68th International Astronautical Congress (IAC), Adelaide, Australia, 25-29 September 2017.

IAC-17-E3.1.10

SPACE AMONGST THE GIANTS: A NEW COURSE FOR ASIA-PACIFIC SPACE COOPERATION

David L.X. Ho[a], Eren Gorur[b]

[a] *Malaysia National Point of Contact, Space Generation Advisory Council*, david.ho@spacegeneration.org
[b] *Sydney, Australia*, eren.gorur@ayaa.com.au

Abstract

Much like other regions of the world, the Asia-Pacific region ("Asia-Pacific") plays host to pressing geopolitical and societal challenges. Nevertheless, what truly distinguishes Asia-Pacific is the level of discord between the towering giants, whether native to the region – India, China, and Japan – or otherwise. Competing strategic ambitions dominate the landscape, and this is especially evident in the space arena.

With space so entwined with national security and economic rivalries, the deep divisions in the regional space arena are unsurprising. Numerous proposals to date have outlined models for Asia-Pacific states to cooperate more effectively in space, including: reforming the two leading space forums, the Asia-Pacific Regional Space Agencies Forum (APRSAF) and the Asia-Pacific Space Cooperation Organisation (APSCO); or further, the creation of a regional space agency. Such efforts are laudable, though space development in the region continues to follow a highly divergent course. Dialogue between the major space powers is lacking, participation in APSCO and APRSAF are considered by some as mutually exclusive, and the multi-polar character of the region forces emerging space states to 'take sides'. Current trends cannot be more discouraging for the pursuit of promoting "international cooperation in the exploration and use of outer space" (Article X of the Outer Space Treaty (OST)).

As we approach the 50th anniversary of the OST, perhaps a gradual and more pragmatic approach to fostering space cooperation in the Asia-Pacific region is required. This paper surveys the different categories of space cooperation and evaluates their successes and weaknesses, especially in Asia-Pacific. It then proposes a particular category, ad hoc long-term non-exclusive projects, as the approach of choice in order for Asia-Pacific to meaningfully chart a new course for the advancement of space cooperation. Security and legal implications of pursuing the ad hoc long-term non-exclusive approach to space cooperation are specifically examined. The paper posits that as a practical step for a significant number of states of Asia-Pacific, ASEAN functioning as a security community has the potential to represent its constituent states to champion their economic interests in the space context, fostering stability and productivity that is conducive to space projects and external investment in space for the Asia-Pacific region.

Keywords: Asia-Pacific, space cooperation

1. Introduction

In this space context, the term 'cooperation' is frequently referred to. Undoubtedly, the exact dealings or transactions described by the hallowed term are seldom identical. This paper will, in Section 2, identify key categories of space cooperation before, in Section 3, recommending one category as particularly relevant for emerging space powers in Asia-Pacific – both in *describing* the activities that are starting to take shape and in *suggesting* the course for the future of space cooperation in Asia-Pacific. In Sections 4 and 5, this paper will evaluate the effects of this new course of space cooperation from the security and legal perspectives respectively before concluding in Section 6.

2. The Categories of Space Cooperation

It is trite that space cooperation is important – after all, Article I of the Outer Space Treaty (OST) concerns itself with the promotion of international cooperation in the "scientific investigation in outer space", while Article X of the OST expressly considers "international cooperation in the exploration and use of outer space". [1] However, what do we mean by 'cooperation'? This paper suggests that 'cooperation' is an activity between two or more parties where each contributes a certain amount of resources (e.g. money, expertise or infrastructure) and

receives an outcome which is greater than what could have been attained given the amount contributed by such party (what liberal institutionalists might term 'absolute gains'). [2] In line with spirit of Article I and Article X, this paper shall focus on cooperation between nation-states as opposed to cooperation within nation-states.

In order to analyse the issue of space cooperation meaningfully, this paper proposes that we distinguish between different categories of space cooperation.

2.1 Category One: Ad hoc short-term non-exclusive projects

Very frequently, we find that emerging space states in Asia-Pacific engage in projects with companies or universities from more advanced space states to develop space-related products like satellites. For example, in 2015, the National University of Singapore (NUS) launched a satellite named Kent-Ridge 1 which it had designed and manufactured with Berlin Space Technologies GmbH (BST) from Germany. By contributing manpower and technology, NUS obtained a functioning satellite. [3] While short of having to perform all of the work, BST added a satellite to its fleet of satellites on which it continues to perform operations. [4] In another example, the Malaysian University of Technology MARA (UiTM) is working with the Japanese Kyushu Institute of Technology to design a research nano-satellite under the BIRDS-2 project. [5] Under this arrangement, UiTM is contributing expertise and human resources and in turn obtaining use of a functioning nano-satellite and human capital experience. Overall, however, it is clear that in the vast majority of such projects the more advanced space states contribute most of the technology and are perhaps charging a fee for their technology and expertise. Nevertheless, it can be argued that there is some level of space cooperation because all parties stand to gain more than the level of resources each devoted.

It is observed that most of these projects are ad hoc and short-term in nature because there is no formal relationship or commitments between states that the parties would continue to undertake further activity once the project is completed. While the relevant transaction between states is necessarily exclusive (i.e. usually no new state is added to the project once it is underway), the mode of projects is not exclusive because State A could sell that same bundle of services to State C at the same time or in the future, or State B could utilise multiple 'State A-like' partners. Finally, it is observed that the balance of bargaining power between the parties is usually skewed in favour of the technology provider state because it ordinarily contributes more of the material and expertise requirements, in contrast to perhaps direct financing.

