United Nations A/AC.294/2023/NGO/4

General Assembly

Distr.: General
3 February 2023

English only

Open-ended working group on reducing space threats through norms, rules and principles of responsible behaviours
Geneva, 30 January – 3 February 2023
Item 6(c) of the agenda
Consideration of issues contained in paragraph 5 of General Assembly resolution A/RES/76/231
To make recommendations on possible norms, rules and principles of responsible behaviours relating to threats by States to space systems, including, as appropriate, how they would contribute to the negotiation of legally binding instruments, including on the prevention of an arms race in outer space

Working paper by the Takshashila Institution for the Third Session of the OEWG on Reducing Space Threats

Submitted by the Takshashila Institution

Executive Summary

In December 2022, the United Nations overwhelmingly adopted a resolution that called for states to commit not to carry out destructive direct-ascent anti-satellite missile tests. The proposed destructive DA-ASAT missile test moratorium does not restrict the research, development and deployment of counterspace capabilities. However, a destructive DA-ASAT moratorium does not mitigate all the risks to space safety and space security. This document recommends four approaches which states can pursue to take forward the ongoing discussions. These recommendations are:

- Pursue legally-binding instruments which ban the destructive testing of anti-satellite capabilities in outer space;
- Advocate for mutual proximity notifications wherein states notify one another during close approaches or when one satellite operator notices unusual satellite behaviour by another operator;
- Promote sharing space situational awareness data to increase the knowledge of the space environment and build transparency and confidence between states;
- Advance existing norms, rules and responsible behaviours in outer space by adopting and strengthening non-legally-binding measures.

No single recommended approach can redress all the threats in space. States must therefore advocate for multiple approaches in tandem to achieve peace and prosperity in outer space.

About the Takshashila Institution[1]

The Takshashila Institution is an independent centre for research and education in public policy based in Bengaluru, India. It is a non-partisan, non-profit organisation that

[1] An earlier version of this working paper was published as a discussion document under the title, "Redressing Orbital Dangers: Approaches to Advance India's Interests in Outer Space."

advocates the values of freedom, openness, tolerance, pluralism and responsible citizenship. It seeks to transform India through better public policies, bridging the governance gap by developing better public servants, civil society leaders, professionals and informed citizens.

Takshashila creates change by connecting good people, to good ideas and good networks. It produces independent policy research in a number of areas of governance, it grooms civic leaders through its online education programmes and engages in public discourse through its publications and digital media.

The discussion document can be found here:

https://takshashila.org.in/research/redressing-orbital-dangers

List of Abbreviations

ABM: Anti-Ballistic Missile

ASAT: Anti-satellite

BMD: Ballistic Missile Defence

DA-ASAT: Direct-ascent Anti-satellite

GEO: Geosynchronous Equatorial Orbit

HEO: Highly Elliptical Orbit

ICBM: Intercontinental Ballistic Missile

ICoC: International Code of Conduct

LEO: Low-Earth Orbit

OEWG: Open-Ended Working Group on Reducing Space Threats

OST: Outer Space Treaty

PAROS: Prevention of an Arms Race in Outer Space

PPWT: Treaty on the Prevention of the Placement of Weapons in Outer Space

RPO: Rendezvous and Proximity Operations

SSA: Space Situational Awareness

STM: Space Traffic Management

TCBM: Trust and Confidence-Building Measure

I. Introduction

1. How must states advance its interests in outer space? What are the options at its disposal to take forward the ongoing dialogue on space security? In this context, this document argues that states must advocate for approaches that do not hinder its ability to develop capabilities and technologies to secure its national interests. Second, the risk reduction measures must not replicate or circumvent the existing legal architecture of space governance. Finally, the approaches must attempt to mitigate risks to the legal space activities of all states.

