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Wilton Park



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Report

Operating in space: current multilateral policy issues and challenges

Tuesday 14 – Wednesday 15 January 2020 | WP1758

Held in Singapore

Organised in partnership with:



Australian Government
Department of Foreign Affairs and Trade



NEW ZEALAND
FOREIGN AFFAIRS & TRADE





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1. Executive summary

1.1 Conference rationale

In January 2020, Wilton Park convened a two-day conference in Singapore to discuss key issues that relate to operating in space. The conference, sponsored by the governments of the United Kingdom, Australia and New Zealand and the Secure World Foundation, followed on from the March 2019 Wilton Park conference on addressing emerging challenges in the space environment through the development of protocols on the norms of behaviour. The Singapore edition brought together a group of policy makers from a diverse range of Indo-Pacific nations with a mix of industry experts in order to build upon the themes and outcomes from the first conference. Participants met in a neutral environment where open and constructive dialogue was encouraged.

1.2 Representation

A total of 47 representatives from 18 states across the Indo-Pacific region (Australia, Cambodia, China, India, Indonesia, Japan, Laos, Malaysia, Myanmar, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Thailand, United Kingdom, United States, Vietnam) as well as representatives from non-government organisations, academia and industry participated in the conference.

1.3 Discussion focus

Discussion focussed on the central role clear and effective communications could play in reducing threats in space resulting from behaviours without known capability of others' space craft or intent behind behaviours. In particular, discussion considered appropriate protocols and mechanisms that could enable improved communication between operators and by governments in order to reduce the perception of threats in outer space.

1.4 Key questions considered

- How could the development of improved space communication protocols contribute to a more safe, secure and sustainable outer space environment?
- What specific communication standards, protocols or mechanisms would achieve this outcome?
- How can space operators effectively demonstrate the intent of the behaviour of space objects?
- What is the appropriate role for governments in communicating its national space activities?

1.5 Key take-aways

- The existing patchwork of multilateral, regional and bilateral arrangements for space communications is not adequate for the outer space operating environment as it continues to evolve.
- The international community should develop communications protocols for space operations. The majority of the conference participants believed norms/standards of responsible or expected behaviours in space would be complemented by these communications protocols, should they be developed.
- Appropriate communication protocols, including when communication is necessary, by whom it would be undertaken, and using which mechanism, need to be considered in closer detail by the international community.
- As a preliminary step, the international community could consider establishing an international point of contact database for all space objects, which includes a first contact point and an escalation point, to facilitate swift communication in real time between foreign operators
- A more comprehensive understanding of the nature, scale and complexity of the threats to space systems by more states would provide a stronger foundation for efforts to define standards of responsible space behaviours.

2. Setting the scene

2.1 Reliance on space

Space systems have long provided critical services that enable a range of activities on earth, including civilian and military telecommunications, geolocation services, weather monitoring and remote sensing. The democratisation and commercialisation of outer space, although uneven in its distribution, has meant that all states are now even more reliant upon space systems for their prosperity and security. In particular, technological developments catalysed by the entry of the commercial sector into mainstream space activities have considerably reduced previously prohibitive barriers to accessing space. These developments have enabled the entry of a variety of new actors into the space market, which is growing exponentially year-by-year. Among them are governments and private actors from previously non-spacefaring nations, representing a wide range of economic and technological development. As a result, space-based systems increasingly play a vital role in facilitating day-to-day functions of governments, businesses, universities and individuals in all nations, including those yet to develop their own spacefaring capabilities. It is therefore in the interests of all nations to ensure that space remains a safe, secure and sustainable environment.

2.2 More activity means more complex challenges

However, the recent proliferation of space activities and the evolving manner in which government and private actors are using space has opened up a raft of new and complex challenges in the space environment. Most pressing is the risk of collisions in orbit. An increase in the number of satellites has meant that orbits are becoming more congested. More orbital activity also means the creation of more debris in space. These factors, considered together, have significantly increased the risk of potential collisions in orbit. At the same time, developments in technology has improved satellite manoeuvrability in orbit, enabling operators to exercise greater control. However, this has contributed to the emergence of proximity manoeuvres, satellite-satellite encounters and other behaviours in orbit that could be perceived as hostile by some operators. Growing space situational awareness capabilities also mean that these manoeuvres rarely occur without being observed. Nations aware of these emerging threats and the strategic value of their space-based assets are also developing counterspace technologies to ensure assets are adequately defended. Each of these challenges, whether it be orbital congestion, space debris, counterspace technologies or pure uncertainty about orbital behaviours, continue to multiply in their scale and complexity.