2.2 Category Two: Formal exclusive groups

At the other end of the spectrum relative to the first category is the mode of cooperation through formal representative institutions like the European Space Agency (ESA). States in Asia-Pacific are not unfamiliar with this mode of cooperation as the Asia-Pacific Space Cooperation Organisation (APSCO) has been likened to an Asian equivalent of ESA. [6] Member states of APSCO contribute a certain membership fee and the organisation develops space-related programmes for the benefit of all member states in return. Formal groups like the International Telecommunications Union (ITU) and the United Nations (UN) are also key nodes for this category of space cooperation through their promotion of common standards (e.g. ITU standards), interoperability, codes of conduct and common projects (e.g. UN SPIDER).

These groups are formal and exclusive as their mandates are either to promote the interests of member states or to coordinate the standards and conduct of member states. While not necessarily so, such groups are usually long-term in nature because of the required diplomatic authorisations to enter or exit such groups. Member states of such groups therefore share certain long-term values or diplomatic positions suitable to the context. Where the organisations function based on a budget contributed on an unequal basis, the balance of power in such groups is skewed in favour of dominant states that contribute a greater portion of the budgets. but probably less so compared to the first category discussed above (ad hoc short-term non-exclusive projects).

Compared to the first category discussed above, this category of space cooperation has greater potential of influencing the legal and security aspects of space. In building consensus among member states around policies and rules, formal groups could mould international customary law and build confidence and trust in the security realm. For example, the EU has played a key role in trying to shape international space customary law through most notably its attempt to lead the establishment of a non-binding International Code of Conduct for Outer Space Activities – as Rajagopalan (2017) noted, such codes of conduct codify certain principles, rules and best practices. [7] Moreover, the little-known but highly influential ITU, [8] because of its role in coordinating the use of satellite frequencies by every state in the world, has

had significant influence in the area of space law. [9] On the security front, the constituent states of ESA have a high level of integration and coordination that contribute to building trust and understanding that prevent escalation of security tensions.

We note that the Asia-Pacific Regional Space Agency Forum (APRSAF), while often compared with APSCO, would not count as an example of this category as it is neither formal nor exclusive. States may choose to join APRSAF or not in any year. Nevertheless, as this paper would explain below, APRSAF has a key role to play in promoting other categories of space cooperation.

2.3 Category Three: Ad hoc long-term exclusive projects

In the middle of the spectrum relative to both categories of space cooperation explored above is the rare mode of space cooperation which sees the International Space Station (ISS) as a central example. Japan is the only state from Asia-Pacific participating in the ISS project. Such projects are complex, expensive and long-term in nature.

Under this category of cooperation, participating states may group together solely for the purpose of undertaking a certain project. Such projects are ad hoc because there is no formal relationship or commitments between states that the parties would continue to undertake similar activities in the future once the project is completed. For example, there is nothing formal about Russia's continued collaboration with other ISS states in any human spaceflight projects after the ISS programme comes to an end.

The ISS project is underpinned mainly by the ISS Intergovernmental Agreement (IGA) which is signed by the participating states. The project is therefore exclusive by design and non-participating states are not meant to contribute to the project in meaningful ways. [10] Nevertheless, experiments and visitors from non-participating states have been welcomed on board the ISS and the Japanese Kibo module has provided the service of deploying small satellites from non-participating states – therefore to a small extent the fruits of the project are also enjoyed by non-participating states. Nevertheless, in terms of the actual infrastructure and administration of the project, the participating states hold exclusive control. The balance of power in such projects is similar to that in the second category discussed above (formal exclusive groups) – for example, under the ISS project, the USA being the coordinating 'integrator' state has relatively greater control over the ISS project than the other participating states. [11]

Projects under this category of space cooperation have the potential to influence the legal and security aspects of space to an equally high extent as formal exclusive groups. Despite being ad hoc, the long-term nature of these projects facilitates the development of legal norms and security coordination. As an illustration, Article 16 of the IGA sets out each participating state's obligation to include cross-waiver of liability clauses in ISS-related contracts entered into by participating states with their contractors and partners. Cross-waiver of liability clauses provide that except in cases of wilful misconduct (which is a rather high standard of culpability), the contracting parties would not owe liability to each other counterparty. The Article 16 obligation has promulgated understanding and adoption of cross-waivers of liability on a near global scale. As Kayser (2001) suggests, "[i]nsofar as ESA has taken the obligation to implement [the cross-waiver of liability clause] and to flow it down to its contractors, a flow down is included in all contracts placed for activities related to the international space station." [12]

2.4 Limitations

It is a recognised limitation of this paper that in demarcating the categories, generalisations have been made and certain instances of space cooperation may have been omitted. Further, it is acknowledged that the categories can be refined to take into account nuances of governmental, industrial and academic partnerships or collaboration. Yet there are even further complexities when categorising developing or emerging space states in space involvement, and these will be discussed. What should become evident is that, for the developing states of Asia-Pacific, their priorities lie in commercial space projects and not in national prestige or human exploration missions.

3. A New Course for Space Cooperation in Asia-Pacific

While the three categories of cooperation discussed above would continue to be relevant not only in Asia-Pacific but globally, it is proposed that increasingly, emerging space states in Asia-Pacific should consider developing nodes of cooperation through another category of space cooperation:

3.1 Category Four: Ad hoc long-term non-exclusive projects

As opposed to the third category explored above (ad hoc long-term exclusive projects), this mode of space cooperation is not exclusive and is designed to accommodate the participation of new states as the relevant project proceeds. It is no pre-requisite that participating states belong to a formal representative group and the projects are long-term in nature.