2. Currently, the major threats to security in space arise from two interconnected phenomena. First, there is a growing perception that outer space is a military domain conducive to warfighting.[1] Amidst the renewal of great power competition and geopolitical uncertainties,[2] states have developed and deployed a panoply of counterspace capabilities and strategies for both offensive and defensive purposes.[3] The second phenomenon deals with the exponential increase in the number of satellites in the Earth's orbit made possible by satellite miniaturisation and easy access to launch services.[4] The dual-use and dual-purpose nature of space assets mean that commercial satellite operations could be misperceived as being malicious and threatening, therefore, setting the precedence for kinetic and non-kinetic attacks against such assets.[5]

3. Kinetic attacks against satellites risk the creation of large clouds of space debris which could cause secondary damage to other satellites and trigger a cascading effect that damages several other satellites.[6] On the other hand, non-kinetic cyber and jamming attacks against dual-use satellites could disrupt essential civilian service and cause secondary harm to human life.[7] The use of anti-satellite capabilities against dual-use command-and-control assets could also create risks for nuclear escalation.[8] These issues were not as pronounced as the present day when the Prevention of an Arms Race in Outer Space (PAROS) agenda entered the United Nations (UN) and the Conference on Disarmament (CD) lexicon in the 1980s.[9] After three decades of futile efforts to control anti-satellite capabilities, the UN member-states shifted their attention to reducing space threats through the regulations of behaviours and operations in outer space.[10]

4. In this renewed effort, states at the Open-Ended Working Group (OEWG) on Reducing Space Threats began discussing various aspects of space security from the ground up.[11] The moratorium on destructive direct-ascent anti-satellite (DA-ASAT) testing was among the proposals that garnered wide support. In December 2022, the UN General Assembly adopted Resolution A/C.1/77/L.62, which calls on states to commit not to conduct DA-ASAT tests.[12] The resolution, which was sponsored by the eleven member-states, garnered 155 votes in favour and nine votes against the resolution and nine abstinences.

5. However, a DA-ASAT test moratorium addresses a single element of risk reduction in outer space. Therefore, the next section lays down the approaches that states could advocate to take forward outer space risk reduction negotiations. It also elaborates on the objectives and parameters based on which the recommendations are made. The Appendix provides further discussion of each recommended approach.

II. Recommended approaches for states

6. This section proceeds to provide four recommended approaches for states to pursue in the appropriate international fora to reduce risks in outer space. To be clear, these recommendations are not proposals. Rather, they are broad exploratory ideas that states can pursue and develop over time. The recommended approaches have been put forward previously in several variations. However, this document provides a nuanced assessment of each approach and elaborates on the parameters chosen for the assessment.

7. Finally, it is important to note that no single approach provides the solution to address all threats in space. States could advocate for multiple approaches in tandem to have the greatest chance of garnering wide acceptance for risk reduction measures.

A. Objectives of pursuing arms control and risk reduction measures in outer space

8. Before putting forward the recommendations for arms control approaches, we must first lay down the objectives for pursuing them. The objectives of arms control are understood to consist of three components: 1. Reduce the risk of war; 2. Reduce the costs of preparing for war; and 3. Reduce the level of destruction should war occur.[13] Historically, however, arms control has also been an exercise for gaining competitive advantages[14] and managing uncertainty.[15] While these principles hold true for arms control in outer space,[16] the risk reduction measures must inevitably address some aspects of space safety and space sustainability.[17] Furthermore, since much of the existing space governance architecture is built on foundational treaties negotiated during the Cold War, any arms control or risk reduction instrument must navigate through the tangled web of international law.[18]

9. With the exponential increase in space activities in recent years, the Earth's orbits are more congested and contested, ensuring the unhindered use of space becomes even more imperative. While the development of defensive capabilities offers some security against potential space threats, passive steps such as better monitoring of space activities, voluntary transparency initiatives, and clarity on the interpretation of international law help mitigate security concerns. In this regard, states could pursue substantive negotiations on space threat reduction based on the following objectives:

(a) To ensure that any risk reduction approach is not prejudicial to states' ability to develop capabilities and technologies to secure its national interests;

(b) To ensure that risk reduction approaches do not replicate or circumvent the existing legal architecture of space governance; and

(c) To seek legally-binding and non-legally-binding risk reduction measures that mitigate risks to the legal space activities of all states.