2.3 Threats to space systems

The growing quantity and complexity of challenges facing space operators has catalysed the emergence of a gradually escalating threat environment in outer space. Nation states and commercial actors alike, aware of their considerable reliance on space systems for economic prosperity and security, are acutely alert to corresponding vulnerabilities of these systems, particularly those assets in orbit. Adding to this dynamic, the dual-use nature of a growing number of space objects and an absence of communication between operators means there is a broad range of activities that raise potential concerns for operators of space systems. At the upper end of this spectrum, these include intentional signal jamming and dazzling, the development of anti-satellite kinetic systems and the placement of weapons in orbit. Shifting towards the lower end of the spectrum, it is more challenging to define the activities of concern. Seemingly innocuous actions or inactions, such as close approaches, proximity operations and even unconventional orbital manoeuvres, could reasonably be perceived as threatening in some circumstances, particularly when operators are unable to establish the other operators' intentions. Indeed, the lack of certainty about other operators' intentions and behaviour is contributing to a steady uptick in tension between operators in space. On its current trajectory, this trend is set to continue and even accelerate. As tensions increase, the risk of misunderstanding or miscalculation between operators will become an increasing likelihood.

2.4 Reducing the risks to space operations

An escalating threat environment is not in the interests of any country, company or university that uses and relies upon outer space. It is therefore paramount that the international space community – comprising all space actors and all countries – prioritises working collaboratively to reduce the risks of operating in space. The current international regime, which includes the space treaties and a range of other non-binding multilateral instruments and guidelines, will continue to play an integral role in the governance of outer space activities. But the new and increasingly complex challenges require tailored and specific solutions that builds upon and complements the existing regime.

3. Wilton Park and space issues: work done to date

3.1 Wilton Park March 2019

Wilton Park convened a conference in March 2019 ('Wilton Park I') on operating in the outer space environment, with a view to developing standards or norms of responsible behaviour. Discussions at Wilton Park I examined four key focus areas identified as fundamental challenges to be addressed in the space environment: launch activities, debris mitigation and management, space situational awareness (SSA) and in-orbit and proximity operations. Within these focus areas, participants considered practical measures the international community could adopt to promote closer cooperation

between governments and the space industry.

In each of these contexts, effective communications – whether between operators, states, or a combination of both – was identified as being integral to minimising the risk of miscalculation. In that light, participants at Wilton Park I encouraged the international community to consider improving the sharing of data and to establish mechanisms to facilitate more frequent and effective communications.

3.2 Space Situational Awareness (SSA)

A number of presenters suggested that having a clearer picture of the operating environment in outer space would greatly assist operators to understand and navigate their orbital paths; it was demonstrated how developments in SSA technology have meant that operators can obtain a high fidelity understanding of the space domain in relation to their own orbital systems as well as neighbouring satellites. The increasing availability of SSA systems and technology to all space actors suggests SSA as an effective communication tool in its own right, which could serve to improve awareness of the space domain and reduce risks of collision. However, its utility as a means to reduce risks in the outer space environment continues to be constrained by two key factors:

- Some space actors are reluctant to share their data. This was recognised at Wilton Park I and remains one of the biggest roadblocks to its utility.
- The real-time situational awareness of the behaviour of neighbouring space systems offered by SSA was insufficient to determine the intent of a space operator, absent clear communication between operators or established norms of behaviour. In fact, improved situational awareness could even contribute to increased threat perception in circumstances such as proximity manoeuvres where the operator's intent is unknown.