3.2 The Descriptive Angle

The ad hoc long-term non-exclusive approach to space cooperation is by no means novel. One high-profile example of such a project is Sentinel Asia. Organised through the APRSAF framework, Sentinel Asia is system under which space agencies, remote sensing agencies and disaster management agencies in Asia-Pacific voluntarily share satellite data and expertise in order to deal with disasters and emergencies in a timely and effective fashion. The UN-SPIDER website describes the project as one which "supports disaster management efforts in the Asia-Pacific region through the provision of imagery derived from earth observation satellites" and states that Sentinel Asia uses data received from satellites from Japan, India, Thailand and South Korea. [13] Sentinel Asia is a good example of ad hoc long-term non-exclusive project because (i) it is of an ad hoc nature focusing particularly on the disaster mitigation context; (ii) it is a long term project which was established in 2005 [14]; and (iii) being voluntary, it is of a non-exclusive nature. The Japanese Aerospace Exploration Agency (JAXA) website on Sentinel Asia states that "Sentinel Asia, first advocated in 2005, now counts 8 international organizations and 51 participating organisations from 20 countries as members, and utilisation of its systems is steadily expanding." [15]

Another similar programme focused on disaster management and monitoring which is being driven by Thailand's Geo-Informatics and Space Technology Development Agency (GISTDA) is Project Optemis. There are plans to coordinate between various states in South East Asia in order to perform co-constellation among the national satellites; currently the project is at the stage of designing solutions, such as an optimised mission planning algorithm, for the proposed co-constellations. [16] The model of collaboration is still under discussion, but it is likely that the ad hoc long-term non-exclusive approach would be adopted, mirroring the arrangement in Sentinel Asia.

Ad hoc long-term non-exclusive projects, being flexible and open in their architecture, would adhere to the diplomatic *modus operandi* of Asian states. As Aliberti (2013) recognised following close analysis of other flagship Asian institutions like the Asia-Pacific Economic Cooperation (APEC), the Association of Southeast Asian Nations (ASEAN) and the East Asia Summits (EAS), "Asian regionalism is characterised by its openness, loose structures and flexibility". [17]

3.3 The Normative Angle

This category of space cooperation is especially relevant to the emerging states of Asia-Pacific because: (i) the unique geopolitical landscape in Asia-Pacific hinders the formation of viable and effective formal groups like the European Union (EU) or ESA; (ii) significant volatility of affairs in Asia-Pacific renders exclusive closed project groups difficult to sustain; and yet, (iii) Asia-Pacific emerging states need a unifying long-term space objective or vision to coordinate their individual ambitions and efforts.

3.3.1 Effective formal groups not viable

Because of the rivalry between the key space powers of Asia-Pacific, [18] a viable and effective regional equivalent to ESA is inconceivable. APSCO does not include among its members either India or Japan and its failure to attract South Korea as a member state was widely noted. [19] APRSAF, as noted above, is not a formal group. In May 2017, India launched the South Asia satellite to underscore a classic act of space diplomacy in the south Asian region, but notably Pakistan (also an APSCO member state) did not participate in the project. Indeed, the rivalry between the blocs led by China, Japan and India, crystallised in the former two cases in the "competing organisations" (to use the words of A. Siddiqi (2010)) of APSCO and APRSAF, is well noted and has been described to constitute a true "Asian space race". [20] It is therefore rather fanciful to expect the creation of one truly effective formal space group in Asia in the near future. [21]

The unique geopolitical landscape of Asia-Pacific blunts the ability of formal groups to enshrine useful legal norms which would be widely recognised or to defuse security tensions at a comprehensive level. This being said, there remain many benefits to be derived by emerging states from participation in the various formal or informal groups led by China, India and Japan; emerging states should not neglect the pragmatic utility of such participation. [22]

3.3.2 Exclusive closed project groups difficult to sustain

Ad hoc long-term exclusive projects like the ISS are difficult to maintain in Asia-Pacific.

One of the key advantages of partnering with allies or other states in this category of space cooperation is that the financial commitments made at the inception of the project are more likely honoured than not due to potential diplomatic implications. Broniatowski et al (2006) observed that "the integration of Russia into the ISS program may well have saved the program from cancellation [considering] that the year before Russia was introduced as a partner, the ISS was saved by one vote in Congress". They also note that there is a "high cost to be paid by any nation that chooses to unilaterally withdraw from an existing cooperative endeavour" that comes in the form of "damage to the departing nation's reputation or credibility". [23]

However, Asia-Pacific is susceptible to volatile swings in the political, economic and diplomatic areas and this means that effective long-term commitments to project groups are difficult to sustain. For example, the Philippine Marawi crisis and the South Korean THAAD issue have impacted domestic priorities and could have the effect of derailing efforts in the space field. Given that there is no reason to cease anticipating such circumstances in the future, states in Asia-Pacific would be cautious in committing to expensive long-term space missions. [24] Yet, as we shall discuss below, there are options available for states to look beyond existing areas of difference and to formulate a more uniform approach to space.

3.3.3 Need for a unifying long-term space vision

Putting aside the pragmatic factors, a unifying vision is needed in order for space development in Asia-Pacific to be coordinated and purposeful. Short term projects would therefore not be sufficient unless they form part of a larger scheme. Overall, while current efforts in Asia-Pacific such as Sentinel Asia and Optemis are laudable, there is potential for Asia-Pacific to use this mode of cooperation to pursue grander agendas which would forge a lasting tradition of excellence in the space industry. Simpson (2012) identified, as one of the pre-conditions for cooperation in the space sector to flourish, a sense of historic connection to the space sector and a view that the missions that parties are contributing to would become part of their space traditions in the future. [25]

Ad hoc long-term non-exclusive projects would supply the long-term goal necessary to galvanise the efforts of Asia-Pacific states. Because such projects are ad hoc, states are not required to commit to unrealistic timelines or crippling financial contributions. Being non-exclusive in nature, new states can join and participate from time to time in order to replace or complement the work of other states. Emerging states would therefore find such a mode of cooperation most palatable.

Yet at the same time, the major space powers should be comfortable participating in such projects given that they are ad hoc and not based on any formal group arrangements. Therefore, this category of space cooperation would likely be able to attract the support of major and emerging states, thus becoming one of the most effective modes of space cooperation in Asia-Pacific.