10. These objectives form the basis for the recommendations provided below.

B. Parameters for assessing recommended approaches

11. On what basis do we assess the approaches recommended here? The document assesses each approach against four parameters, which are as follows:

- **Scope and Benefits:** What are the space activities covered by the recommended approaches? And to what extent does the approach limit specific capabilities and actions? The scope of an approach or proposal varies in the spectrum of very broad and very narrow coverage of activities. Benefits from an approach are often subjective as different sets of groups perceive the objectives of risk reduction measures differently.[19] For example, some view the destructive DA-ASAT test moratorium as beneficial as it grants states the freedom to field capabilities that enhance deterrence in space.[20] Others consider the moratorium detrimental since states in the international system do not share the same views on norms of responsible behaviour.[21] Scope and benefits of an approach must therefore strike a balance between enhancing security and protecting national interests that are consistent with international law.

- **Limitations and Risks:** Do the recommended approaches eliminate major security threats in space? Are these limitations political or technical, and what are the risks that arise from these limitations? Since an agreement cannot address all issues, any approach or proposal is bound to have certain limitations. However, limitations can also arise due to other reasons, such as poorly defined terms that can lead to the risk of misinterpretation.[22] Further, an approach or proposal could also face severe limitations because of the flawed design of agreements.[23] For example, the politically contentious entry-into-force clauses can often leave a treaty in limbo for decades.[24]

- **Verifiability:** What mechanisms could be used to verify the prohibited and restricted activities in a proposed agreement? More importantly, does an approach require verification at all? Verification in arms control involves a set of actions and/or technical tools used to collect, collate and analyse information and determine the state of compliance with an agreement or treaty.[25] Verification is not just a technical process but also a political one, as the domestic preferences of individual states determine the requirements of ‘adequate’ or ‘effective’ verification.[26] Verification poses two major hurdles in the context of risk reduction in space. Since space and missile technologies are often sensitive, intrusive on-site inspections - especially in a multilateral setting - might not be acceptable to all states.[27] Further, the asymmetry in verification capabilities among states means that potential member-states must rely on unilateral verification methods to determine the state of compliance. This limits the scope of verification to a handful of member-states, placing another hurdle on verifiable multilateral treaties. Hence, a mix of cooperative transparency measures and unilateral non-intrusive monitoring could create a balanced model for verification.[28]

- **Degree of Accountability:** Is the approach or proposal acceptable to all states in international fora? Measures based on norms and principles might be widely acceptable as they do not impose binding restrictions on states. However, a non-legally-binding approach might also be highly problematic for those states who wish to impose binding measures as they fear that pure norms-based approaches are ad-hoc and might fuel an arms race even further.[29] The EU’s ICoC and the insistence on the right to self-defence were among the most contentious issues during deliberation and one reason for limiting its acceptability.[30] Concerning legally-binding instruments, the degree of accountability is contingent upon the scope of the approach and the degree of freedom it offers. The narrow scope of the PPWT, which focused exclusively on space-based weapons, meant that the treaty design severely limited its acceptability. While achieving universal acceptability is tasking, any approach or proposal must consider the positions put forward by all states and later aim to negotiate the specific provisions.

12. The table below provides a summary of the recommended approaches. The Appendix of the document provides a detailed evaluation of each approach.

