, disordered, and dangerous than the first space age."

¹⁹ Barry Buzan, *The United States and the Great Powers: World Politics in the Twenty-First* (Cambridge: Polity Press, 2004).

²⁰ David C DeFrieze, "Defining and Regulating the Weaponization of Space," *ETH Zurich Center for Security Studies*, Aug. 14, 2014.

²¹ Ray Acheson and Beatrice Fihn, "Outer Space: Militarization, Weaponization, and the Prevention of an Arms Race," *Women International League for Peace and Freedom* (no date).

²² Wade L. Huntley, "Smaller State Perspectives on the Future of Space Governance," *Astropolitics* vol. 5, no.3 (2007): 237.

²³ Phillippe Henry, "The Militarization and Weaponization of Space: Towards a European Space Deterrent," *Space Policy* vol. 4, no. 2 (2008): 61-66.

consideration of military means in the second. Yet, due to the transition, those same national security professionals now find themselves confronted with a strategic dilemma born from decisions made in the first space age. On one hand, existing treaties recognise the international community's interest in upholding space as a peaceful arena and exige that the "use of outer space {...} shall be carried out for the benefit and in interest of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."²⁴ The intentions behind the treaties and agreements are entirely straightforward: protecting an environment which is solely dictated by the laws of physics and on which the whole international community relies upon—be it for forecasting climate change and weather analysis, or establishing communication and transportation satellites. On the other hand, the ever faster emerging technological innovations driven by great-powers leads to a drastic acceleration in the destructive potential of space warfare.

During the Cold War the United States and the Soviet Union avoided a serious escalation due to the common understanding of the "mutual assured destruction" doctrine, insomuch as a nuclear conflict would mean the annihilation of both countries. The advancements in technological endeavours, like the hypersonic glide vehicles developed by the United States,²⁵ now upturn this space deterrent predicated on nuclear arms retaliation. An increasing number of states are acquiring advanced weaponry, such as satellites able to use "combat laser systems" or non-military rockets capable of launching satellites into low-Earth orbit.²⁶ Reports from the United States intelligence community systematically claim that Russia, as well as China, are conducting research into directed energy weapons (DEW) for use as ASATs and will most likely reach initial operating capability over the "next few years."²⁷ This acceleration in the space race over the past decade is partly explained by this upturn of the space deterrence concept. Satellites are difficult and expensive to build, but easy to destroy. As they are crucial instruments to a states' security and overall power index, losing one could have a significant strategic, operational and tactical impact on a military's capabilities or on a country's economy. The interest in being able to inflict such damage (e.g. augmentation in risk-seeking behaviour),²⁸ and thus prevent others from doing so, explains, amongst other things, the weaponisation of space.²⁹

The increase in investments in hit-to-kill systems over the last couple years used in the fight against hostile satellites or for missile defence further emphasise that great-powers see space power as an essential element of the prosperity and security of their countries and will continue to compete for predominance in the space domain.³⁰ This aim was made especially evident by the United States, when President Donald J. Trump on the 20th of December, 2019, signed the *2020 National Defense Authorization Act*. The Act established the Space Force as the sixth independent service branch in the United States armed forces.³¹ The newest branch is now separate from the United States Air Force when it comes to weapons acquisition. Its first weapon system, the "counter communications system," is a land-based, "transportable space electronic warfare system that reversibly denies adversary satellite communications, and is literally putting "force" into the name Space Force."³² Advocates of space dominance by the United States promote the idea as a public

²⁴ United Nations Office for Outer Space Affairs, "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies," *United Nations*, (Oct. 1967).

²⁵ Jen Judson, "US-developed Hypersonic Missile Hit Within 6 Inches of Target, Says Army secretary," *Defense News*, Oct. 13, 2020.

²⁶ Nathan Strout, "Space Command calls out another Russian anti-satellite weapon test," *CAISRNET*, Dec. 16, 2020.

²⁷ Justin Paul George, "History of anti-satellite weapons: US tested 1st ASAT missile 60 years ago," *TheWeek*, Mar. 27, 2019.

²⁸ King Mallory, "New Challenges in the Cross-Domain Deterrence," *RAND Corporation*, (2018): 1-35.

²⁹ Nayef Al-Rodhan, "Weaponization and Outer Space Security," *Global Policy*, Mar. 18, 2020.

³⁰ See note 29 above.

³¹ Staff, "United States Space Force," *Military.com*, Dec. 20, 2019.

³² Caleb Larson, "'Rods from God': Why Mach 5 Hypersonic Tugeston Bombs Were Never Dropped," *The National Interest*, Nov. 16, 2020.

good, contending that such dominance decreases incentives for other states to compete militarily in space, thereby providing a source of stability benefiting all peaceful nations.³³

Likewise, the Russian Federation is increasingly pushing towards military space operations. Observed in the broader picture of great-power competition, Russia recognises great-powers as only those states which exercise absolute sovereignty. The strategic perception of territorial interests of the world, seen from a Russian point of view as a poly-centric geopolitical arena, extends into the space domain. Therefore, a United States military superiority or dominance in the space domain is to the contrary considered as destabilising. The insistence by the United States on a continental missile defence system, as well as ASAT testing by both the United States and China, is reportedly leading the Russians to engage in a variety of space warfare activities.³⁴ The Russian consideration of the importance of militarising space is, however, mostly due to the highly acknowledged doctrine of strategic deterrence.³⁵ The weaponisation of space could be employed to coerce peer and near-peer adversaries from taking hostile actions which go against its interests. Therefore, Russian strategists perceive space assets to be legitimate targets if they support warfighting—regardless whether they are weaponised or not.³⁶ If they can provide critical information for military operations or if they are economically relevant to adversaries, they are read as legitimate targets under the condition that their destruction creates political harm on adversaries. It is important to note that Russia seems not to consider military space operations as part of a domain-specific strategy, but as one part of a broader range of strategic operations that are contrasted with theatre operations.³⁷

On the other hand, China's People's Liberation Army (PLA) seems to have a similar approach to space as the United States. They see the space environment as one of four critical warfighting theatres, next to nuclear, maritime, and cyber.³⁸ As a territorial invasion of China is deemed more or less improbable due to geographical circumstances, Chinese strategists consider space as one of the domains needed to be shaped accordingly. This, to counter the United States steadily ascending regional military and naval presence,³⁹ which is perceived as a threat to the Chinese sphere of influence. Investment trends over the last years on the military and its latest reorganisation producing the "Strategic Support Force" reflect the overall importance China places on space operations. While China's space capabilities are not completely consolidated thus far, it is nonetheless using its space program as a centrepiece in its soft power agenda, promoting space-based public goods along with the "Belt and Road Initiative." The most recent example being the trip to the Moon as noted earlier. This promotion on space-based public goods can be linked back to the deterrence effect witnessed with the construction of the Great Wall of China during the Qin dynasty, both delivering a clear message of power to the prevailing peer and near-peer adversaries, but, also, to possible future adversaries and to the Chinese population itself.⁴⁰

³³ Wade L. Huntley, "Smaller State Perspectives on the Future of Space Governance," *Astropolitics* vol. 5, no.3 (2007): 237-261.

³⁴ Michael Haas, "Vulnerable Frontier: Militarized Competition in Outer Space," in *Strategic Trends 2015: Key Developments in Global Affairs*, ed. Oliver Thränert and Martin Zapfe (ETH Zurich: Center for Security Studies, 2015), 74-75.

³⁵ Haas, 74-75.

³⁶ Benjamin A. Silverstein and Scot M. Purvis, "3rd Annual CGSR Workshop On Space Policy Space Strategy and Strategic Competition, Summary" *Center for Global Security Research*, (Dec. 2019): 1-19.

³⁷ Benjamin A. Silverstein and Scot M. Purvis, "3rd Annual CGSR Workshop," 6.

³⁸ Silverstein and Purvis, 6.

³⁹ Megan Eckstein, "Top Stories 2020: U.S. Navy Acquisition," *USNI News*, Dec. 25, 2020.

⁴⁰ Silverstein and Purvis, 6.

Space Power and Smaller-States

With the increase of critical dependencies on space-based infrastructure in recent decades, smaller states are also increasingly dependent on the strategically effective use of the space domain. Yet, as geopolitical rivalries re-emerge in more traditional domains of interstate conflict, the prospects for future stability in space, considering the latest developments and announcements noted above, appears increasingly dim.⁴¹ The consequences of a great-power hegemony as well as of a great-power clash in space could be ruinous, but, none more so than for smaller-state space powers. As Michael Haas states, “strategic interaction along the ‘final frontier’ is set to enter a period of considerable danger.”⁴²

Erroneous Perceptions of Smaller States and the Space Domain

Such interactions between great-power states cannot be standardised though, and differ according to the existing fundamental differences between states. Especially when treating power dynamics in the international system, international relations scholars note that power has become more fragmented and diffused among different actors.⁴³ When it comes to smaller state powers themselves, conventional thought postulates that while these countries are not completely powerless, it is unlikely that small states can become relevant players when faced by great-power opposition.⁴⁴ Already millennia ago, Thucydides highlighted the effects of the general weakness of smaller states vis-à-vis larger more powerful states during the Peloponnesian War. In a now frequently noted passage, the Athenians remind the Melians that: “You know as well as we do that, as the world goes, right is only in question between equals in power. Meanwhile, the strong do what they can and the weak suffer what they must.”⁴⁵

Conventional thought is erroneous here though, due to the different perceptions of space weaponisation. Despite this consideration that the direct stakes of leading spacefaring nations still exceed those of newly emerging actors like small states, the latter are now almost as vulnerable to big disruptions of the orbital environment as great-powers.⁴⁶ Thus, while most smaller states are currently merely users of space, rather than actors, it does not negate their need for participation in space defence and resilience.⁴⁷

Behaviour in Asymmetrical Relationships as the Defining Factor

Small power states perceive a future in which space becomes a weaponised environment as threatening and irreconcilable with their own vision for increasing their endeavours in this new domain. This is mainly a result of the technological and financial barriers they face when it comes to space access.⁴⁸ According to Håkan Wiberg, increasing gaps in military research and

⁴¹ Michael Haas, “Vulnerable Frontier: Militarized Competition in Outer Space,” in *Strategic Trends 2015: Key Developments in Global Affairs*, eds. Oliver Thränert and Martin Zapfe (ETH Zurich: Center for Security Studies, 2015), 63.