3.3.4 Effects of the New Course

In focusing on ad hoc long-term non-exclusive projects, Asia-Pacific states are able to chart a gradual and practical course towards greater integration and coordination of standards and policies. Needless to say, formal groups like ESA can theoretically drive such a movement most efficiently; however, such a mode of cooperation, for reasons explained above, would not be realistic in Asia-Pacific. As such, ad hoc long-term non-exclusive projects would provide a viable alternative.

This paper proceeds to analyse, from the security and legal perspectives, how active engagement in this mode of space cooperation could translate into tangible economic and geopolitical return for all participating Asia-Pacific states. It is important to note that while regional space coordination, as regards project management and government investment, is not an immediate possibility for Asia-Pacific, existing economic structures in the region can act as peripheral vehicles to channel attention and investment towards pressing space-derived development.

4. The Security Dimension: Economic, Political and Military Issues

Critical in any government's evaluation of space involvement is the need to assess implications for security. The notion of security in space extends beyond security within the space environment, or of supporting infrastructure, to the ways in which space involvement impacts the geopolitical positioning of the country itself. Space assets and capabilities are inherently dual use, and naturally any stirrings or aspirations within a particular country to become space-capable may provoke responses of caution or concern from established space players.

However, the extent of this concern branches out beyond the purely military applications of space involvement, including the consequences that space ambitions may have on the security environment through: (i) potential changes in established economic relationships; (ii) further development of technical capability, sophistication, and expertise; (iii) the formation of new and non-traditional partnerships between states; and (iv) shifting government priorities, and therefore government policies.

If we take the use of space for humanity's benefit as essentially necessary, then in the absence of any effective global regulation, an approach to international relations needs to be developed to enable equality of access to space (and space-derived benefits) for non- and emerging-space actors. To ensure efficacy and buy-in from contemporary major space actors, this approach needs to minimise disruption to existing areas of cooperation and disagreement between states, and avoid any significant interference with current economic supply chains. This paper posits that the ad hoc long-term non-exclusive mode of space cooperation is able to supply such an approach.

4.1 Opportunities Arising from Distinguishing Civil and Military Space

First and foremost, this approach provides for a framework under which states may meaningfully distinguish between military and civil space activity. It is highly unlikely that space can ever be fully divorced of its military connotations; however, the goal of ad hoc long-term non-exclusive projects should be to facilitate engagement with space for civil purposes without stirring regional or global concerns about changes in the military, economic, technical, and political balances that prevail. As Robinson (2012) rightfully acknowledges, space must not become solely the high ground for securing military and other defence-related assets in space and on Earth, dragging civilian and commercial space activities around as budgetary coattails on efforts organised primarily for military interests. [26] This does not, however, negate the importance of space to national and global security.

In this respect, the ad hoc long-term non-exclusive approach is not entwined, unlike the formal groups approach, with existing diplomatic and security interests. This provides an opportunity for meaningful space projects to develop independent of security concerns, geopolitics and ideologies. To illustrate the issue with the formal groups approach, in the Asia-Pacific context the East Asia Summit [27] grouping of states embodies states of clear 'tiers' regarding space capability, with the USA, Russia and China at the top, and all others stratified below. The region is beset by long-standing traditional and non-traditional security issues, which have shaped the relations between and within the involved states. What we have seen to date is an automatic (and quite natural) association of space with defence and military posturing, reflected in US export controls and in the divergent regional cooperation vehicles which have been drawn along alliance-type lines. However, there has been a gradual shift in thought and behaviour regarding the treatment of civil space activity, and the ad hoc long-term non-exclusive approach stands to benefit from such a paradigm shift. This could be demonstrated through Track 2 diplomacy, where private economic activity in space between various space actors could forge channels for greater overall cohesion and understanding amongst states.

Assuming there is to be no considerable change in the positioning of US national space policy as it relates to national security, the *National Security Space Strategy* (2011) indicates an aim to balance US advantage in space with close cooperation. It also emphasises a commitment to partnerships and rule-making in space, and clearly highlights the importance of civilian space applications, with a need to focus on the commercial opportunity for the private sector in space. [28] That document successfully conveys the extent to which civil and commercial space is intertwined with national security outcomes, albeit largely from a military perspective. However, more exploration is required into how the economic products of space involvement, and their political ramifications, bear on security considerations.

4.2 Gradual Integration with Global Space Supply Chains

No real discussion is required on the economic benefits of space involvement and space-derived resources, where states and private industry have identified significant prospects for enhancing day-to-day life on Earth. What is not so clear is how the global commercial supply chains for space align (or misalign) with the ambitions and capabilities of states that are yet to establish themselves in space. These supply chains involve the complete spectrum of project life-cycles, from inception with technical knowledge to end-user outcomes and tangible benefits.

As is repeatedly emphasised throughout post-Cold War scholarship on space, cooperation is key, and thus the days of purely indigenous space development have largely ended. However, aside from the success of partnerships among developed space states, Simpson (2012) draws attention to the role that cooperation between states has

played in helping boost states with less space experience into a position where they benefit economically from participation in space activity, whilst also contributing materially to the success of space missions. [29]

Nevertheless, attempts to penetrate or integrate with the prevailing space supply chains may be very difficult, or nearly impossible, for some states due not only to the economic costs but also the political effects of such actions. The question is whether an emerging space state can truly develop its space activity in line with economic justifications, knowing that the act of cooperating could be interpreted as 'taking sides'. The goal should be for states to be able to represent themselves internationally in space without the economically undermining effects of soft power and hegemony derailing their ambitions. This is especially true for emerging space actors, who may often find themselves in imbalanced and subordinating relationships as regards economic partnerships.