Approach	Scope and Benefits	Limitations and Risks	Verifiability	Degree of Acceptability
Legally-binding ban on destructive ASAT tests	Places a legal ban on destructive testing. Ban could include only DA-ASAT tests or both direct-ascent and space-based tests. Freedom to conduct non-destructive testing and development of capabilities.	A complete legally-binding ban on debris-creating DA-ASAT testing could interfere with the testing of BMD capabilities. A pure legally-binding test ban could lull states into a sense of safety and security, and therefore, hinder the negotiations of further measures.	Debris-creation verifiable through SSA capabilities. Multilateral verification is unlikely due to asymmetry of capabilities among countries. Data-sharing SSA arrangements could mitigate the gap between asymmetry and available data.	Medium to high degree of acceptability for ban on destructive DA-ASAT testing. Low to medium degree of acceptability for ban on destructive space-based ASAT tests.
Mutual proximity notifications	The agreement to mutually notify proximity approaches of satellites helps address some concerns regarding rendezvous and proximity operations.	Effectiveness of notification agreement will depend on what states deem as a close proximity approach and timeliness of notification.. Disputes regarding proximity can also arise due to varying interpretations of data.	Detection of proximity approaches depends on two sets on capability: 1. On-board capabilities of a satellite. 2. SSA capabilities of individual states.	Low to medium degree of acceptability.
SSA data-sharing arrangement	Agreement could mandate sharing of data within a prescribed timeframe. No legal restrictions placed on testing and development of capabilities.	While an SSA data-sharing agreement could increase the overall transparency between states, meaningful risk reduction is possible only when widely-accepted standards for the processing and interpretation of data are developed. SSA data-sharing is also best utilised when used to verify other risk-reduction agreements in outer space.	Debris-creation verifiable through SSA capabilities. Multilateral verification is unlikely due to asymmetry of capabilities among states. Data-sharing arrangement could mitigate the gap between asymmetry and available data.	Medium to high degree of acceptability.
Non-legally-binding destructive ASAT tests moratorium	High degree of freedom to conduct non-destructive DA-ASAT tests. High degree of freedom to conduct non-kinetic space operations.	A norms-based test ban gives states a high degree of freedom to improve ASAT capabilities, hence, having little effect on perceived risk reduction. A norms-based and behavioural approach could lock states into a system of non-legally-binding architecture.	States can violate international norms with little consequence. No multilateral verification instrument.	Medium to high degree of acceptability.

III. Conclusion

13. A renewed interest in preserving the safety, security and space activities has given rise to the proposal to redress the threat posed by destructive DA-ASAT testing. In line with the efforts to reduce space threats through norms, rules and responsible behaviours, the test moratorium is non-legally-binding. It contains no provision that restricts the development and deployment of counterspace capabilities. The challenge ahead for states is to convert the norm-based test moratorium into a legally-binding instrument.

14. Furthermore, since there are no provisions to verify the deliberate generation of space debris or monitor close approaches, states must also advocate for greater sharing of SSA data. Finally, mutual proximity notifications can function as a bridge between the norms-based approach favoured by some states and the PPWT approach favoured by others.

Appendix

The fourth section of this document provided a summary of the recommended approaches for states to pursue in the appropriate international fora. This Appendix elaborates on each of the approaches and the requirements for their implementation. The recommended approaches are:

- Legally binding ban on destructive ASAT testing;
- Mutual proximity notifications;
- SSA data-sharing arrangement;
- Non-legally-binding ASAT test moratorium.

Approach 1: Legally-binding ban on destructive ASAT testing

The proposed approach for states to pursue is relatively straightforward. It aims to push the proposed moratorium on destructive ASAT testing into a legally-binding instrument. In essence, it requires all member-states to commit not to conduct destructive ASAT tests by signing a treaty - with or without specific verification measures.

Scope and Benefits

The proposed legally-binding test ban approach places a complete ban on testing debris-generating anti-satellite weaponry. Unlike other approaches that recommend an altitude ceiling for debris-generating ASAT tests, this proposal calls for a complete ban on all debris-generating tests in space. The approach could take shape in two forms. First, a ban only on destructive DA-ASAT tests. And second, a ban on both DA-ASATs and space-based ASATs.