⁴² Haas., 63.

⁴³ Richard N. Haas, “The Age of Nonpolarity: What Will Follow U.S. Dominance?” *Foreign Affairs*, (May/June 2008).

⁴⁴ Tom Long, “Small States, Great Power? Gaining Influence Through Intrinsic, Derivative, and Collective Power,” *International Studies Review* vol. 19 (2017): 185-205.

⁴⁵ Thucydides, *History of the Peloponnesian War*, trans. by Rex Warner (London: Penguin Classics, 1974).

⁴⁶ Michael Haas, “Vulnerable Frontier: Militarized Competition in Outer Space,” in *Strategic Trends 2015: Key Developments in Global Affairs*, eds. Oliver Thränert and Martin Zapfe (ETH Zurich: Center for Security Studies, 2015), 67.

⁴⁷ Alexandra Stickings, “Space as an Operational Domain: What Next for NATO?,” *Royal United Services Institute* vol. 40, no. 9 (2020): 1-3.

⁴⁸ Wade L. Huntley, “Smaller State Perspectives on the Future of Space Governance,” *Astropolitics* vol. 5, no.3 (2007): 237-261.

development between states “make it necessary for small states to rely more on different military strategies from the great-powers, putting more stress on invulnerability and on non-offensive defence.”⁴⁹

When it comes to international relations literature, there is a lack of common definition or a set of criteria to define which states could be considered as small.⁵⁰ Even if one takes the geographical size as the essential parameter, the differences between them are stark. For instance, certain articles included Turkey and Spain⁵¹ in their analyses on small states, while others included island microstates.⁵² Building on previous approaches,⁵³ the article considers as the most crucial characteristic the behaviour of states in the context of asymmetrical relationships. As defined by Tom Rostoks, “relational power or, to be more precise, relational weakness is the main characteristic of small states.”⁵⁴

When considering inter-state relations in the space domain, behaviours differ. Great-powers tend to focus on other great-powers and tend to see each other as rivals and, hence, consider interactions with other great-powers on space development as competitive. On the other hand, these small states look for cooperation and try to create opportunities and relationships, be it bilateral or multilateral, for collaboration that provides them a “seat at the table.”⁵⁵ To understand the behaviour and the vision of the international sphere of smaller-state power is particularly important when it comes to the space environment. While accessing space may serve broader domestic purposes and economic developments, it can also foster the well-being of the population by creating new opportunities and benefitting national prestige. The perception that their interests would be overlooked or violated in a world shaped by space-based conflict drives an overall call for small states to restraint military uses of space through multilateral arenas, like the United Nations.⁵⁶ This is one of the options to preserve their interests. Then smaller state powers are aware of the limits other countries impose on their power capabilities.⁵⁷

This is the case, since this strategic environment is shaped by a very strong asymmetry of power, due to the immense importance of technological progress and economic capabilities—forcing small states to look for cooperation. A second reason is the nature of space. While interests and values in the terrestrial sphere are differentiated, be it maritime or land power, geographic proximity plays a role. When it comes to space, the geographic proximity becomes irrelevant.⁵⁸ As all are subject to the “unity of the domain” of space, whereas states have an equivalent geographical

⁴⁹ Håkan Wiberg “The Security of Small Nations: Challenges and Defences,” *Journal of Peace Research* vol. 24, no. 4 (1987): 339–363.

⁵⁰ Alan K. Enrikson, “A Coming ‘Magnesian’ Age? Small States, the Global System, and the International Community,” *Geopolitics* vol. 6, no. 3 (2001): 49–86.

⁵¹ Annette Baker Fox, *The Power of Small States: Diplomacy in World War II*, (Chicago: University of Chicago Press, 1959).

⁵² Debbie A. Mohammed, “The CARIFORUM-EU Economic Partnership Agreement: Impediment or Development Opportunity for CARICOM SIDS?,” in *The Diplomacies of Small States: Between Vulnerability and Resilience*, eds. Andrew F. Cooper and Timothy M. Shaw (New York: Palgrave Macmillan, 2013), 160–177.

⁵³ Tom Long, “It’s Not the Size, It’s the Relationship: From ‘Small States’ to Asymmetry,” *International Politics* vol. 53, no. 6 (2016): 144–160; Anders Wivel, “From Small State to Smart State: Devising a Strategy for Influence in the European Union,” in *Small States in Europe: Challenges and Opportunities*, eds. Robert Steinmetz and Anders Wivel (Farnham: Ashgate, 2010), 15–30; Tom S. Rostoks, “Small States, Power, International Change and the Impact of Uncertainty,” in *Small States in Europe: Challenges and Opportunities*, ed. Robert Steinmetz and Anders Wivel, (Farnham: Ashgate, 2010), 87–102.

⁵⁴ Tom S. Rostoks, “Small States, Power, International Change and the Impact of Uncertainty,” in *Small States in Europe: Challenges and Opportunities*, eds. Robert Steinmetz and Anders Wivel (Farnham: Ashgate, 2010), 87–102.

⁵⁵ Rostoks, 100.

⁵⁶ David C DeFrieze, “Defining and Regulating the Weaponization of Space,” *ETH Zurich Center for Security Studies*, Aug. 14, 2014.

⁵⁷ *Ibid.*

⁵⁸ Rostoks, 102.

proximity to outer space, it “creates an equivalence of interest to all states independent of capabilities to influence events in space.”⁵⁹ Therefore, smaller states tend to view space holistically: security, commercial, and civil sectors converge into a web of interrelated activities.⁶⁰

Given their relative power positions within the broader system, these actors perceive themselves as parties to a community within which acknowledgement and management of the divergent interests of other actors is essential. Their own self-interests are highly dependent upon realising many common interests. Thus, smaller states’ prioritisation of common interests does not simply flow from naïve “idealism” about space security. Rather, their perspective reflects how lesser-empowered actors may discover needs and opportunities to pursue their interests in qualitatively different manners than dominant actors.

Achieving Strategic Independence Through Gain of Power

These considerations, however, directly restraint the capabilities of smaller states to achieve some kind of strategic independence. Scholarship has long recognised that “brute quantifications of resources are an inadequate metric for many issues in world politics.”⁶¹ Even when it comes to military questions greater powers can topple governments with a major effort but then find definitive victory elusive.⁶² While resources, be it of financial or natural origin, still matter, small states are as powerful as their “capacity to achieve intended results” and sometimes “other factors outweigh their material weakness.”⁶³ Therefore, small states should not be considered and treated as objects but as subjects of international relations.⁶⁴ In fact, publications on small states have mostly alternated between emphasising constraints these countries face and the value of their independence and their resilience. They mostly point out three main forms of power and are based on the idea that due to the fact that small states, by definition, lack more traditional forms of power, they must specialize in how they employ their resources and relationships.⁶⁵ First, one of the notions is based on “resource-based power.” This aforesaid argument rests on resource-based and compulsory understandings of power.⁶⁶ The idea is that the possession of certain material resources constitutes power and is mainly assumed by the realists school of thought.⁶⁷ Michael Barnett and Raymond Duvall called it “compulsory power” and see in the possession of resources the ability to change others’ behaviour.⁶⁸ Second, discussions about the power of small states consider the gain of power through interdependence and institutions.⁶⁹ It is argued that behaviour of small states in the international arena, where no threat to their survival exists, leads to smaller

⁵⁹ Wade L. Huntley, “Smaller State Perspectives on the Future of Space Governance,” *Astropolitics* vol. 5, no.3 (2007): 256.

⁶⁰ Tom S. Rostoks, “Small States, Power, International Change and the Impact of Uncertainty,” in *Small States in Europe: Challenges and Opportunities*, eds. Robert Steinmetz and Anders Wivel (Farnham: Ashgate, 2010), 102.

⁶¹ Tom Long, “Small States, Great Power? Gaining Influence Through Intrinsic, Derivative, and Collective Power,” *International Studies Review* vol. 19 (2017): 185-205.

⁶² Long, 2.

⁶³ Robert L. Rothstein, *Alliances and Small Powers* (New York: Columbia University Press, 1968).

⁶⁴ Iver Neumann and Sieglinde Gstöhl, “Lilliputians in Gulliver’s World?,” in *Small States in International Relations*, eds. Christine Ingebritsen, Iver Neumann, Sieglinde Gstöhl, and Jessica Beyer (Seattle: University of Washington Press, 2006), 3–36.

⁶⁵ Robert A. Dahl, “The Concept of Power,” *Behavioral Science* vol. 2, no. 3 (1957): 201–215.