The ad hoc long-term non-exclusive approach allows states to gradually integrate themselves, in a partnership by partnership method, within global supply chains. There are numerous examples of cross-involvement with various partners for space development, one being Turkey. Cooperation with multiple states for technology, integration and launch has led to a string of successfully operating satellites. Specifically, the most recent telecommunications satellite, Turksat 4B, featured a satellite structure supplied by Japan's Mitsubishi Electric, and launched by International Launch Services (the joint US-Russia private launch cooperation) from Kazakhstan. [30] This follows a commendable string of satellite projects in partnership with European states, and with launch capability supplied by China. Another example is Brazil, where its developed local aerospace sector cooperates with various states/companies for assembly and launch. In particular, SGDC-1 was built by Thales and launched by Arianespace on board an Ariane 5 from Kourou. [31]

4.3 Space Commerce Policy as a Catalyst

As the commercial space sector continues to grow, the operation of non-state actors in the space environment has become more normalised. Much of the recent technological development relating to space has come from the private sector, as industrialised states hand over responsibility for Low-Earth Orbit to the marketplace. Thus, it is in the interest of advanced space-faring states to minimise barriers to entry for their domestic space industry, and part of this is to ensure companies are not walled off from the almost exclusively global supply chains that support space activity. This view is recognised in the US National Security Space Strategy (2011), where the effect of overly-stringent export controls on the health and welfare of the nation's industrial base is potentially quite negative, restricting the competitiveness of second and third tier suppliers in the global space market. [32] With this perspective in mind, there does seem to be a viable path for future cooperation in space that does not necessarily need to impact broader military and economic differences that exist between states.

In parallel to a stated goal of easing US restrictions on commercial space cooperation, China's policies on security cooperation in Asia-Pacific appear to mirror some of the sentiment expressed by the US, highlighting the gathering pace of regional and sub-regional cooperation, and the continued advancement of free-trade agreements across the region. [33] The policies stress the goal of further progress in economic integration with a foundation on regional and national security, suggesting that the Chinese government sees opportunity in partnerships despite international issues. There is a clear commitment to multilateralism and connectivity, stating that "[c]ountries may become partners when they have the same values and ideals, but they can also be partners if they seek common ground while reserving differences." It also recommends that the small and medium-sized states of the region need not take sides among big states, and that all should pursue partnerships, in contrast to alliances, so as to build an Asia-Pacific that features mutual trust, inclusiveness and mutually beneficial cooperation. [34] While we are unlikely to see enmeshed space cooperation between the US and China on the horizon, what we can see is a real opportunity for the opening up of civil and commercial space in the region: particularly for the emerging space states of Asia-Pacific.

4.4 ASEAN as an economic and security framework for space involvement

The future development of space cooperation in Asia-Pacific largely hinges on the prospects for the developing states of the region to enter into space. If a path for these states to become involved in space exists that embodies 'common ground' and 'partnerships' which can endure despite other differences, then perhaps space access that is both secure and economically viable is possible. It is then important to survey the relationships amongst the emerging states of the region to qualify their prospects for space involvement between the giants.

Perhaps crucial to their future success in space is the Association of Southeast Asian Nations (ASEAN). [35] The features of this association that position it so well to spearhead regional space development and cooperation stem largely from its home-grown approach to multilateralism, finding lasting common ground between the governments and industry of the involved states in a way that is unique among the regions of the world. This approach, commonly termed 'the ASEAN way', sees a mode of cooperation that relies little on formal institutions and laws for the dictating of state behaviour, but built more on non-binding norms of behaviour that are underpinned by a vital acknowledgement of the economic and security realities of the region.

Though contentious, it can be asserted that ASEAN acts as a Security Community in the International Relations sense: describing a group of states that are able to resolve disputes amongst themselves peacefully, without the realistic prospect of war or use of force. Propounded by Karl Deutsch (1957), the concept of the Security Community enables an analysis of how regions function cooperatively and how the absence of war between states of certain regions can explain deeper linkages and integration between states. [36] [37] The security community framework has undergone much redefinition since Deutsch's work, and there is controversy over the consideration of ASEAN as a security community. Much of the counter-argument centres on the absence of institutions and the prevalence of political and ideological differences between the states of ASEAN, alongside the existence of examples of armed conflict that have taken place between particular states. [38] [39] It is the view of the authors that an approach to Security Communities which presupposes a requirement for Western-style institutions and for ubiquitous application ignores the reality of the Asia-Pacific region and its constituent states. Nonetheless, the theory is not concrete; yet the constructivist, norms based, approach to ASEAN and Security Community theory, led by Amitav Acharya (2014), proves the most realistic path forward for the states of Asia-Pacific to develop a cohesive method for space involvement. [40] This is largely due to the combination of a lack of regulating ASEAN institutions, with a prevailing view amongst the states of the region that a rules-based system works to everyone's benefit. The norms that have been developed, and continue to evolve, in Asia-Pacific draw their legitimacy from their ongoing acceptance among the states, though at the same time are liable to being changed or modified at the discretion of those concerned.

However, it is not proposed that ASEAN will act as a regional space coordinator, or as a platform to formulate a regional space agency. Rather, ASEAN has a mandate to steer economic policy and cooperation, and thus it is best positioned to build consensus amongst the states on commercial priorities, and to represent those states globally. With extant justifications for space involvement, ASEAN just needs to encourage the appropriate economic environment for greater external commercial investment in space projects. As the states already have convergent economic and societal perspectives, the regional bloc can effectively represent these needs to the global space industry.