The proposal does not restrict the non-destructive testing of such capabilities. These include launching interceptors into empty points in outer space or placing space-based capabilities in orbit. Further, the proposal also allows for the development, testing and deployment of BMD capabilities, which include endo-atmospheric and exo-atmospheric interceptors.[31] Since the objective is to ensure that member-states are legally bound by their non-destructive ASAT testing commitments, the recommended approach formalises the measures to foreclose the pressing concern of space debris. At the same time, the scope of the approach is narrow enough to allow states to develop capabilities in their national security interest.

Limitations and Risks

The legally-binding destructive test ban approach comes with two potential limitations or risks. The first is the test ban's possible interference with BMD interceptor testing and development. Midcourse interceptors attempt to engage incoming ballistic missiles during the longest phase of the missile's flight to the target. The notional intercept altitude for midcourse interceptors is well over 500 km above the Earth's surface and could also reach targets above 4000 km.[32] Given the high-altitude testing conditions for BMD systems, a legally-binding destructive ASAT test ban could impose indirect restrictions on BMD intercept testing. These constraints could become pronounced if countries wish to test their missile defence capabilities under realistic conditions.[33] The BMD testing problem could persist unless states agree to define an ASAT test.

The second limitation arises from the fact that the legally-binding destructive ASAT test ban approach limits specific behaviours of states but does not control for capabilities. This is indeed by design, as member-states could thwart any attempt to control capabilities at the multilateral level of discussions. Therefore, seeking a legally-binding treaty could come with two secondary effects. First, states could be lulled into a false sense of safety and security as they come to believe that the ban or limits on destructive ASAT tests will foreclose the most pressing threat to space sustainability.[34] Since the effort to jump from soft law to a legally-binding instrument is itself a strenuous effort, states may also be reluctant to negotiate further measures to address the threats in outer space. Second, the signing of a legally binding detective ASAT test ban agreement also comes with a risk of triggering a stimulating effect, where states redirect resources to develop and deploy new counterspace capabilities so as to avoid being locked into agreements that could curtail their capabilities in the future.[35]

Verifiability

The verification and monitoring of a destructive ASAT test ban involve an assortment of processes and techniques. The requirements for verifying DA-ASAT tests and space-based ASAT tests, for example, utilise two different sets of approaches - where the technologies required for verification are accessible to states markedly disproportionate.

Monitoring and verifying a DA-ASAT destructive test ban involves two separate elements:

Launch detection: States must be able to verify the launch of a missile or space launch vehicle from any point on the Earth's surface. Traditionally, missile and space launches are detected globally using satellites that detect the infrared signatures of launches. These early-warning satellites are deployed in geostationary orbits (GEO) or highly elliptical orbits (HEO) as part of a state's nuclear command-and-control infrastructure.[36] Due to their nature of operations, therefore, the data gathered by the early-warning satellites are kept secret. Moreover, since missile early-warning satellites require enormous investment in their research and development, access to space-based launch detection technology is inaccessible to most states. Hence, launch detection-based verification could either be unilateral or stipulated by a multilateral-level agreement to exchange space launch data.[37] Alternatively, states could tap into novel methods such as acoustic, infrasound and ionospheric detection to monitor and verify space launches on a multilateral scale.[38] In recent years, infrasound detection has proven particularly useful in detecting a wide variety of launches using existing infrasound sensors in the Comprehensive Test Ban Treaty Organisation's (CTBTO) International Monitoring System (IMS).[39] While such novel approaches are technologically attractive and feasible, their adoption will prove politically challenging in the near future.

Debris detection: States must be able to detect the debris created by the collision of the interceptor's kill vehicle and a satellite in orbit. Currently, states use SSA capabilities to monitor satellite activities, track space debris and assess the potential for collision between objects in space. SSA capabilities include a wide range of radars, electro-optical telescopes and space-based satellites used for both civilian and military purposes.[40] In order to verify a state's destructive ASAT test ban commitments, SSA assets must accurately detect the creation of debris after a kill-vehicle has hit the target satellite. The data gathered from the SSA assets must also distinguish a destructive ASAT test from the collision of two objects to avoid false positives or false negatives to avoid misattribution. Much like the technologies required for detecting space launches, SSA capabilities are also disparately distributed between states, complicating the possibility of multilateral verification.[41] However, the rise of hobbyist satellite tracking and the private SSA industry opens the potential for open verification of an ASAT test ban.