⁶⁶ Tom Long, “Small States, Great Power? Gaining Influence Through Intrinsic, Derivative, and Collective Power,” *International Studies Review* vol. 19 (2017): 185-205.

⁶⁷ Hans J. Morgenthau and Thompson W. Kenneth, *Politics among Nations: The Struggle for Power and Peace* (New York: Knopf, 1985).

⁶⁸ Michael Barnett and Raymond Duvall, “Power in International Politics,” *International Organization* vol. 59, no. 1 (2005): 39–75.

⁶⁹ Tom Long, “Small States, Great Power? Gaining Influence Through Intrinsic, Derivative, and Collective Power,” *International Studies Review* vol. 19 (2017): 185-205.

states “punching above their weight.”⁷⁰ Additionally, institutional arrangements allow them to have a greater voice and grant them a greater degree of influence. Third, smaller states can attain power through norms.⁷¹ Annette Fox notes that “the ability of a state to secure what it wants through the use of violence is only one mark of political power {...} small states may have at their command the capacity to appeal to world opinion, operating from a “rectitude” base.”⁷² The last form of power is based on the idea of attaining influence by co-opting foreigners through the attractiveness of one’s values, ideas and practices. Such soft power approaches may be much cheaper than hard military force and may seem a valid and interesting alternative to small states. Then for small states, military force often seems to fail as an instrument of policy, which “invites the view that it is becoming obsolescent and even anachronistic.”⁷³

Choosing the Right Strategic Approach — A Crucial Juncture for the Future

States must pay close attention to the choice of strategy they pursue. Soft power can often be misunderstood and as a consequence mis-assessed as a substitute of military force. This also applies to the space domain. While small states may face all of the above mentioned constraints and limitations and, thus, feel weak when it comes to military power, it does not mean that soft power should directly be considered the policy of choice.⁷⁴ The space domain is—if not already—well on the way to become the scene of military conflict and will without any doubts remain it and civil as well as military vulnerability of states is likely to persist well into the future.⁷⁵ While a stable sense of mutual vulnerability as experienced through the nuclear deterrence doctrine is unlikely to emerge in the short run, and may not even hold in the long run if it did reappear like in the previous space age, the increase in space-military-related events and thus of space rivalries must be cause for concern for established space powers, as well as for small states, that depend on space-based services provided by others.⁷⁶ As Haas stresses, “for better or worse, the coming decade may be decisive in shaping the future of our tenuous presence along this vulnerable frontier.”⁷⁷ To be prepared for this potential eventuality, Thailand now finds itself at the crucial juncture of choosing the right strategic approach to operate effectively into this crucial domain.

Thailand: A Smaller-State Space Power?

According to the Lowy Institute 2020 Asia Power Index, Thailand is registered as a “middle power” with its power ranking increasing by one spot from last year.⁷⁸ Most notably, Thailand is categorised as an overall “overachiever” country on the power index on account that it exerts more

⁷⁰ Laurent Goetschel, “The Foreign and Security Policy Interests of Small States in Today’s Europe,” in *Small States Inside and Outside the European Union*, ed. Laurent Goetschel (Boston: Springer, 1998), 13–31.

⁷¹ Ian Manners, “Normative Power Europe: A Contradiction in Terms?,” *Journal of Common Market Studies* vol. 40, no. 2 (2002): 235–58.

⁷² Annette Baker Fox, *The Power of Small States: Diplomacy in World War II* (Chicago: University of Chicago Press, 1959).

⁷³ Colin S. Gray, “Hard Power and Soft Power: The Utility of Military Force as an Instrument of Policy in the 21st Century,” *Strategic Studies Institute* (Apr. 2011): 1-73.

⁷⁴ Gray, “Hard Power and Soft Power,” 5-8.

⁷⁵ Michael Haas, “Vulnerable Frontier: Militarized Competition in Outer Space,” in *Strategic Trends 2015: Key Developments in Global Affairs*, eds. Oliver Thränert and Martin Zapfe (ETH Zurich: Center for Security Studies, 2015), 64-80.

⁷⁶ Haas., 65-67.

⁷⁷ Haas., 69.

⁷⁸ Staff, “Asia Power Index 2020 Edition,” *Lowy Institute*, Jan. 1, 2020.

influence in the region than expected given its available resources. This classification of Thailand as a “regional middle power” is frequently repeated in various academic articles.⁷⁹

Yet, one must question the underlying assumption in the modelling that leads to the categorisation of Thailand as a middle power and overall overachiever country. The rising prominence of the space domain and traditional lack of power of non-great-powers in this domain is underrepresented in the future military posture or power projections sub-sections. The modelling’s nonalignment with the contemporary strategic and operational environment and trends may inadvertently result in an overestimation of Thailand’s contemporary and future overall relative power within and outside of the geographic region.

A recent analysis of Thailand’s procurements for the space domain⁸⁰ affirms revisiting whether the country should indeed retain its middle power and overall overachiever country status. After qualitatively juxtaposing the rapidly burgeoning centrality of the space domain for a state’s overall security to Thailand’s nominal historical and contemporary capabilities in the domain, it becomes less clear that the country should indeed retain a middle power status.

At the very least, even after accepting that the contemporary strategic environment and trends in the space domain do not yet holistically affect Thailand’s overall overachiever status and, thus, its middle power status, Thailand’s historical and contemporary strategic approach towards the space domain nonetheless coheres with the aforementioned description of smaller-state space power in the previous section with its focus on power asymmetry in inter-state relations and adoption of a multilateral, non-adversarial and holistic approach towards the space domain.

Even prior to its first operational use of space in the 1970s, Thailand’s foreign policy approached the space domain through cooperation and not competition with other states and international organisations due to its recognition of the power asymmetry between great and smaller-state space powers. Thereupon, the country consistently entered into bilateral, regional or multilateral cooperation agreements with numerous states and organisations on space-related activities. Thailand ratified two United Nations space treaties—the Outer Space Treaty of 1967 and the Rescue Agreement of 1968—and acknowledges the significant role of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) in the development of space and all attendant applications. Since 2004, Thailand has contributed to and participated in activities under other United Nations affiliations.⁸¹ For instance, as part of a schedule meeting for the Economic and Social Commission for Asia and the Pacific (ESCAP) on the 10th of October 2018, Thailand hosted ministers and heads of the space community from over thirty countries across the Asia-Pacific region in Bangkok for the Third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific, which “adopted two documents that will guide work in the region for the next decade: (1) the *Ministerial Declaration on Space Applications for Sustainable Development in Asia and the Pacific* and (2) the *Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030)*.”⁸²

Since its first operational use of space in the 1970s, Thailand opted towards a holistic approach to space affairs: security, political, commercial and civil sectors converging into a web of interrelated

⁷⁹ Bonnie Bley, “A Middle-Power Moment,” *The Interpreter*, Aug. 23, 2020; Chietigj Bajpae, “Have Asia’s Middle Powers Come of Age,” *The Diplomat*, Oct. 07, 2020; Stephen R. Nagy, “Middle Power alignment in the Indo-Pacific: Securing agency through Neo-middle Power Diplomacy,” *East Asia Security Centre*, Aug. 2020.

⁸⁰ Hadrien T. Saperstein, “Thailand’s Space Program Drifts Out of China’s Orbit,” *East Asia Forum*, Dec. 12, 2020.

⁸¹ Chukeat Noichim, “The Asean Space Organization Legal Aspects and Feasibility,” *PhD Dissertation* (Leiden: Leiden University, 2008).

⁸² Economic and Social Commission for Asia and the Pacific, “ICT and Disaster Risk Reduction: Integration Of Geospatial Information For Resilience Building,” *United Nations*, Oct. 10, 2018.

activities. A ground receiving station was established to utilise data from National Aeronautics and Space Administration's (NASA) Earth Resources Technology Satellite-1 in 1971, the first of its kind in Southeast Asia. Shortly thereafter, Thaicom Public Company Limited launched its first communication satellite in 1993.⁸³ Jumping to nowadays, the Geo-Informatics and Space Technology Development Agency (GISTDA)—a Thai space agency formed in the early 2000s that is responsible for remote sensing and satellite technology development—“used space applications to combat COVID-19, in particular to enable policymakers to utilize COVID-19 related data {...} [by] visualising the impact of the policies employed in the country. For example, GISTDA analysed reduced night-light images to monitor the impact of lockdown measures.”⁸⁴

The focus on a holistic approach was always intended to serve a broader domestic purpose, notably economic development. In the last years, this intention was raised to a “whole-of-government approach” through the National Space Policy Committee's (NSPC) adoption and promotion of the “NewSpace” concept, with a focus on domestic space technology and sustainable economic development.⁸⁵ The latest public-private partnership on investments of 100 million baht between Telecom of Thailand (TOT) and Mu Space Corporation, a three-years old domestic private satellite and space technologies firm, attests to the continued commitment to the NewSpace concept.⁸⁶ In 2021, Mu Space will hold a soft opening on the first large-scale factory to produce and assemble spacecrafts in Thailand. The factory is also supposed to produce satellite parts and communication systems, like a locally made “global positioning system” (GPS), along with sufficient room allowance for robotic and autonomous systems testing on unmanned vehicles used in the planned lunar mission.⁸⁷

Over the last years, the Royal Thai Air Force (RTAF) with support from the Thai Ministry of Defence (MOD) and Royal Thai Armed Forces Headquarters (RTARF-HQ) attempted to enhance the NewSpace's “comprehensive development” strategy in four basic space activities and applications—space telecommunication, remote sensing, satellite navigation and research and development—by infusing the “comprehensive security” and “resilience” principles,⁸⁸ which includes amongst other things a muted militarisation of Thailand's space efforts. Instead of a departure from the noted non-adversarial and holistic approach, this latest lexical and doctrinal emphasis on the “national security” dimension actually hopes to reinforce those two historical approaches by adopting a non-offensive defence or restrained military strategy (further discussed in the next section).