3.3 Acknowledging the need for norms of responsible behaviour

In recent times, States, international organisations and prominent commentators have consistently acknowledged that space is a potential warfighting domain. Reflecting this sentiment, there has been a recent uptick in the development and acquisition of new counterspace capabilities, such as counterspace weapons, jamming, blinding, directed energy, cyber attacks and other in-orbit capabilities. In fact, there is a general acceptance that space assets would likely be targeted during a conflict on earth, even if only via jamming or cyber (and not kinetic) capabilities. Given the gradually escalating nature and scale of the threats to space systems, the international community has recognised the increasing urgency to intensify the dialogue on responsible space behaviours. The 2013 Report of the *Group of Government Experts on Transparency and Confidence Building Measures*¹ remains a useful starting point when considering appropriate measures or practices aimed to mitigate the risks in outer space. However, presenters at the Wilton Park II conference argued that the measures identified in the report are not sufficient to address the myriad complexities and challenges of the new space environment. In the view of some presenters at the conference, the international space community – private actors and governments alike – needs to develop internationally agreed responsible space behaviours and other confidence building measures for outer space in order to mitigate further the impact of some of these emerging risks. In the opinion of a number of presenters at the Wilton Park II conference, such an approach represents the most pragmatic and practical option available to the international community, which can deliver urgent outcomes in the short-term. These outcomes could be further expanded or complemented in the medium term by other measures, such as legally binding commitments, although the practical feasibility of such an approach remains the subject of debate.

4. Challenges to be addressed

4.1 Improving communication as a central tenet of risk management in outer space

International dialogue on responsible space behaviours consistently highlights the importance of improving transparency. This was indeed a key takeaway from Wilton Park I, which flows from the fact that many perceived threats to space systems are borne from a misunderstanding of foreign operators' intentions. Such misunderstandings manifest differently in various contexts. For instance, launch activities undertaken without prior notification of the nature of the activity and the payloads attached to the launch vehicle could be misinterpreted as a missile launch. Equally, proximity manoeuvres or shadowing operations in orbit without communicating the intent for such activities could be misunderstood as interference operations or even a threatened attack. In each of these circumstances, effective communication by and between operators in particular would go a long way to reducing and minimising the perceived threats, which would in turn reduce the risk of miscalculation. Importantly, improved transparency and communication mechanisms will be equally important for space activities in normal times as well as in times of stress. However, it may be necessary to establish different modes or protocols tailored for different scenarios. In that light, establishing best practices on the kind of communication that should accompany particular activities, behaviours or manoeuvres in defined circumstances

¹ Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities (2013), UN Doc 68/189.

would be a fundamental step towards reducing the risk environment in space. This can only be effective with recognition by the international community supported by fit-for-purpose mechanisms, whether they be operator-to-operator, country-to-country, regional or multilateral in nature.

4.2 Variable capabilities of states as a factor in the development norms

Although the democratisation of space has meant there is an expanding group of spacefaring nations, there remains a substantial incongruity in spacefaring capabilities. Any attempt to develop norms of responsible behaviour in outer space, including protocols on communication, must take into account the varied space capabilities of members of the international community. In particular, it will be important to consider measures that avoid introducing prohibitive barriers to participating in space activities, where an additional burden could be imposed, seek to distribute this between well-established spacefaring nations. This is particularly relevant within the Indo-Pacific context, where there are broad disparities between the space capabilities of constituent countries. States with sophisticated space industries will need to take the lead in the developing, implementing and upholding best practices and standards of behaviour, including through transparent communication. They must also undertake efforts to support and build capacity in states with less-developed space sectors. After all, the exploration and use of space shall be for the benefit and in the interest of all countries and is the province of all humankind.

4.3 Leveraging existing mechanisms and ongoing programs of work

There are a range of existing multilateral, regional and bilateral mechanisms and arrangements that already play a role in facilitating communication for and between space operators for various purposes.

- In the multilateral context, the UN Register of Objects Launched into Outer Space provides baseline data about a majority (87%) of the man-made objects currently in space, while the Hague Code of Conduct against Ballistic Missile Proliferation requires subscribing states to exchange pre-launch notifications for all launch activities.
- Publicly available space situational awareness services, such as the Space-Track.org database, are useful tools.
- Ad hoc arrangements between states at a bilateral or regional level provide and establish communication channels for a range of purposes, including to facilitate cooperation or reduce tensions around certain potentially threatening activities.
- Other international domains, such as international airspace or the high seas, have established mechanisms and protocols that could be directly or indirectly leveraged and used in the outer space context. This includes communication channels reserved for real-time communication between operators and established international bodies (such as the International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO)) responsible for standards and protocols that coordinating traffic and communication in these domains.