The verification process for a destructive space-based ASAT test ban regime also consists of two elements. As discussed above, the ability to detect the deliberate creation of space debris is an essential element of any destructive test-ban regime in space. In addition, a space-based destructive test ban agreement also requires member-states to accurately attribute the cause of debris creation to a space-based weapon. Classifying a satellite as a space-based weapon is not possible through SSA capabilities and requires more intrusive methods, such as a visual attribution from an inspector satellite.[42] While states use inspector satellites regularly for reconnaissance purposes,[43] their wide-scale adoption in a multilateral setting will prove politically contentious, as member-states could disagree on how best to describe a space-based ASAT and differentiate it from on-orbit servicing (OOS) satellites.[44]

Degree of Acceptability

Since legally-binding agreements, to some extent, tie the hands of member-states, their degree of acceptability might not be as wide-ranging as a non-legally-binding commitment. The degree of acceptability for a destructive DA-ASAT test ban could be medium to high, depending on the definition of a DA-ASAT and the model of verification. A unilateral verification model could bring with it a high degree of acceptance.

For a degree of acceptability for a space-based ASAT is, at best, medium. As discussed above, defining what constitutes a space-based weapon is the greatest hurdle to such an agreement. Since countries have yet to demonstrate consensus on whether OOS capabilities pose a genuine threat to space security, building consensus on the threat posed by destructive space-based capabilities also seems unlikely.

Approach 2: Mutual proximity notifications

The proposed approach calls for member-states to mutually notify one another if one state's registered satellite is in the same altitude, orbital plane, phase or at close distance to the registered satellite of another state.[45]

In order to understand the working of such an arrangement, consider two satellite operators, Operator-A and Operator-B, operating Satellite-A and Satellite-B, respectively. If Operator-A notices that Satellite-B is approaching unusually close to Satellite-A, then Operator-A can notify Operator-B of the proximity of their satellite (Satellite-B). Alternatively, if Operator-B wishes to undertake a series of manoeuvres which might be considered eccentric or in proximity to Satellite-A, then Operator-B can choose to notify Operator-A of such manoeuvres.

The proposed approach could take the form of a non-legally-binding TCBM and eventually be adopted as a legally-binding instrument.

Scope and Benefits

The scope of the proposed approach is strictly limited to notifying member-states of close approaches. The approach does not place any restrictions on the space operations of member-state. Unlike other proposals that call for keep-out zones, safety zones and warning zones, this approach aims to place the onus of notification on member-states without triggering fears of military confrontation.[46]

Having a mutual proximity notification arrangement has two important benefits. First, voluntary notifications strengthen the duty of due regard of member-states, which constitute an essential pillar of existing outer space legal instruments.[47] Second, the approach allows states to have open lines of communication to clarify the intention behind satellite manoeuvres to avoid any misperception regarding space activities and potentially avoid accidents and inadvertent escalations.

Finally, mutual proximity notifications could also help address the potential threat and risks posed by cooperative and noncooperative rendezvous and proximity operations (RPO) satellites. Since the mutual notifications arrangement does not restrict any form of close approaches of satellites, member-states are only required to acknowledge the presence of the satellite in proximity. Such notifications help identify and acknowledge potential threats while leaving the onus of response on states or satellite operators.