This newfound emphasis on the security dimension within its holistic approach has thus far resulted in increased monetary investments and manpower in an effort to shore up its space capabilities and protect against future threats. At the organisational level, this translated into the establishment of a new RTAF Space Operations Center (SOC/Centre), launched on the 16th of

⁸³ Nandini Sarma, “Southeast Asian space programmes: Capabilities, challenges and collaborations,” *Observer Research Foundation*, Mar. 07, 2020.

⁸⁴ Economic and Social Commission for Asia and the Pacific, “Geospatial Practices for Sustainable Development in Asia and the Pacific 2020: A Compendium,” *United Nations* (2020): 85.

⁸⁵ Staff, “Thailand Pushes Forward Strategy Space Affairs and Technologies,” *Pattaya Mail*, Jul. 10, 2020.

⁸⁶ Komsan Tortermvasana, “Reach for the Stars,” *Bangkok Post*, Nov. 7, 2020.

⁸⁷ Staff, “Mu Space soft launches factory in Thailand, to build first spaceship in 2021,” *Telecompaper*, Dec. 29, 2020; Ammarin Pimnoo, “Opportunity of Thailand Space Industry via National Space Exploration Project of GISTDA,” *NASA Advisory Council*, Oct. 31, 2019. Pimnoo suggests that other domestic aerospace companies to track are the C.C.S Group, Lenso Aerospace, and Senior Aerospace (Thai branch). Analysts should also keep a close eye on domestic small and medium-sized enterprises (SMEs), like Astroberry, Space Zab, HG Robotics, and Maidana Research.

⁸⁸ Ralph Emmers, “Comprehensive Security and Resilience in Southeast Asia: ASEAN's Approach to Terrorism,” *Pacific Review* vol. 22, no. 2 (2009): 159-177.

August, 2019.⁸⁹ The RTAF SOC stands as the primary organisation to prevent and preserve national security in space for Thailand. The Centre holds several units, including an “operations unit” responsible for space mission planning and a “space patrol unit” responsible for outer space patrols.⁹⁰ It also led to the procurement of Thailand’s first and second military satellites from Innovative Solutions in Space of the Netherlands.⁹¹ The first of the two satellites was already launched through the French Arianespace Vega rocket at the Guiana Space Centre in French Guiana,⁹² while the second is scheduled for launch through the Soyuz rocket at a later date.⁹³

This effort to rebalance the domestic conversation between the political, commercial and security dimensions by the military establishment can already be seen to have had an impact on civilian governmental agencies and ministries, like the Ministry of the Digital Economy and Society (MDES).⁹⁴ Over the last months, the leadership in the civilian institutions have moved beyond their held coupled position of “sustainability” and “prosperity,” now frequently discussing in public venues needing a robust national security dimension. Just weeks ago, Colonel Setthapong Mali Suwan, Vice-Chairman of Telecommunications in the MDES, publicly expressed this concern in a recorded interview. He stated that “Thailand should sustain its traditional balancing role in competition over space affairs between great-powers or else it will be required to follow policies dictated by other states and that there is a need to urgently promote the development of the country’s own space technology to prevent a loss of bargaining power.”⁹⁵

The RTAF successfully started the process to rebalance Thailand’s holistic approach towards the space domain. Nonetheless, prior to his retirement, the then Air Chief Marshal Manat Wongwat estimated that it will take roughly seventeen years (2037) for the air force to satisfy the procurement ends designated for the security dimension. Speaking during a keynote address on the “[Royal Thai] Air Force and Defence Industry Development,” he posited that this long delay is necessary to allow domestic manufacturing companies sufficient time to raise their level of production to a high enough standard and expand their production of high-tech equipment to include the production of software. This amelioration would allow the air force to augment its prevailing domestic procurement acquisition percentages up from ten-or-twenty percent⁹⁶ and, correspondingly, increase Thailand’s resilience against future threats from and in the space domain. Though this is the declared end date, a recent analysis of Thailand’s indigenous defence industry doubts whether this delay is even inexorably tenable seeing that the country still has not adopted a systematic long-term approach towards its growing indigenous defence industry.⁹⁷

In the 2021 fiscal year Thailand’s smaller-state space power will increasingly move centre stage in public discussion, albeit unlikely to test whether a power status upgrade (e.g. middle-state space power) is warranted. Although further information and instruction is to come in the coming weeks from the government, the NSPC already ratified its intention to bolster the *National Space Strategy 2016-2035* and revise the *National Space Master Plan 2017-2036*. In that effort the Committee is amid the final stages for the approval and enactment of a *National Space Act* and a *National Space Master*

⁸⁹ Prashanth Parameswaran, “What’s in Thailand’s New Military Space Center Launch,” *The Diplomat*, Aug. 23, 2020.

⁹⁰ Staff, “RTAF Opens Space Operations Center,” *Pattaya Mail*, Aug. 23, 2019.

⁹¹ Staff, “Thailand’s Air Force Set to Launch a Napa-1 Security Satellite,” *Chiang Rai Times*, Jun. 17, 2020.

⁹² Caleb Henry, “Arianespace launches Vega on return-to-flight mission with 53 smallsats,” *SpaceNews*, Sep. 03, 2020.

⁹³ Pugnatorius Research, “No Rocket Science: Space and Satellite Business in Thailand,” *International Lawyers Kingdom of Thailand*, Sep. 14, 2020.

⁹⁴ Hadrien T. Saperstein, “Thailand’s Space Program Drifts Out of China’s Orbit,” *East Asia Forum*, Dec. 12, 2020.

⁹⁵ Online Manager, “เศรษฐกิจ เชื้อสหรัฐฯ หนุนนโยบายอวกาศกับชาติพันธมิตร หลังได้ ปธน.ใหม่,” *MGR Online*, Nov. 08, 2020.

⁹⁶ Watcharapussaya Nawin, “กองทัพอวกาศจับมืออีอีซี พัฒนาอุตสาหกรรมป้องกันประเทศ,” *BangkokBizNews*, Aug. 23, 2020.

⁹⁷ Hadrien T. Saperstein, “A reckoning for Thailand’s Indigenous Defence Industry,” *The Interpreter*, Dec. 09, 2020.

Plan 2020-2037.⁹⁸ While the former aspires to create a baseline for Thailand's domestic use of space in alignment with pre-established international law and establish a regulatory body for satellite sales and purchases, the latter is needed to study the status and obstacles of Thailand's space affairs in the contemporary strategic environment and trends for future space development.⁹⁹ It will nevertheless take further time and research to certify whether the Committee's forthcoming efforts either breaks or reaffirms the smaller-state space power status held since prior to the inception of Thailand's operational use of space.

Thailand's "Five No" Positions for the Space Domain

As the last section concluded, Thailand's smaller-state space power has hitherto maintained a focus on power asymmetry in inter-state relations and a multilateral, non-adversarial (e.g. non-offensive defence or restrained military strategy) and holistic approach towards space-related activities throughout its history and in the contemporary strategic environment. However the Royal Thai Government (RTG) still lacks a systematic professional treatment on the transition from militarisation to the weaponisation of the space domain that has only accelerated over the last decade. This may have been averted, though. Prior to the establishment of the RTAF Space Operations Centre, the Strategic Studies Centre (SSC) at the Thai National Defence Studies Institute (NDSI) had already produced and publically released a work that had partly treated this transition from defensive to offensive capabilities in the space domain inside a case study of the impact of the Sino-American competition on Thailand.¹⁰⁰ The conclusions and understandings drawn from part of this study never translated into the RTAF's strategic thought and operationalisation for the space domain. This present lack of treatment by the air force implicitly engenders "five no" positions in its strategic and operational approach towards the space domain.

First, the RTAF holds *no* truly independent, unitary space domain concept. The RTAF's most explicit articulation of the space domain are found in the *White Paper 2020*¹⁰¹ and the *20 Years Air Force Strategy*.¹⁰² In both documents, the RTAF does indeed explicitly articulate that the space domain occupies the "fifth dimension of warfare" together with the land, maritime, air and cyber domains. Yet it is arduous to discern exactly how the RTAF's formation of its space domain concept is not solely an enabler for operations in other domains, notably the cyber domain, in lieu of a truly independent, unitary domain. Perhaps, part of the lack of independent structure to the RTAF's space domain concept is that its formation arrives immediately after an attempt to modernise the three service branches through the Network Centric Warfare (NCW) concept¹⁰³

⁹⁸ Narumol Pinyosinwat, "รอง นรม. ประวีตรศ ย์ดำเนินกรกิจการอวกาศของประเทศให้เกิดประโยชน์ต่อเศรษฐกิจ สังคม ความมั่นคง สิ่งแวดล้อม และ ประชาชน อย่างเป็นรูปธรรม," *Royal Thai Government*, Feb. 03, 2020, <https://www.thaigov.go.th/news/contents/details/26240>.