ASEAN has provided a strong basis for regional cooperation on multiple fronts, and few can argue that the regional association has acted to the detriment of the included states and their neighbours. It provides international representation to states who otherwise would not have such opportunities, and has enabled better economic, political and security integration within the region. One prime example of this is the ASEAN Plus Three (APT) cooperation initiative, combining the ASEAN states with China, Japan and the Republic of Korea. The APT cooperation has enabled better coordination and development of the involved states on a wide range of issues, including security, transnational crime, economics and finance, tourism, agriculture and forestry, energy and minerals, the environment, poverty eradication, education, science and technology, and public health (among others). [41]

Given the initiative's commitment to promoting peace, stability and development in the East Asian region, space has a solid platform from which to grow in Asia-Pacific. Setting aside commercial space as a function of advanced economies, the civil role that space can play clearly permeates all the goals and successes of the APT, and it is likely that space-derived resources have played a role in furthering the achievement of the APT initiative. Now the ASEAN 'bloc' needs to coordinate space in an official capacity, encouraging the formation of government and regional policy on space cooperation and laying the foundations for economic involvement in space. Specifically, as trade liberalisation develops, with stronger and formal economic ties between ASEAN states and others, there should come further opportunities to cement regional space development. Under such regional functions, it is therefore likely that future space cooperation should take the form of ad hoc long-term non-exclusive projects, providing the development that these states require with the flexibility to balance other interests

and needs, as well as creating an economic environment that attracts space investment.

4.5 Promising Prospects for Security Communities

Within, and outside of, ASEAN, there are various promising initiatives in Asia-Pacific that demonstrate a renewed focus on space as a national priority. Examples include the proposals in both the Philippines and Australia for the formalisation of a space policy and the potential establishment of a national space agency. Much has been written about Australia's lack of involvement in space, but it is clear that on a range of international issues pertaining to security and multilateral cooperation, Australia has largely taken a leading role in implementing, and ensuring compliance with, international security initiatives. It therefore can be expected that Australia, following better formalisation and clarity of its commitment to space and security, could take on a leadership role in establishing norms of behaviour in Asia-Pacific as regards space and security, particularly among new space actors. [42] [43] [44]

A means of furthering Australia's space and security credentials in the region could be through both deeper partnerships with established space states, namely Japan, and with nascent or emerging space actors, such as Singapore and the Philippines. Davis (2016) highlights the opinion of Davies and Lyon (2015) that Australian-Japanese space cooperation could ultimately lead towards a regional space security community, where common security threats and interests in space could be handled in a more nuanced way. [45] [46]

With security at the forefront of space involvement, and with a gradual divergence of civil and commercial space from military space programmes, Asia-Pacific space stands to benefit from new initiatives to better cooperate and integrate.

5. The Legal Dimension: Expertise, Norms and Certainty

5.1 Development of Space Law Experts

For emerging states, the chance for commercial ventures and businesses to engage in ad hoc long-term non-exclusive projects would give the domestic economic players exposure to contractual arrangements which incorporate space law principles and norms. There are certain unique features of space-related contracts, such as launch contracts and satellite procurement contracts, which legal experts in emerging space states need to grapple with. These features include liability arrangements, registration of space objects and state responsibility for space objects. The proliferation of such contracts in emerging states would promote the advance of space law experts.

5.2 Creation and Testing of Norms

In developing ad hoc long-term non-exclusive projects together, Asia-Pacific states could negotiate and agree on certain legal norms, coordinate contractual arrangements between participating states and their contractors and draft model clauses in consultation with each other. We have seen how this could play out in the example of cross waiver of liability clauses in the ISS context. These practices if adopted widely (from procurement of materials, construction of parts to the actual standards governing the use of space-bound equipment), could create a ripple effect and propel commercial and legal understanding of activities connected with space. Over the long run, legal certainty and understanding would drive economic activity in the space industry.

Perhaps even more important than the creation of norms is the testing of norms over a period of time. Being time-tested and having endured the crucible of dynamic activity afford norms and legal principles acknowledgement and appreciation – and the latter attributes are vital in promoting legal certainty around such norms. Once again, the key illustration is to be found in the ISS context. As presented by ISS representatives to the United Nations Committee on the Peaceful Uses of Outer Space Legal Subcommittee on 17 April 2013, the experience of implementation of the ISS legal arrangement, consisting of the IGA, Memoranda of Understanding (MOUs) between the participating states and Implementing Arrangements, which were concluded as and when the need arises between the participating states over the 15 years prior to the date of that presentation, "has shown that, including from the legal standpoint, the partnership has been able to adapt to the different situations – even when difficult or dramatic circumstances materialised – and respond to the specific needs arising from time to time". [47] It was also remarked that the IGA and the MOUs have been "flexible enough to provide an adequate legal framework for the functioning of the partnership". [48] Such salient observations can only be made of norms and principles following a significant period of implementation and testing. With the proliferation of ad hoc long-term exclusive projects,

perhaps norms and principles would be incepted and subject to the tests of reality.

Finally, with the spread of space law awareness and practice, legal academics would find meaningful work in rationalising or theorising about legal norms and standards which could provide the intellectual ammunition for the rise of an Asian space commercial century.

6. Conclusions

This paper seeks to identify that the way forward for space cooperation in Asia-Pacific is through ad hoc long-term non-exclusive projects. As emerging states of the Asia-Pacific region and their private industries become more aware of the importance of the space applications, the necessary legal and economic frameworks need to be introduced in order for the respective states to flourish. Under the auspices of ASEAN economic initiatives, and its representation to the world, developing space actors in Asia-Pacific now have the opportunity to cooperate in space with various partners while ring-fencing existing issues and conflict. Should the development of regional economic cooperation in Asia-Pacific continue to improve, underpinned by a concern for their sovereignty and security, then the space aspirations of developing states in the region will be in good hands.

In increasingly trying times, existing actors in space need to consider the benefits of promoting wider involvement in space projects, both at the inception and end-use phases. Space applications undoubtedly contribute to the advancement of economic and social activity in states, and space involvement is the hallmark of modern, developed, global economies. Established space players stand only to benefit from increased responsible engagement from developing states, as they evolve into key contributors to, and users of, space.

Yet, as is much the same in many other respects, the emerging states of the region must somehow leap-frog much progress to be able to engage with the rest of the world in space. Their space industries will likely be almost wholly commercially driven, and while entirely possible, the new course to space cooperation which this paper proposes does come with risks and challenges. However, commercial space enterprise presents itself as a viable tool for Track 2 diplomacy, and if sensible policy prevails then space can have a hand in bringing the states of the region (and the world) into a better state of understanding and cohesion.