Limitations and Risks

The proposed approach comes with two potential shortcomings. First, for any proximity notification arrangement to be successful, states must agree on the conditions that constitute proximity between satellites and the timeliness of the notification. Agreeing on proximate distances is both a political question and a technical one. Satellites perform RPOs in two ways. One, a satellite must change its relative position with respect to its target by performing a series of manoeuvres that involve increasing or lowering the satellite orbit.[48] This form of RPO is relatively slow and, therefore, simple to identify due to the eccentric behaviour of a satellite.[49] Two, a satellite can also change its orbital plane or altitude within the same orbital plane. With enough change in velocity (Δv), a satellite could carry out such manoeuvres quickly.[50] In such cases, the distance between satellites matters less, and the detection of a satellite's Δv and the timeliness of the notification become more significant.[51] Hence, disagreement on a measure of proximity between satellites and the timeliness of notification could leave the mutual notifications arrangement completely ineffective in addressing space threats.

The second limitation arises from the possibility of misinterpretation of SSA data. As mentioned previously, states monitor activities in space through the use of SSA capabilities. Due to the equal distribution of these capabilities, some states may have more data to work with than others. Further, assuming that all parties are operating in good faith, states may also have varying standards of collating and processing data, opening the door for technical misinterpretation and derailing timely notifications.[52] Asymmetries in standards and technologies, therefore, could limit the extent to which a mutual proximity notifications arrangement can be effective.

Verifiability

Since the proposed mutual proximity notifications arrangement does not ban or restrict any form of space activity, the approach does not require any form of verification. However, states must possess some form of SSA capability in order to confidently monitor and identify RPO activities and changes in a satellite's behaviour.

Ideally, a mutual proximity notifications arrangement could function through unilateral verification methods, whereby the SSA assets — which include ground-based, space-based and on-board satellite capabilities — could be labelled as national technical means of verification. As mentioned above, the success of mutual proximity notifications is contingent upon the degree to which states can accurately identify changes in a satellite's behaviour. Therefore, verifying satellites' behaviours is limited to only a few states. However, if states agree to a multilateral SSA data-sharing regime, mutual proximity notifications could become widely acceptable.

Degree of Acceptability

Since the technology required to monitor activities in space is within the possession of only a small number of states, the degree of acceptability of mutual proximity notifications is low within UN member-states. Moreover, even if the arrangement is confined to space-faring nations, the degree of acceptability will likely be low as states might be reluctant to disclose highly secretive national security RPO operations, especially among states which are seen as non-friendly.

Approach 3: SSA data-sharing arrangement

A space situational awareness data-sharing arrangement aims to promote transparency and confidence-building in outer space.[53] The approach calls for states to share SSA data to increase the overall knowledge and picture of the space environment. The proposed approach is consistent with the Guidelines on Long-Term Sustainability (LTS Guidelines), which calls for the promotion, dissemination and sharing of orbital and space debris monitoring information.[54]

Scope and Benefits

The recommended approach advocates for states to explore the sharing of SSA data through a variety of data-exchange models. Given the disparity in capabilities between states, no single data-sharing model fits all use cases.[55] Hence, states must negotiate and update different types of arrangements depending on the political and technological feasibility.

An SSA data-sharing arrangement is open-ended and does not place any form of restrictions on the behaviours or capabilities of states. Instead, states can use the shared data for a variety of purposes, including space traffic management and monitoring of satellite RPOs. The broad scope of the approach means that SSA data-sharing can promote both space safety and space security,[56] thus bridging the divide that currently exists between UN member-states who call for the separation of space sustainability issues from those related to space threats.

The approach could also help establish a regime that provides a full picture of the space environment. Currently, the United States has the largest SSA network in the world, utilising both civilian and military assets.[57] Through several bilateral agreements with allies and partners, the United States has also expanded its coverage of the space environment to the Southern Hemisphere.[58] However, despite the expansive coverage, the United States network still has gaps. Therefore, the cooperative multilateral SSA data-sharing not only helps fill the knowledge gap of the Earth's orbits, but it could help less technologically-capable states to have the same level of access to data as the advanced states. The data gathered from commercial SSA capabilities could also complement state-owned capabilities to provide new and innovative solutions for SSA data processing and visualisation.[59]