⁹⁹ Geo-Informatics and Space Technology Development Agency, "แผนปฏิบัติการ สำนักงานพัฒนาเทคโนโลยีอวกาศและภูมิสารสนเทศ (องค์การมหาชน) ระยะ 5 ปี วาระแรก 3 ปี (พ.ศ. 2563 – 2565)," *Royal Thai Government* (Oct. 2019), 33.

¹⁰⁰ Chayanisa Ratsutikul and *et al.*, "การศึกษาเชิงเปรียบเทียบยุทธศาสตร์ ความมั่นคงของประเทศมหาอำนาจ สาธารณรัฐประชาชนจีน และสหรัฐอเมริกา," *Strategic Studies Center* (2018): 1-161.

¹⁰¹ Royal Thai Air Force, "White Paper 2020," *Royal Thai Government* (Feb. 2020): 1-100.

¹⁰² Royal Thai Air Force, "ยุทธศาสตร์กองทัพอากาศ พ.ศ. 2551-2562 (ฉบับปรับปรุง พ.ศ. 2557)," *Royal Thai Government* (2014): 1-64.

¹⁰³ Hadrien T. Saperstein, "The Royal Thai Navy's Maritime and Naval Strategic Thought in the Post-Global Financial Crisis Period," *Strife Journal*, Issue 13 (Summer 2020): 15-38; Arthur K. Cebrowski and John J. Garstka, "Network-Centric Warfare: Its Origin and Future," U.S. Naval Institute Proceedings (January 1998). Cebrowski's Network Centric Warfare concept was once explained as "the shift from platforms to networks, the shift from viewing actors as independent to viewing the battlefield continuously in an identical picture, and the importance of making strategic choices to adapt or even survive in such changing warfare philosophy."

over the last decade.¹⁰⁴ As the implementation took a decidedly technicist turn rather than a strategic and operational level focus amid the process,¹⁰⁵ the RTAF's space domain concept currently fits more appropriately with the upper or "sensor" layer in the Network Centric Operations (NCOs)¹⁰⁶ concept than as an independent, unitary domain.

Second, the RTAF does *not* interpret the space domain as a "war-fighting" domain, but an operational domain.¹⁰⁷ The same two documents mentioned above never explicitly discuss the process to counter efforts by great-powers to weaponise the space domain through the acquisition of offensive capabilities. The white paper's "10-Year Requirement Plan [2020-2030]" section only conveys the organisation's intent to invest in *defensive* space capabilities and space situational awareness (SSA) technology,¹⁰⁸ (also called, space domain awareness (SDA)).¹⁰⁹ In declaring so, the RTAF has placed priority in integration and interoperability of assets belonging to different agencies, ministries, and other service branches. It is also more concerned using these assets as enablers of terrestrial and cyber military operations (such as for communications and intelligence, surveillance, and reconnaissance (ISR)), rather than those with the capability of denying space to adversaries.¹¹⁰ This effectively leads the organisation to interpret the space domain as an operational and not war-fighting domain. This interpretation is commonplace with countries developing nascent space programmes and managing limited space capabilities. Again though, as Thailand ameliorates its conceptual understanding of and acquires advanced capabilities in the space domain, it might accordingly begin to choose to transition away from strictly possessing operational capabilities towards acquiring certain "needed" war-fighting capabilities.

¹⁰⁴ Royal Thai Air Force, "ยุทธศาสตร์กองทัพอากาศ พ.ศ. 2551-2562 (ฉบับปรับปรุง พ.ศ. 2557)," *Royal Thai Government* (2014): 1-64; Rithi Indrawut, "Thai Armed Forces and Network Centric Warfare," *Military Information Technology Center* (no date), <http://www.ilc2012.org/ilc60/images/frile/menuL10/manulelf1020.14.pdf>.

¹⁰⁵ Hadrien T. Saperstein, "A Death of Hominidae Strategy," *Strife Journal*, Issue 14 (Winter 2020): 28-40; Peter Haynes, *Toward a New Maritime Strategy: American Naval Thinking in the Post-Cold War Era* (Annapolis: Naval Institute Press, 2015), 89. It may be necessary to suggest that the lack of independent structure to the RTAF's space domain concept is a result of "techno-strategists" inside the organisation replicating the decisions made by the "bureaucratic managers" that came to dominate the United States Navy's strategic thought in the mid-1990s, who were themselves more concerned with maximising a "joint operations" concept than construction of a new dimension of warfare (e.g. space).

¹⁰⁶ Director of Force Transformation, "Network Centric Warfare: Creating a Decisive Warfighting Advantage," *Office of the Secretary of Defense* (Winter 2003), 4. The three levels from bottom-to-up are: (1) Effectors, "regardless of service;" (2) Decision Makers, "regardless of location;" and, (3) Sensors, "regardless of platform."

¹⁰⁷ Franz-Stefan Gady, "How the US Space Force Doctrine Paves the Way for Future Warfighting," *The Diplomat*, Nov. 18, 2020; Colin Clark, "General Hyten On the New American Way of War: All-Domain Operations," *Breaking Defense*, Feb. 18, 2020; Eliahu Niewood, Greg Grant, and Tyler Lewis, "A New Battle Command Architecture for Multi-Domain Operations: Countering Peer Adversary Power Projection," MITRE Corporation (2019): 1-19. In contrast to smaller-state space powers, great-powers view space as a war-fighting domain. This position usually presupposes the adoption of multi-domain, "cross-domain" and "all-domain" warfare concepts. While the first two might be more familiar terms to readers, the latest seeks to "combine "space, cyber, deterrent, transportation, electromagnetic spectrum operations, missile defense—all of these global capabilities together {...} to compete with a global competitor and at all levels of conflict."

¹⁰⁸ Prashanth Parameswaran, "What's in the Thailand Air Force's New White Paper?," *The Diplomat*, Feb. 24, 2020; Greg Waldron, "Thai air force issues exhaustive list of aircraft requirements for 2020s," *Flight Global*, Feb. 21, 2020.

¹⁰⁹ Hadrien T. Saperstein, "The Royal Thai Navy's Maritime and Naval Strategic Thought in the Post-Global Financial Crisis Period," *Strife Journal*, Issue 13 (Summer 2020): 22. Across the Royal Thai Armed Forces (RTARF), the phrase "situation awareness" can be interchanged with "domain awareness" without any changes necessary to accommodate the different word selection.

¹¹⁰ Alexandra Stickings, "Space as an Operational Domain: What Next for NATO?," *Royal United Services Institute* vol. 40, no. 9 (2020): 1-3.

Third, the RTAF possesses *no* strategic or operational protocol towards “space hybrid provocations or operations” in the space domain.¹¹¹ In 1996, Colin S. Gray published a now well-known essay entitled “The Influence of Space Power Upon History,” which posits that “despite [space’s] growing importance, no comprehensive theory of space power has been formulated.”¹¹² In an attempt to correct such failings almost a decade later, John Klein penned that the absence of a space power theory may be relieved in the short term by applying Sir Julian S. Corbett’s maritime strategic theory.¹¹³ Gray still subsequently found much left to be desired from this argument seeing that there remains serious limitations with the application of the Corbettian understanding of offence, defence, concentration, and dispersal in the space domain.¹¹⁴ Others expanded on this work stating that pairing “the writings of [Alfred Thayer] Mahan and Corbett as a starting point for future conversations regarding a strategic approach offers firm ground upon which to build.”¹¹⁵ This position was reaffirmed recently by Manuel Moreno Minuto, voicing that “the same strategic approach used by Mahan, Corbett, and in more recent times by Gray, Klein, {...} can be a useful instrument for the leaders of the space era.”¹¹⁶

Under this understanding that the strategic approaches for the maritime domain may be transferred to the space domain, it is therefore unsurprising that the already noted organisational-wide shortcomings attributed to the Royal Thai Navy’s (RTN) strategic and operational approach towards the hybridisation of the maritime domain¹¹⁷ are also found with the RTAF’s strategic and operational approach towards the hybridisation of the space domain. It is undeniable that the Centre cannot at this moment thwart the surging trend of space hybrid operations, including “space hijacking,”¹¹⁸ “shadowing and trailing,”¹¹⁹ “directed energy operations,” “electronic operations,” “cyberattacks,” or “rendezvous and proximity operations,” each aimed at partial or full control of a country’s space sectors (so-called, “space sector capture”).¹²⁰ All of these approaches are more or less currently utilised by great-powers to exploit and learn more about satellite systems from other states, and may quite effortlessly be directed towards Thailand’s newest military space capabilities today and over the coming years; especially after it launches and deploys its domestic technology into a sector of outer space (possibly in the future) territorially claimed by great-powers.

¹¹¹ Jana Robinson, “Cross-Domain Responses to Space Hybrid Provocations via Economic and Financial Statecraft,” *The Prague Security Studies Institute* (March 2018): 1-9; Jana Robinson and *et al.*, “Europe’s Preparedness to Respond to Space Hybrid Operations,” *Prague Security Studies Institute Report*, (Jul. 2018): 1-27. Robinson defines space hybrid operations as “intentional, temporary, mostly reversible, and often harmful space actions/activities specifically designed to exploit the links to other domains and conducted just below the threshold of requiring meaningful military or political retaliatory responses.”

¹¹² Colin S. Gray, “The Influence of Space Power upon History,” *Comparative Strategy* vol. 15, no.4 (1996): 293-308.

¹¹³ John J. Klein, “Corbett in Orbit: A Maritime Model of Strategic Space Theory,” *Naval War College Review* vol. 57, no. 51 (Winter 2004): 1-16.