To avoid unnecessary repetition, and in the interest of exploiting efficiencies, existing mechanisms should be leveraged or built upon where it is appropriate to do so. However, each of these mechanisms comes with unique limitations that may restrict their utility or applicability to the specific characteristics of the outer space operating environment.

4.4 The role of industry in contributing to the development of responsible space behaviours

While this is undeniably a pressing issue for States, it is equally in the space industry's interests to ensure that space remains safe, secure and sustainable. The private sector will innovate and disrupt at dramatically faster speeds than their government counterparts, which will only further change that manner in which we use outer space. With that in mind, industry should be expected to make strong contributions to the development of standards of responsible space behaviour. After all, the space industry will be one of the biggest beneficiaries of such efforts. Industry's role in this regard could be undertaken in partnership with governments, or among itself. In fact, there are already informal, voluntary industry groupings established to develop common solutions to facilitate improved interoperability. These efforts, which have included the creation of communication and data sharing channels, should be harnessed and enhanced. However, as codified by the foundational principles of the Outer Space Treaty, it remains the role of the international community (comprising all UN member states) to take the lead on developing appropriate standards. In that context, governments must think intelligently about where this process can be complemented by efforts from industry leaders. In particular, the international community should consider where industry can make the strongest contributions, and how these contributions could feed into and complement state-led processes.

5. Focus area: communication and transparency

Discussions during the conference focussed on the important contribution that robust standards and mechanisms for effective communication could make to the future space environment to ensure it would be secure, safe and sustainable. Participants agreed that the current patchwork of arrangements and mechanisms for space communications was disparate and insufficient for the challenges posed by the rapidly evolving operating environment. Some participants believed the international community of space operators, including governments and private actors, needed to work

collectively and collaboratively to develop mechanisms, protocols and standards that would facilitate improved communication at all levels (from operator-operator up to state-state). Also, that such efforts could contribute to and complement a broader program of work on the development of standards of responsible behaviour. While participants were unable to reach consensus on precise measures that should be adopted, there was a general willingness among participants to engage constructively in dialogue aimed at achieving this outcome. Broadly speaking, discussions coalesced around the following key themes and concepts. Careful consideration of these themes would inform and guide international dialogue as it matured.

1. Communication between operators
2. Modes of communication by governments
3. Preliminary steps towards improving communications mechanisms and protocols

5.1 Communication between operators

In some circumstances, both in the course of normal operations and when behaviour of foreign space objects is perceived as a threat, operators needed to communicate with other operators – for example, following identification of a conjunction risk in order to determine whether manoeuvres were required. Separately, where operators perceived the behaviour of another space object to be threatening, establishing communication provided the swiftest avenue to de-escalate any tensions. Participants widely agreed that improved communication between space operators, to inform real-time decision-making, would drastically improve the safety of space operations and reduce risks of miscalculation.

5.2 Communication by governments

Participants agreed that States, in their capacities as operators of spacecraft and as entities responsible for regulating non-governmental operators, had a significant role in facilitating good communication practices. At a high-level, participants identified three distinct modes of communication available to states:

1. **National communication** – effected by publishing national strategies, policies and doctrines around space operations. National declarations served to improve transparency by demonstrating a state's broad national intent and builds confidence among the international community. Participants agreed a high degree of value could be derived from national communications around space activities.
2. **Bilateral communication** – effected through formal consultation mechanisms (whether established by treaties or otherwise) and/or the establishment of hotlines. Such mechanisms would prove valuable in times of stress or increasing tensions between states, particularly direct communication lines. The communication channels established between Pakistan and India had proven an effective model for risk reduction in the context of launch activities.
3. **Multilateral communication** – effected by constructive contributions to United Nations processes or independently established mechanisms.

While acknowledging that the three modes of communication each had played an important role, participants agreed that there was a significant gap in the multilateral context. Although challenging dynamics persisted in the multilateral environment – demonstrated by the inability to reach an outcome by the Group of Government Experts on the Prevention of an Arms Race in Outer Space in 2019 – participants agreed multilateral communication was underutilised and should occupy a more prominent role. Any efforts should carefully build upon and leverage existing initiatives, such as the Guidelines for the Long-term Sustainability of Outer Space², where appropriate. Within this context, many participants acknowledged the importance of the distinction between dialogues on the peaceful uses of outer space and dialogues on space security. Many participants expressed views that it would be important to maintain the separation between these dialogues wherever it was possible.