Limitations and Risks

Space Situational Awareness data-sharing could be of limited use if states do not develop common standards for assessing, interpreting and processing data gathered by various SSA capabilities.[60] The SSA data interpretation problem is not uncommon, as it persists even among allied states.[61] The impediments to developing a common operational picture could arise from two factors. First, since SSA is predominantly a national security tool, the data gathered could be considered too sensitive for wide dissemination.[62] Second, cooperative SSA might require states to set up an independent international body to collect, process, secure and disseminate data.[63] However, setting up such a formal organisation might be viewed as a step too far for some states. A bottom-up approach to resolving the technical issues behind SSA data-sharing could mitigate the risk of data misinterpretation.[64]

The proposed SSA data-sharing approach will also be ineffective if states do not use the data as risk reduction tools. While SSA is indeed a tool for transparency, sharing SSA data does not automatically reduce risks and threats in space. Hence, states must view SSA data-sharing as complementary to other risk reduction measures, such as an ASAT test ban or mutual proximity notifications agreement.

Verifiability

The verification of SSA data does not work in the same way as used to assess other approaches. Since SSA is itself a tool for verification, the authentication and cross-verification of shared data take prominence. Since the accuracy and authenticity of data is a key pillar of an SSA data-sharing agreement, verifying the accuracy of shared data is all the more important for parties to maintain trust within the agreement.[65] The comparison of data points from various sensors functions as one method of verifying the accuracy and authenticity of shared data.

Degree of Acceptability

An SSA data-sharing agreement could garner a medium to a high degree of acceptance if states find an arrangement that is non-discriminatory and equally beneficial to all actors in space.

SSA-data sharing as a stand-alone agreement might attract a high degree of acceptability if all space-faring and SSA-capable states choose to be party to the data-sharing agreement and distribute and disseminate the agreed data to all member-states. However, acceptability could fall in two ways: one, it fails to bring together all space-faring nations; two, SSA data-sharing is bundled as part of a controversial risk reduction measure.

Approach 4: Non-legally-binding destructive ASAT test moratorium

The norm-based ASAT test moratorium aims to take forward the ongoing efforts to promote norms, principles and rules of responsible behaviour. The destructive DA-ASAT test moratorium, for example, could be widely adopted to strengthen the norm of non-destructive testing in outer space.

Scope and Benefits

As discussed in the second section, the scope of a non-legally-binding destructive ASAT test moratorium is extremely narrow. States declare their unilateral commitments not to conduct destructive debris-creating ASAT tests. Under this approach, states maintain a high degree of freedom to conduct non-destructive ASAT and BMD tests.

Non-legally-binding commitments also allow states to overcome the domestic impediments created by legally-binding instruments. Since the ratification of treaties is one of the greatest hurdles to arms control in some states,[66] non-legally-binding commitments offer states to take forward the best practices in outer space without creating roadblocks to their adoption.

Limitations and Risks

Even if a majority of states accept non-legally-binding measures, such as a moratorium on ASAT testing, states who wish to test ASATs will break in norms in any case. Therefore, the effectiveness of the non-legally-binding approach is limited.

Also, non-legally-binding instruments could become impediments to negotiating legally-binding instruments. Since non-legally-binding measures offer states a high degree of freedom to operate in space, those states with high stakes in maintaining counterspace capabilities could refuse to participate in negotiations that hinder their freedom to develop or deploy counterspace capabilities.

Verifiability

Non-legally-binding instruments do not require verification measures. However, states can unilaterally monitor and verify activities in outer space. The data gathered from unilateral capabilities can also be made available to the public to induce responsible behaviour.

Degree of Acceptability

A non-legally-binding measure such as the destructive DA-ASAT test moratorium could garner a high degree of acceptance. The UN resolution on destructive DA-ASAT testing, for example, gained 155 votes of member states in favour.

More importantly, non-legally-binding measures do not require states to make explicit public commitments. A state could adhere to normative commitments without ever making public statements.

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