¹¹⁴ John B. Sheldon and Colin S. Gray, “Theory Ascendant? Spacepower and the Challenge of Strategic Theory,” in *Toward a Theory of Spacepower: Selected Essays*, eds. Charles D. Lutes and Peter L. Hays (Washington, D.C.: National Defense University Press, 2011).

¹¹⁵ Jerry Hendrix and Michelle Shevin-Coetzee, “From Blue to Black: Applying the Concepts of Sea Power to the Ocean of Space,” *Center for a New American Security* (Nov. 2016): 1-19.

¹¹⁶ Manuel Moreno Minuto, “The Space Power of the Nations,” *USNI Blog*, Dec. 13, 2020.

¹¹⁷ Hadrien T. Saperstein, “Modernising the Royal Thai Navy,” *East Asia Forum*, Oct. 17, 2020; Hadrien T. Saperstein, “The Royal Thai Navy’s Theoretical Application of the Maritime Hybrid Warfare Concept,” *Asia Center*, Oct. 12, 2020.

¹¹⁸ Beyza Unal and Mathieu Boulegue, “Russia’s Behaviour Risks Weaponizing Outer Space,” *Chatham House*, Jul. 27, 2020.

¹¹⁹ W. J. Hennigan, “Exclusive: Strange Russian Spacecraft Shadowing U.S. Spy Satellite, General Says,” *Time*, Feb. 10, 2020.

¹²⁰ Jana Robinson and *et al.*, “Europe’s Preparedness to Respond to Space Hybrid Operations,” *Prague Security Studies Institute Report*, (Jul. 2018): 3. Robinson writes that space hybrid operations “should be thought of as a number of events, rather than a single incident, that probe the gaps in preparedness, readiness, allied coordination and response options of a competitor/adversary.”

The forthcoming *National Space Act* is likely to be another victim of the Thai government's lack of preparation towards the hybridisation of the space domain. To reiterate, the Act is intended for release in the near-future, seeking to create a baseline for Thailand's domestic use of space in alignment with pre-established international law. The issue is that the efforts made by the National Space Policy Committee (NSPC), which includes lawyers from the air force, to develop this baseline has not properly taken under consideration the newest efforts by great-powers in space to apply hybrid provocations, like legal warfare (also called, lawfare). As Michael J. Listner wrote, newcomers to the space game have traditionally given little attention "to the contest that continues to be fought over outer space using the tools of international law and policy."¹²¹ A signal of this shortcoming towards legal warfare will be discussions on overhauling the Act within years of its implementation.

Fourth, the RTAF holds *no* independent, fully-developed "space power" concept. As there is no consensus (yet) about a space power concept within and between great-powers, it is not surprising that in the two documents stated above, the RTAF transplants its airpower concept into the space domain. In other words, the RTAF white paper's single mention of the "space power" concept is again indicative of an organisation that does not possess an understanding of the space domain as a "war-fighting domain." Another indication that the air force holds *no* independent, fully-developed "space power" concept is that "space operations" are viewed only as "support operations" for air and cyber domain operations. This lack of separation between the air and space power concept is inherently tied to Thailand being a smaller-state space power with only nascent space capabilities that is thus far unable to operate wholesale in the space domain without first acquiring more dynamic defensive space capabilities and other foundational terrestrial assets, such as domestic satellite, spaceflight orbiter, sub-orbital launching vehicle and reusable spacecraft manufacturing facilities; manned space program training facility; and/or international spaceport with numerous launch platforms.

Fifth, the RTAF does *not* possess a "space deterrence" concept similar to its "air" and "cyber deterrence" concepts. Along with the result that the possibilities of undertaking offensive action against space assets by great-powers remained limited until recently and there is a lack of consensus about a space power concept within and between great-powers, the systematic absence of Thailand's stated response to the flourishing trend of offensive capabilities in the space domain by great-powers in turn begets an absence of a conceptual framework for the acquisition of offensive or "dual-use" purpose capabilities¹²² that could lead to the formation of a space deterrence concept closer to Thailand's lunar exploration days.

Thailand's Smaller-State Space Power Responds to Great-Power Competition

Thailand's smaller-state space power will rapidly need to come to terms with the transition from the militarisation to weaponisation of the space domain by great-powers and their frequent, manifold technological progress and innovations. This will necessitate further reforms and modifications to ensue on a regular basis. The appropriately periodic NSPC meeting schedule is poised to meet this challenge. In this light, the article offers some initial recommendations at the strategic and operational levels for the medium-to-long term (one to seven years: 2022-2028) underneath. Breaking somewhat with the classical understanding of the medium-to-long term time

¹²¹ Michael Listner, "The Art of Lawfare and the Real War in Outer Space," *The Space Review*, Sep. 17, 2018.

¹²² Trevor Brown, "Revolutionizing Space Warfare: "Power Star" Space Solar Power Concept," *Astropolitics* vol. 18, no. 1 (2020): 51. Brown defines "dual uses" in the context of the space domain as assets "with both commercial and military applications."

frame, the time frame was formed around the documented announcement that Thailand's space program will orbit and explore the Moon within seven years' time. The recommendations for the medium-to-long term seek to align and reinforce the small-state space power approach taken by Thailand over the course of its history and in the contemporary strategic environment. On the other hand, though improbable, if the forthcoming new master plan and announcement sharply abandon this approach and move towards a more overt, offensive approach traditionally found with great-powers, then the following recommendations must be adopted sparingly. As a warning, all forthcoming recommendations are given solely for Thailand's smaller-state space power and may not be wholly suited without secondary modification to the interests, ambitions and capabilities of other smaller-state space powers, despite the fact there are fundamental regularities between each as penned earlier.

Medium-to-Long Term Recommendations (One to Seven Years: 2022-2028)

The first recommendation is that Thailand should adopt a “multi-dimensional” approach towards space-related activities. Nicholas Chapman defines multi-directionalism “as a foreign policy in which a state, usually a small or medium power, attempts to play a more active role, which encourages diversity and pragmatism in its relationships to reap as many economic, political and security benefits as possible, at the same time as enhancing its bargaining position, notably vis-à-vis asymmetrical relations. This is a strategy that maximises gains but also guards against the potential pitfalls of uncertainty and future conflict in an increasingly complex, interdependent and multipolar world order.”¹²³ With that understanding, and in effort to comply with its multi-dimensional approach, Thailand should integrate the “alliance shelter” theory into its multi-directionalism. As defined by its progenitors, “alliance shelter is the series of strategies that small states adopt to alleviate the inherent vulnerabilities of being small. It is a unique form of alliance relationship with a great-power or regional or international organisation whereby the small state yields effective control of its political decision-making in specific areas.”¹²⁴ This theory should be adopted with care, though, owing to competitors and adversaries being less clearly delineated than in the previous space age. For instance, Thailand should expand upon its previously established power asymmetry understanding of inter-state relations and multilateral and non-adversarial record by joining the Artemis Accords—an agreement signed on the 13th of October, 2020, between eight countries over “a set of principles governing norms of behaviour for those who want to participate in the Artemis lunar exploration program”—¹²⁵ as the principles herein derive themselves directly from the Outer Space Treaty of which Thailand already holds signatory membership. Although the agreement does necessitate a restriction on future behaviours, the country also pragmatically reaps many economic, political and security benefits from the relationship. One of the benefits found in this particular agreement that some integrationist/institutionalist alliance theorists were hoping for was the use of “collective choices/efforts” to defend Thailand's assets or interests, though, not through the formulation of intra-regional institutions (e.g. Asia Space Agency (ASA)).¹²⁶ As it stands, this last expression of institutionalism will most likely not come to pass in view that it has not registered with the Thai governmental leadership, who has opted for a more tempered approach.¹²⁷

¹²³ Nicholas Chapman, “Mechanisms of Vietnam's Multidirectional Foreign Policy,” *Journal of Current Southeast Asian Affairs* vol. 36, no. 2 (2017): 36-37.

¹²⁴ Alyson J. K. Bailes, Bradley A. Thayer and Baldur Thorhallsson, “Alliance Theory and Alliance ‘Shelter’: The Complexities of Small State Alliance Behaviour,” *Third World Thematics* (May 2016): 2.

¹²⁵ Jeff Foust, “Eight countries sign Artemis Accords,” *SpaceNews*, Oct. 13, 2020.

¹²⁶ Christoph Beischl, “Towards an Asian Space Agency?: The Whence and Whither of Asian Interstate Relations in the Space Sector in the 21st Century,” *PhD Dissertation* (London: University of London, 2018).

¹²⁷ Kiatyut Tiansuwan, “ASEAN: A Regional Collective Security Strategy: Will the NATO Model Work?,” *United States Naval War College* (May. 2007): 1-23. There is also an integrationist/institutionalist alliance school of thought

The second recommendation is that, with access to new potential partners (i.e. other small-state space powers, like the Iceland Space Agency), Thailand should rapidly enhance or upgrade its Track 1.5 and Track 2 networks (also called, “People to People” networks) on space-related activities over the next several years.¹²⁸ Like the plethora of noteworthy examples in other closely related sectors,¹²⁹ an example of the former track network in space-related activities is the formation and implementation of the Sirindhorn Center for Geo-Informatics (SGCI) Master Programme between two public and two academic institutions—the People's Republic of China, GISTDA, Wuhan University and Burapha University—which offers a double master degree in geo-informatics.¹³⁰ Along with forming new lines of communication, sub-inter-state track networks will have the secondary effect to reduce fears domestically and internationally about creating structural linkages with great-powers and their affiliated partners that oftentimes manifest a public backlash, like the China National Space Administration (CNSA) or private companies from the Chinese mainland with known ties to the government. Nevertheless, Thailand should take care not to split from its hitherto multilateral approach by establishing a *parallel entrenchment scheme*, where any deepened institutional relationship with a state is coupled with the deepened institutional relationship with another state of commensurate capabilities. This scheme will have the simultaneous effect to ensure that Thailand preserves its historical balance of power approach and maintains its holistic approach towards space-related activities, too.