Acknowledgements

We are grateful to the sponsors and organisers of Space Generation Advisory Council's Asia-Pacific Space Generation Workshop 2016 in Philippines for occasioning our discussion of the ideas crystallised in this paper.

David would like to acknowledge the support granted by Secure World Foundation (SWF) under their 2017 SWF Young Professional Scholarship scheme, without which David would not be able to travel to present this paper at IAC in Adelaide.

Eren thanks those stalwarts of the Australian space community who have guided his views and perspectives on the importance of space, balanced with the realities of our region and the world.

References

[1] The full texts read: "There shall be freedom of scientific investigation in outer space, including the Moon and other celestial bodies, and States shall facilitate and encourage international cooperation in such investigation." (Article I of the OST) and "In order to promote international cooperation in the exploration and use of outer space, including the Moon and other celestial bodies, in conformity with the purposes of this Treaty, the States Parties to the Treaty shall consider on a basis of equality any requests by other States Parties to the Treaty to be afforded an opportunity to observe the flight of space objects launched by those States." (Article X of the OST).

[2] This ought not to be controversial – Broniatowski et al (2006) expressed this idea this way: "[i]f cooperation between nations is to be successful, each nation must have an incentive to cooperate (i.e., each nation must derive positive utility from the partnership)." See: D. A. Broniatowski, G. Ryan Faith, Vincent G. Sabathier, The Case for Managed International Cooperation in Space Exploration, International Space Exploration Update by Center for Strategic and International Studies (2006).

[3] Kent Ridge 1 is described as being "jointly build by NUS and BST as part of a training programme" and "carries three payloads including two hyperspectral cameras, based on the FTR (Fourier Transform Recovery) method, developed by DSO (Defence Science Organization) National Laboratories, Singapore." See: eoPortal Directory, Kent Ridge 1, https://directory.eoportal.org/web/eoportal/satellite-missions/k/kent-ridge-1, (accessed 20.08.17).

[4] Kent Ridge 1 is described as "fully functional and operated by a team of NUS and BST". See: eoPortal Directory, Kent Ridge 1, https://directory.eoportal.org/web/eoportal/satellite-missions/k/kent-ridge-1, (accessed 20.08.17).

[5] Universiti Teknologi MARA, Academic Visit to Kyutech, Tobata Campus, Japan, 25 July 2017, https://fke.uitm.edu.my/v5x/index.php/news-events/372-academic-visit-to-kyutech-tobata-campus-japan-18-21-july-2017, (accessed 20.08.17).

[6] Suzuki (2016) observed that the Convention of APSCO bearing some resemblance to the ESA Convention "suggests that APSCO aims to be an ESA-like international institution for the development of space technology". See: Kazuto Suzuki, How Governance Models Affect Geopolitics: The Asian Case Study, in: Cenan Al-Ekabi, Blandina Baranes, Peter Hulsroj, Arne Lahcen (Eds.), Yearbook on Space Policy 2014, Springer, Vienna, 2016, pp. 199-210.

[7] Rajeswari Pillai Rajagopalan, Beyond Outer Space Treaty – Time for New Mechanisms?, in: Ajey Lele (Ed.), 50 Years of the Outer Space Treaty, Pentagon Press, New Delhi, 2017, pp. 172-184.

[8] The ITU is so described by: Los Angeles Times, Who rules the Internet, 16 December 2012, http://articles.latimes.com/2012/dec/16/opinion/la-ed-itu-united-nations-internet-20121216, (accessed 20.08.17).

[9] Patrick S. Ryan, The ITU and the Internet's Titanic Moment, Stan. Tech. L. Rev. 8 (2012).

[10] This being said, it is recognised that the participant states are able to "barter and sell their unused utilisation rights [of the ISS] among themselves and to other non-participants". This is noted by Landfester et al. (2011); see: Ulrike Landfester, Nina-Louisa Remuss, Kai-Uwe Schrogl, Jean-Claude Worms (Eds.), Humans in Outer Space – Interdisciplinary Perspectives, Springer, Morlenbach, 2011.

[11] As Broniatowski et al put it, "This form of cooperation therefore creates a natural hierarchy of partner nations among those who have the most control of the critical path; the most de facto decision making power; and those who provide the extraneous capabilities but have little in the way of programmatic utility and contribute little in the form of decision making." See: Broniatowski et al, *supra* note 2.

[12] Valerie Kayser, Launching Space Objects: Issues of Liability and Future Prospects, Kluwer Academic Publishers, Dordrecht, 2001, pp. 252.

[13] United Nations Officer for Outer Space Affairs UN-SPIDER, Sentinel Asia, http://www.un-spider.org/space-application/emergency-mechanisms/sentinel-asia, (accessed 01.09.17).

[14] *Ibid*.

[15] Japanese Aerospace Exploration Agency, Sentinel Asia, http://global.jaxa.jp/article/special/sentinel_asia/index_e.html, (accessed 01.09.17).

[16] Wasanchai Vongsantivanich, Supatcha Chaimatanan, and Panwadee Tangpattanakul, The Development of Mission Planning Tool for Thailand's Earth Observation Mission, SpaceOps 2016 Conference, SpaceOps Conferences, (AIAA 2016-2542) https://doi.org/10.2514/6.2016-2542.

[17] Marco Aliberti, Regionalisation of Space Activities in Asia?, ESPI Perspectives 66 by European Space Policy Institute (2013).

[18] Suzuki (2007) noted the jolt response within the Japanese political circles to the Chinese APSCO movement which he analysed to have spurred the lawmakers to establish the Japanese Basic Law for Space Activities. See: Kazuto Suzuki, Transforming Japan's Space Policy-making, Space Policy 23(2) (2007) 73-80.

[19] Rong Du, Space Cooperation in Asia: a Mystery, IAC-14.E3.1.4, 65th International Astronautical Congress, Toronto, Canada, 2014.