5.3 Preliminary steps towards improving communications mechanisms and protocols

There was consensus among participants for further dialogue aimed at developing protocols on communication for a wide range of activities and operations in outer space. Participants proposed a range of preliminary steps or initiatives that could be taken forward by the international community.

Demonstrating intent in outer space

Participants acknowledged that an operator's perception of threatening behaviour in outer space was informed by three primary elements of such behaviour: the intent, capability and operability of a space object. Improvements in space situational awareness technology meant it was becoming easier to understand capability and operability. However, it remained difficult to understand a space object's intent in the absence of communication – particularly in light of the dual-

² Guidelines for the Long-term Sustainability of Outer Space Activities, UN Doc A/AC.105/2018/CRP.20. Recommendations B.1, B.2 and B.3 all addressed aspects communications and transparency of space operations.

use nature of space technology, which blurred the delineation between military and civilian assets. Participants agreed that misunderstanding the intent of another operator could have the potential to lead to negative, or even catastrophic consequences for the outer space environment. Effective communication between operators was the easiest way to avoid such misunderstandings. Some participants noted that proactive communication had proven to be an effective means of reducing the perception of threat and potential miscalculation in advance of otherwise threatening activities, such as launch, proximity operations or even shadowing manoeuvres – it left little doubt about intent. For example, the United States' attack on its own toxic satellite in 2008 was preceded by notifications of its intent to the international community. Participants also agreed that operators could demonstrate intent by practicing predictable orbital behaviour (consistent with previously agreed standards of behaviour). Further consideration would need to be given to developing appropriate standards, including what is considered 'predictable'.

Challenges of communication between state and non-state operators

Participants identified challenges that might arise due to the different operational cultures of the private sector and the military. In particular, some participants noted that civilian operators often found it difficult to initiate contact with military operators at all. Separately, other participants noted that due to the dual-use nature of an increasing number of space objects, drawing the distinction between space objects that were military in nature, and those that performed civilian functions, was increasingly challenging. Nonetheless, participants agreed that efforts would need to be channelled towards bridging the cultural gap between civilian and military operators in order to establish effective modes of communication both in real time, and as required in other circumstances.

Developing a universal point of contact system

Participants acknowledged that, despite the various mechanisms in existence, there was not a central system containing point of contact information for the operators of space objects. This meant that operators often experienced challenges when trying to engage other, foreign operators with whom they did not share a pre-existent relationship. These challenges were amplified when the foreign operators were military entities. In that light, participants proposed that the international community should consider the establishment of an international point of contact database for all space objects. The database would need to be publicly available to all space operators and should include a clearly identified i) first point of contact, ii) escalation point of contact – although, participants disagreed on whether the escalation contact should be attached to the operator of the space object, or its authorising government. The proposed database would facilitate more swift communications between operators unfamiliar with one another. Participants did not reach agreement on an appropriate mechanism or platform to host such a database, and suggested it be given further consideration. Further consideration could also be given to whether a platform could be expanded to coordinate space traffic and/or provide universal space situational awareness.

Tailoring communication protocols for different circumstances

Discussions addressed the necessity for communication protocols to differentiate between, and apply differently to, different circumstances encountered by operators. Participants discussed the utility of distinguishing appropriate communications between operators during normal operations from those during times of stress or increasing tensions. Establishing communications protocols for everyday space operations, such as pre-notification prior to conducting manoeuvres and proximity operations, would reduce the risk of accidents and should be encouraged. In contrast, different mechanisms would be appropriate in the event of escalating tensions between two space operators. Participants agreed on the importance of tailoring communications protocols to different scenarios – including the appropriate mechanism for such communication, expected response times following attempts to engage, and escalation pathways.

Establishing conditions that give rise to communication

Participants acknowledged that any communication mechanisms would need to be accompanied by agreed protocols that define conditions, which when met, give rise to an expectation that operators establish and engage in communication. Communications protocols could then guide the appropriate mechanism to use and establish expected response times. These standards would also legitimise the escalation of concerns where such conditions are met and operators have been unable to establish communication in accordance with the protocols.