The third recommendation is that, after a thus far somewhat successful implementation of its interpretation of the NCW concept that started nearly a decade ago, Thailand should initially seek to complete the implementation of this joint operations development programme in its present articulated form and, then, at the very least, strengthen the key system and procedural nodes in the joint operations concept, or, at the very best, commence discussions on engineering a new “joint warfighting” concept¹³¹ to parallel the contemporary operational level trends towards the space domain.¹³² The product from the ensuing discussions will impulsively actualise an independent, unitary space domain concept that reflects an *a priori* unique in and to itself similar to the *a priorities* found with the land, air, maritime and cyber domains and provides the option for the air force to shift its approach in the space domain from an operational to warfighting understanding at its preferred time. The latter option will only be adopted when Thailand begins to transition away from its smaller-state space power approach towards something else south of a great-powers approach.

inside the the Royal Thai Navy arguing that, similarly to the formulation of an intra-regional institution for the space domain (e.g. ASA), the Navy should be open to the establishment of an intra-regional institution akin to the NATO model to generate a “collective security” concept for the maritime domain.

¹²⁸ Monawadee Tangtongharutai and Nantiya Thongkanarak, “การพัฒนาแนวทางการเสริมสร้างความร่วมมือด้านความมั่นคงของกองทัพไทยกับ ประเทศมหาอำนาจในทศวรรษหน้า,” *Strategic Studies Center* (2017): 1-235.

¹²⁹ Patrick Jory, “Enter the Dragon: Thailand Gets Closer to China,” *The Interpreter*, Jul. 07, 2017. A “smart city” initiative between the Wuhan Optics Valley Beidou Holding Group and the Thai government produced the construction of the “China-ASEAN Beidou Technology City,” located two and half hours from Bangkok and worth \$US 1.45 billion.

¹³⁰ Staff, “รวม.อว.ชี้ภูมิศาสตร์ไทย 1 ใน 7 ของโลกสามารถทำฐานปล่อยจรวด,” *BangkokBizNews*, Sep. 20, 2020.

¹³¹ Tom Greenwood and Pat Savage, “In Search of a 21st-Century Joint Warfighting Concept,” *War on the Rocks*, Sep. 12, 2019. Similarly to Greenwood and Savage’s insistence that joint warfighting can be differentiated between a concept and a doctrine, after its utility has been demonstrated in field experimentation. Therefore, for the time being, the article only suggests to adopt a concept and not a doctrine.

¹³² Robert O. Work, “A Joint Warfighting Concept for Systems Warfare,” *Center for New American Security*, Dec. 17, 2020. Work apprises that “future combat between peer and near-peer adversaries will be characterized, dominated, and decided by the collision of opposing systems of systems assembled to prosecute campaigns in wartime.” Therefore, Thailand’s efforts and endeavours in the space domain at some point must go beyond merely a focus on what constitutes the appropriate technology packages it theoretically should harbour, but be coupled with a conceptual framework towards encountering possible “systems confrontations {...} aimed at disrupting, disabling, and destroying the opposing system of systems.”

To arrive at this discussion stage, the most pressing issue to resolve is the lack of delineated conceptual boundary between the RTARF-HQ's "joint operations" concept and two service branches' "multi-domain warfare" concept.¹³³ While the RTARF-HQ does not have a multi-domain warfare concept and only at this time responsible for joint operations, the RTAF and Royal Thai Navy (RTN) do possess the multi-domain warfare concept having developed a doctrine together. This doctrine was supposedly completed without participation from the Royal Thai Army (RTA), who still lacks this particular initiative.¹³⁴ Both the lack of conceptual delineation and lack of participation are indicative of an underlying problem, where the "service concepts [actually] focus on a different aspect of multi-domain operations and each has adopted different assumptions about war {...}, which makes integration difficult."¹³⁵ One encompassing solution might be to reverse this ineffectual "bottom-up" approach and move from the "top-down" starting perhaps as high as the Thai National Security Council.

As Thai strategists inside the armed forces headquarters, service branches and education committees are closely attuned to the internal debates of the United States Department of Defense, there may be calls over the coming years to assist the formulation of an independent, unitary space domain by indeed transcending the present joint operations development programme (e.g. the NCW concept), howbeit, accomplishing so by modifying the "joint all-domain command and control" (JADC2)¹³⁶ with Thai characteristics. Any modified JADC2 concept will be difficult to implement for two reasons. The first being the already stated reason in the lack of clarification between the armed forces headquarters and two service branches about the demarcated lines between joint operations and multi-domain warfare concepts. The second reason is that the JADC2 concept presupposes efficacious use of artificial intelligence,¹³⁷ fifth generation aircraft, and electromagnetic spectrum capabilities,¹³⁸ none of which the air force enjoys adequately or at all in its arsenal. Although some tenets and elements of the aforesaid concept would perhaps be instructive, the armed forces headquarters and services branches will need to look elsewhere for the next joint operations development programme.

The final recommendation is that, despite the obvious fact the space program must actually first acquire the stated capabilities needed for space exploration, Thailand should seek to ameliorate its "critical infrastructure resiliency" in space-related activities. This will not only mean increasing resilience of its infrastructure already and eventually located throughout the different "geo-centric orbits" in outer space,¹³⁹ but of those infrastructure on Earth, too, such as a domestic satellite,

¹³³ Rakesh Sharma, "Multi-Domain Warfare, Cross-Domain Deterrence," Center for Land Warfare Studies, Apr. 25, 2020; Michael Raska, "Strategies of Cross-Domain Coercion in East Asia," *Synopsis*, Jul. 18, 2018; Robert B. Brown, "The Indo-Asia Pacific and the Multi-Domain Battle Concept," *Military Review*, (Oct. 2017): 14-20. Sharma maintains that "multi-domain warfare implies creating an effect in one domain that produces an effect in another. Multi domain-specific capabilities can be leveraged to defeat a capable foe in another domain, or the 'force-on-force' operations would supplement the creative ways."

¹³⁴ Information courtesy of an anonymous retired Royal Thai Navy officer.

¹³⁵ Tom Greenwood and Pat Savage, "In Search of a 21st-Century Joint Warfighting Concept," *War on the Rocks*, Sep. 12, 2019.

¹³⁶ Congressional Research Service, "Joint All-Domain Command and Control (JADC2)," *United States Government* (Nov. 2020), <https://fas.org/sgp/crs/natsec/IF11493.pdf>. This concept is the hottest operational trend inside the Department of Defense and might be seen as an attractive fit for Thailand's joint operations integration issues.

¹³⁷ Henrik Røboe Dam, "Central to meeting the complexities of JADC2? Artificial intelligence," *CAISRNET*, May. 13, 2020.

¹³⁸ David Deptula, "Moving further into the information age with Joint All-Domain Command and Control," *CAISRNET*, Jul. 09, 2020.

¹³⁹ Michael Haas, "Vulnerable Frontier: Militarized Competition in Outer Space," in *Strategic Trends 2015: Key Developments in Global Affairs*, ed. Oliver Thränert and Martin Zapfe (ETH Zurich: Center for Security Studies, 2015), 65. Haas considers that there are four geo-centric orbits: (1) Low Earth Orbit (LEO) (approx. 200-2,000 km); (2) Medium Earth Orbit (MEO) (approx. 2,000-35,000 km); (3) Geostationary Orbit (GEO) (approx. 36,000 km); and, (4) Highly Elliptical Orbit (HEO) (approx. 200-500,000 km).

spaceflight orbiter, sub-orbital launching vehicle and reusable spacecraft manufacturing facilities; manned space program training facility; and/or international spaceport with numerous launch platforms. Some futurists note that the spaceport is distinctly vulnerable seeing that it is the physical manifestation of a *spatial chokepoint* akin to a “maritime chokepoint” (i.e. think Malacca Straits),¹⁴⁰ both being narrow geographic spaces with congested or rooted traffic wishing to access another territorial space. Towards ameliorating the infrastructural resilience, the government should replicate successful structural development efforts in other sectors by integrating “hard” and “soft” infrastructures, where “hard infrastructures” are the functional networks with physical elements providing goods or services and “soft infrastructures” are elements like culture, governance and social patterns that encompass, amongst other things, social networks.¹⁴¹

Even on the occasion that the integration does not transpire, the RTAF SOC should still ensure it improves its defensive cyber capabilities. At present, Thailand is admittedly behind other states with regards to its cyber capabilities. This poses a real concern for its efforts in the space domain. If Thailand does not wish to place the “cart before the horse” by exposing its assets to attacks prior to having the capability to defend them,¹⁴² the RTAF needs to adopt effective defensive cyber capabilities against attacks “above and below the threshold of war” ranging from “cyber sabotage,” “cyber espionage,” or “cyber subversion.”¹⁴³ The *20 Years Air Force Strategy* already started working towards this strategic and operational end by establishing guidelines, as well as initiating and laying a critical foundation for capacity development in the cyber domain.¹⁴⁴ The latest recruitment call by the RTAF SOC for “smart soldiers” with degrees in related fields¹⁴⁵ and organisation of the “cyber operations contest 2021” to be contended over the coming year with a total prize money of 200,000 baht¹⁴⁶ is evidence of the Centre’s desire to buttress its cyber capabilities.