[20] Asif A. Siddiqi, An Asian space race, hype or reality?, in: Subrata Ghoshroy, Gotz Neuneck (Eds.), South Asia at a Crossroads: Conflict or Cooperation in the Age of Nuclear Weapons, Missile Defense, and Space Rivalries, Nomos Publishers, Berlin, 2010, pp. 184-198. See also: Kazuto Suzuki, The Contest for Leadership in East Asia: Japanese and Chinese Approaches to Outer Space, Space Policy 29(2) (2013) 99-106 - "it can be said that there is a space race between Japan and China, but it is more about the race to become the space leader in this region. Their aims are not to be on top of the rival in space, but to utilize their space capability for diplomatic activities."

[21] As Du (2014) put it, "The coexistence of several cooperation initiatives in Asia basically reflects the political reality in this region." See: Du (2014), *supra* note 18.

[22] Siddiqi (2010) was particularly sanguine about APSCO, describing it as potentially "the most enduring and important legacy of the new Asian space race. See: Siddiqi, supra note 19.

[23] Broniatowski et al, *supra* note 2.

[24] As Suzuki (2013) put it, "politicians are concerned the cost and benefit of space activities, and it would be difficult to promote "big projects" such as manned-space programs." See: Suzuki (2013), *supra* note 19.

[25] Michael Simpson, Ph.D., Broadening the Base: Cooperation as a Springboard for New Participants in the Space Sector, in: Langdon Morris, Kenneth J. Cox, Ph.D. (Eds.), International Cooperation for the Development of Space, Aerospace Technology Working Group, 2012, pp. 19-42.
[26] George S. Robinson, Public Space Law, The Legal Practitioner, and The Private Entrepreneur: Distinguishing What "Ought To Be" From "What Is", in: Langdon Morris, Kenneth J. Cox, Ph.D. (Eds.), International Cooperation for the Development of Space, Aerospace Technology Working Group, 2012, pp. 67–80.
[27] East Asia Summit states: Australia, Brunei, Cambodia, China, India, Indonesia, Japan, Laos, Malaysia, Myanmar, New Zealand, Philippines, Russia, Singapore, South Korea, Thailand, USA, Vietnam
[28] US Department of Defense, National Security Space Strategy, http://archive.defense.gov/home/features/2011/0111_nsss/ (accessed 03.09.17). To date, no subsequent document detailing US national security space arrangements has been published under the new administration.
[29] Michael Simpson, *supra* note 24.
[30] International Launch Services, ILS and MELCO Announce the Contract for Launch of the Turksat 4A and Turksat 4B Satellites on ILS Proton, http://www.ilslaunch.com/newsroom/news-releases/ils-and-melco-announce-contract-launch-turksat-4a-and-turksat-4b (accessed 03.09.17).
[31] N2YO.com, SGDC, http://www.n2yo.com/satellite/?s=42692 (accessed 03.09.17).
[32] *Supra* note 27.
[33] Ministry of Foreign Affairs of the People's Republic of China, China's Policies on Asia-Pacific Security Cooperation January 2017, http://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1429771.shtml (accessed 03.09.17).
[34] *Ibid*.
[35] Association of Southeast Asian Nations: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam.
[36] Deutsch, Karl W. et al, Political Community and the North Atlantic Area: International Organization in the Light of Historical Experience, Princeton University Press, Princeton NJ, 1957.
[37] Andrej Tusicisny, Security Communities and Their Values: Taking Masses Seriously, International Political Science Review (2007), Vol. 28, No. 4, 425–449.
[38] Morgan Potts, ASEAN is Not a Security Community (Yet), The Diplomat, 10 March 2015, http://thediplomat.com/2015/03/asean-is-not-a-security-community-yet/.
[39] Jun Yan Chang, Essence of security communities: explaining ASEAN, International Relations of the Asia-Pacific, Vol. 16, Issue 3, 1 September 2016, Pages 335–369, https://doi.org/10.1093/irap/lcv026.
[40] Amitav Acharya, Constructing a security community in Southeast Asia, London, Routledge / Taylor & Francis Group, 2014
[41] ASEAN Secretariat Information Paper, Overview of ASEAN Plus Three Cooperation, June 2017, http://asean.org/storage/2017/06/Overview-of-APT-Cooperation-Jun-2017.pdf.
[42] As a respected 'middle power' in global diplomacy, Australia is ideally positioned to take an active role in progressing space security policy May 2017 http://www.defence.gov.au/adc/adfj/Documents/issue_201/Westwood_April_2017.pdf
[43] Brett Biddington, Australia's Place in Space: Historical Constraints and Future Opportunities, in: Langdon Morris, Kenneth J. Cox, Ph.D. (Eds.), International Cooperation for the Development of Space, Aerospace Technology Working Group, 2012, pp. 165-208
[44] Review of Australia's Space Industry Capability, July 2017 http://www.minister.industry.gov.au/ministers/sinodinos/media-releases/expert-review-australia%E2%80%99s-space-industry-capabilities-participate
[45] Malcolm Davis, Australia in Space: Developing a Regional Space Community, Australian Strategic Policy Institute, 4 Feb 2016, https://www.aspistrategist.org.au/australia-in-space-developing-a-regional-space-community/
[46] Andrew Davies and Rod Lyon, Japan's new space policy—do we need one too?, Australian Strategic Policy Institute, 23 Sep 2015, https://www.aspistrategist.org.au/japans-new-space-policy-do-we-need-one-too/.
[47] Diane St-Arnaud, Andre Farand, Motoko Uchitomi, Robin J. Frank, Igor Porokhin, The Legal Framework for the International Space Station – presentation made to UNCOPUOS Legal Subcommittee on April 17 2013. http://www.unoosa.org/pdf/pres/lsc2013/tech-05E.pdf.
[48] *Ibid.*