Participants identified and discussed example behaviours that were considered primary candidates for the development of protocols or standards, which give rise to certain communications protocols:

1. identification of a conjunction risk between two space objects (within a defined/agreed time period)
 - a. operators could make contact at an agreed time prior to the calculated risk, to negotiate whether manoeuvres are required, and if so, which operator shall be responsible for conducting them.
2. operators approaching within defined/agreed distance of other space objects, including for proximity operations
 - a. operators could be expected to provide notification prior to entering a defined safe zone around another

space object in orbit

- b. absent notification, operators could be expected to respond to and engage in good faith negotiations from the operator of the affected space object within a standardised response time
 - c. international community and/or operators to discuss further what might constitute appropriate parameters for such 'safe zones', including distances/limits – some participants expressed the view that the appropriate distances would vary between different orbits (for instance, in lower earth orbit, satellites passed nearby one another frequently; whereas such behaviour was not common in geostationary earth orbit).
3. operators conducting abnormal orbital manoeuvres
 - a. international community and operators to discuss further whether pre-notification should be provided
 - b. consideration would need to be given to appropriately defining what constituted an abnormal manoeuvre and when another operator was impacted by such manoeuvres, as well as avoiding the creation of an overly burdensome process.
 4. behaviours that interfered with the ordinary operations of space objects (including jamming, dazzling, spoofing and other counterspace activities).

Some participants also suggested protocols be established that activate 'emergency' procedures, which would permit a broader range of actions – which could represent an escalation step in any agreed communication protocols.

Lessons drawn from other international domains

Participants identified established practices used in similar international domains – maritime, international airspace and to a lesser extent, cyberspace – that had established communication mechanisms that had proven effective in mitigating potential threats and risks to varying extents. These could be useful precedents for communication in space.

In the military context, aircraft operators used the aircraft emergency frequency (also known as GUARD) to communicate with nearby foreign operators, including to de-escalate potentially threatening circumstances. A similar protocol also exists for naval communications. On the civilian side, the ICAO and the IMO had oversight over agreed standards and practices, but delegated communication and functional oversight to individual states. These authorities also mandated tracking devices being fitted to commercial aircraft and maritime vessels respectively. Participants queried whether these regulatory models could be modified or used to inform the development of a similar framework to oversee commercial space activities. However, participants also acknowledged that outer space was a unique domain with its own unique set of challenges: in particular the unreliability of situational awareness (owing to the absence of physical oversight), the dual-use nature of a large volume of space systems, and the high proportion of space assets that were operated by State militaries. Drawing distinctions between military and civil assets and their applications was significantly more challenging in space. Any solution would need to be tailored to address these challenges, which included military operators' general reluctance to publish or exchange information. Participants also noted that language and cultural barriers would also be a relevant consideration in the context of establishing universal communications channels and protocols. Lessons drawn from the precedents in the maritime and airspace domains would be useful starting points.

6. Reflections

Although unable to achieve consensus upon how communication should occur, at what time, and between which entities, participants widely agreed that developing protocols on communication for all aspects of space operation was an issue that the international community should address with a degree of urgency. There was clear recognition that the existing patchwork of multilateral, regional and bilateral arrangements was not adequate to facilitate desired operator-operator/operator-state/state-state communication required in the numerous circumstances raised. Participants undertook to consider this issue more closely.

The discussions at the conference revealed that broad consultation with the whole international community as dialogue matures towards the development of possible norms or protocols would be important. While established spacefaring nations would continue to play an influential role, emerging spacefaring nations and other smaller states have a growing stake in the outer space environment and needed to be included in any processes. With that in mind, capacity building to educate new and emerging space operators about good communications in outer space should be given close consideration. This could be achieved effectively through regional meetings or conferences, potentially utilising existing regional and multilateral architecture.

It was notable that discussion at the conference centred primarily upon how operators and states should communicate in the event of a real or perceived threat to space systems. There was minimal attention given to the nature of certain threats and how operators might perceive such behaviours. Upon reflection after the event, organisers assessed that the conference would have benefited from a further discussion and elaboration of the threats to space systems. Many states

across the Indo-Pacific region did not have extensive spacefaring capabilities, and as such had not needed to develop a fulsome picture of the outer space operating environment. A more comprehensive understanding of the nature, scale and frequency of the current and emerging threats to such systems across the widest range of countries would provide a foundation for efforts to define what the international community considers are responsible space behaviours.

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