As part of increasing the infrastructural resilience, the RTAF SOC should also adopt a transitory protocol to deal with space hybrid provocations until such times that a more autogenous approach can be designed and materialised after the acquisition of offensive, counterforce space and cyber capabilities beyond the medium-to-long term time frame (e.g. early 2030s). The transitory protocol should initially articulate the Centre’s adoption of “preventative measures” via development of technology with “attribution” capabilities.¹⁴⁷ As one might phrase it, the ability to identify or attribute perpetrators is a key determinant to an effective use of the space domain.¹⁴⁸ In the early part of this time frame, the adoption of this sub-tenant of the recommendation might have to arrive in the form of collaboration or coordination through narrowly-defined space partnerships or the alliance shelter noted above. Little by little though, the Thai government will wean off its

¹⁴⁰ Trevor Brown, “Revolutionizing Space Warfare: “Power Star” Space Solar Power Concept,” *Astropolitics* vol. 18, no. 1 (2020): 62.

¹⁴¹ Alessandro Pagano, Irene Pluchinotta, Raffaele Giordano and Umberto Fratino, “Integrating “Hard” and “Soft” Infrastructural Resilience Assessment for Water Distribution Systems,” *Hindawi* vol. 18, no. (2018): 1-17.

¹⁴² Malcolm Davis, “The Cyber Threat to Satellites,” *The Strategist*, Sep. 09, 2019.

¹⁴³ Staff, “Cyber Security: Cyber Security 101,” *Thailand Future Foundation* (no date), accessed on Jan. 02, 2021, <https://www.thailandff.org/post/cyber-security-101>

¹⁴⁴ Royal Thai Air Force, “ยุทธศาสตร์กองทัพอากาศ พ.ศ. 2551-2562 (ฉบับปรับปรุง พ.ศ. 2557) (ฉบับเผยแพร่),” *Royal Thai Government* (2014): 20. Although during this time frame it is a second concern, as the RTAF cyber deterrence concept is very novel and thin on details, the RTAF does possess limited offensive cyber capabilities and expects in the coming years to be able to affect Front Line Operations (FLOs) with assistance of such capabilities.

¹⁴⁵ Space Operations Centre, “Main Page,” *Royal Thai Air Force*, Apr. 05, 2020, https://www.youtube.com/watch?v=LNtOuHvEHbM&feature=emb_title.

¹⁴⁶ Cyber Operations Centre, “RTAF Cyber Operations Contest 2021,” *Royal Thai Air Force*, (no date) accessed on Jan. 02, 2021, <http://cyber.rtaf.mi.th/cyber2021/index.html>.

¹⁴⁷ King Mallory, “New Challenges in the Cross-Domain Deterrence,” *RAND Corporation*, (2018): 18. Mallory defines attribution as “the ability or willingness of [a state to] definitively identify the ultimate actor that chose to cross an intervention threshold.”

¹⁴⁸ Christopher Stone, “Deterrence in Space: Requirements for Credibility,” *RealClear Defense*, Dec. 01, 2020.

partners and allies and domestically develop such capability. The Centre's protocol with backing from the NSPC's whole-of-government approach should then embrace five other recommendations endorsed by the Prague Security Studies Institute:¹⁴⁹

“[1] Track and map space incidents and the quick ability to differentiate between anomalies and space hybrid operations; [2] organize tabletop exercises and simulations to rehearse the operational aspects of detecting, attributing, characterizing and reacting to space hybrid incidents; [3] educate and train personnel in operations centers concerning these threats, including the economic and financial (E&F) “space sector capture” predations of [great-powers] globally; [4] review classification standards related to these threats to enable partner and allied access to essential information; [5] include these threats in the development of a Space Domain Awareness architecture.

In case that these six preventative measures espoused by the protocol are insufficient the Centre should also initially apply the here dubbed *water strider approach* for its satellite operationalisation. Similar to the survivability of the insect in the wild, the approach stipulates that the air force should fabricate and operate satellites outfitted with technology that can perform an “evasiveness and escape” technique for its last defence. The focus on small-satellite (also called, smallsat(s)) construction by both the private¹⁵⁰ and public sector in Thailand facilitates the application of this technology and technique, as, not only do smallsats already move at great speed being in a lower geo-centric orbit, they “can also be reconstituted more rapidly than larger satellites—with spares available in orbit or ready to launch {...} [and more] “rapidly deployed to provide short-term, mission-specific support.”¹⁵¹ Furthermore, the Centre should follow one of the more popular trend lines in the second space age and develop technology with “dual-use” purpose capability.¹⁵² Sometimes described as technology and capability that invites rather than discourages others to implement space hybrid provocations onto its adherents, in a context where the most capable authoritarian regimes have an appetite for a more aggressive role in the space domain the negative effects of such incitement are at worst marginal.

In the end, whilst alone the water strider approach with its evasiveness and escape technique and dual-use technology become gradually impotent over time in the face of the rate of technology development by great-powers, coupled with the six recommendations for space hybrid provocations in the transitory protocol stated prior to, Thailand promptly expands its SSA capabilities, advances its comprehensive “space traffic management” (STM) regime and gains an “immediate deterrence” doctrine¹⁵³ against lower threshold provocations in the space domain all without needing to upturn its historical and contemporary smaller-state space power approach.

¹⁴⁹ Jana Robinson and *et al.*, “Europe’s Preparedness to Respond to Space Hybrid Operations,” *Prague Security Studies Institute Report*, (Jul. 2018): 11-12.

¹⁵⁰ Elizabeth Howell, “A 3D-Printed Rocket Will Launch A Thai Satellite Into Space,” *Forbes*, Apr. 23, 2019. Mu Space corp. holds contracts with the U.S.-based company Relatively Space, who specialises on “small satellites in very low Earth orbits.”

¹⁵¹ Stephen Beaumont, “Small satellite constellations: agile, resilient and replaceable in a conflict,” *The Strategist*, Dec. 07, 2020.

¹⁵² Todd Harrison, Zach Cooper, Kaitlyn Johnson and Thomas G. Roberts, “Escalation and Deterrence in the Second Space Age,” *Center for Strategic and International Studies* (Oct. 2017): 29.

¹⁵³ King Mallory, “New Challenges in the Cross-Domain Deterrence,” *RAND Corporation*, (2018): 3; Lawrence Freedman, *Deterrence* (Cambridge Polity Press, 2004); Paul K. Huth, *Extended Deterrence and the Prevention of War* (New Haven: Yale University Press, 1991). Mallory explains immediate deterrence as “required when an actor starts to contemplate or prepare for military action, thereby unleashing a crisis or emergency and causing general deterrence to break down.” As the second section of the article laid out, this is the present environment in the space domain.

Conclusion

[Section 1] The transition from the first to second space age precipitated the evolution from the defensive to offensive use of military assets in the space domain. [Section 2] Now years into the second space age, space systems and services have become increasingly integrated into states' national security considerations due to their potential menace but, also, the beneficial provisions afforded to their citizens. This accelerating development in space weaponry has increased the risk of conflict amongst states. The trend of increased investments in hit-to-kill systems by great-powers, like the United States, China and the Russian Federation, further emphasises that the run for predominance in the space domain will shape the future considerations for defense and offensive operational capabilities of states. [Section 3] Such strategies must not limit small-state space powers solely to soft power approaches but should contrarily hold diversified approaches to enhance their military power.

[Section 4] Thailand is regularly classified as a middle power. Yet the country has historically and contemporaneously adopted a smaller-state space power approach with its focus on power asymmetry in inter-state relations and adoption of a multilateral, non-adversarial and holistic approach towards the space domain. Inevitably, smaller-state space powers like Thailand need to regularly reconsider their strategic and operational approach to the space domain in order to reflect and keep pace with the technological, operational and strategic developments prompted by great-power states. With a newfound emphasis on the security dimension within its holistic approach, Thailand has made a step in the right direction by increasing monetary investments and manpower, like shoring up its defensive space and cyber capabilities, along with establishing new organisations and programmes for space-related activities. [Section 5] As a smaller-state space power though, Thailand still does not hold a truly independent, unitary space domain concept, does not interpret the space domain as a war-fighting domain, does not possess a strategic or operational protocol towards space hybrid provocations or operations, does not maintain a space power concept, and still lacks a space deterrence concept. [Section 6] In support of the findings on and its smaller-state space approach, the article proposes that for the medium-to-long term (one to seven years: 2022-2028) Thailand adopts a "multi-dimensional" approach towards space-related activities, partners with key actors through Track 1.5 and Track 2 networks, engineers a new joint operations concept, ameliorates its infrastructure resiliency through adoption of preventative measures via development of technology with attribution capabilities and a transitory protocol to deal with space hybrid provocations, and, in case these measures are insufficient, achieve resilience by fabricating and operating satellites outfitted with "dual-use" purpose technology that can perform an "evasiveness and escape" technique. By following these recommendations, Thailand would position itself as a forerunner towards space-related activities in the Association of Southeast Asian Nations (ASEAN) and, also, show unequivocally that the country is indeed a regional middle power and overall overachiever country on the power index.