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The Realities of Middle Power Space Reliance

Daniel Golston with Ben Baseley-Walker

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Foreword

The world is becoming increasingly dependent on space-based services and the space domain, with wide-ranging applications including telecommunications, Earth observation, satellite navigation and weather forecasting. As such, it is clear that any destabilization of the space environment and disruption to space-based services has the potential to cause far-reaching impacts in nearly all States around the world.

Considering the conclusions of the 2013 Group of Governmental Experts on Transparency and Confidence-Building Measures for Outer Space Activities, the work of the Conference on Disarmament on the Prevention of an Arms Race in Outer Space and various United Nations General Assembly resolutions on the prevention of instability in outer space, it is evident that the international peace and security implications of space activities are of growing importance, and topics space “middle powers” must continue to follow.

I am delighted that UNIDIR is publishing *The Realities of Middle Power Space Reliance*. This strategic analysis is aimed at helping governments and other relevant actors to prepare and structure their thinking and decision-making as they continue to develop policy in this complex and interconnected arena.

This project builds on decades of work on outer space security at UNIDIR. Our current work has an emphasis on the future sustainability of the space domain, and the particular facets that could act as triggers for conflict or could threaten socioeconomic development.

In this vein, UNIDIR aims to continue providing forward-thinking policy analysis and tools with which the international community can more effectively tackle emerging challenges to space security over the coming years.

Jarmo Sareva
Director
UNIDIR

About the authors

Daniel Golston is an analyst with the Emerging Security Threats Programme at UNIDIR. Mr. Golston has worked across the range of issues covered by the Emerging Security Threats Programme. He graduated from the University of British Columbia in Canada.

Ben Baseley-Walker is Programme Lead of the Emerging Security Threats Programme at UNIDIR. Mr. Baseley-Walker has led the programme since 2011, with particular expertise in the topics of outer space and cyberspace, and with developing key conceptual frameworks on emerging issues. He studied at the University of Edinburgh, the Universiteit van Amsterdam, and the International Space University.

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1. Introduction

Space Middle Powers are uniquely reliant on space-based services outside their direct national control; this reliance combined with the fragility of and lack of stability in the space domain lead to a series of key vulnerabilities that need to be addressed and managed.

Today's space domain is increasingly complex. As more and more actors become invested in space assets and services, the management of man-made risks is becoming more challenging. One of the groups that is most exposed to such risks are those States that are highly space dependent yet have not traditionally played a central or direct role in exploiting space resources and do not fully control all elements of the full life cycle of assets that they rely on. For the purposes of this paper, these are being defined as Space Middle Powers.

It is clear that space can provide significant benefits to nearly every facet of society from telecommunication technology for use by civilian and military communities, weather forecasting for aviation and agricultural purposes, to disaster monitoring and management. However, independent and autonomous access to the space domain for Space Middle Powers is limited due to costs and other domestic factors. At the same time, such States continue to increase their reliance on foreign service providers for space resources, which carries with it implications for national interests and equities, specifically national security. The potential for instability in the space domain caused by human activity, the increase in space-faring entities, and the reliance of Space Middle Powers on other States all combine to create an urgent need for a concerted assessment of how these factors affect national interests and objectives, both in the terrestrial and space domains.

This research study seeks to provide Space Middle Powers with a strategic, security-focused overview of the considerations and options available to them in order to best position themselves for securing long-term sustainable access to space-based services. This study first establishes the problematic and provides key definitions and research methodologies, followed by the provision of a SWOT analysis which will outline key considerations for Middle Powers seeking to explore courses of action on how to secure long-term access to space-based services. The following section explores the ways in which Middle Powers can and should interact with external partners and the international community on space issues and the final section details the way ahead for Middle Powers in the space domain and offers recommendations for how these States can best position themselves for maximal benefit from and secure access to the space domain.

1.1 Background

The brief history of human activity in the space domain, and the increase in space-faring actors, provide a backdrop to the current realities of space engagement for

smaller space-enabled States. This is often defined by an increased level of reliance on others and associated implications. In 1957, the Union of Soviet Socialist Republics successfully launched the first satellite into orbit, Sputnik 1. At this time, there were only two entities, the United States of America and the Soviet Union, capable of exploring the cosmos and utilizing it to advance national and international security objectives. Since that era, there has been a significant growth in the number of space-faring entities: over 60 States and private actors are currently active in the space domain.¹ However, few can compare with the extended history of established space-faring nations such as the United States and the Russian Federation, nor the enormity of their national space budgets. This means that throughout the utilization of space-based assets, most States will at some point rely on the technologies or services of another space-faring nation. In one way, this establishes and develops important linkages between States in the space domain that enables all to benefit from the combined pool of resources and expertise, much more than if each nation were to pursue unilateral space activities. However, from the security perspective, this interconnection connotes a sense of reliance which, in times of crisis or instability, can devolve into a vulnerability. Additionally, as the space environment becomes increasingly congested, the risks to spacecraft, and consequently space services, are growing. States are now increasingly obliged to work towards developing global solutions to address such risks.

1.2 Definition of Terms

1.2.1 Space Middle Powers

“Middle Powers are states that are neither great nor small in terms of international power, capacity and influence, and demonstrate a propensity to promote cohesion and stability in the world system.”²

For the purposes of this study, the term Space Middle Powers is used to identify States at a specific point in the trajectory of their engagement with the space domain: post-“emerging space-faring nation” status yet not wholly autonomous. The term Middle Power manifests in various incarnations throughout literature on international relations and political science.³ In determining the parameters of a Middle Power in the space domain, existing literature was reviewed, which contributed to a working framework for identifying such States. Applied to the space domain, three overarching characteristics emerge which, when combined, set Middle Powers apart from States that are established or emerging space powers:⁴

1 General Assembly, *Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities*, UN document A/68/189, 29 July 2013, p. 4.

2 E. Jordaan, “The Concept of a Middle Power in International Relations: Distinguishing between Emerging and Traditional Middle Powers”, *Politikon*, vol. 30, no. 2, 2003, p. 165.

3 For various examples, see “The Middle Powers Initiative for Nuclear Disarmament”, www.middlepowers.org/about.html; and K. Sung-han, Vice Minister of Foreign Affairs and Trade, *Global Governance and Middle Powers: South Korea’s Role in the G20*, Council on Foreign Relations, February 2012.

4 Levels of space capabilities can be viewed as a continuum. Such a continuum could be broadly broken down into several key groupings. At one extreme are future or aspiring space States that do not yet heavily rely on space assets or space services, followed by emerging space States (those which have placed a focus on increasing their access to space-based services or are developing indigenous capability but are limited in their ability to immediately achieve this due to financial, technological or other capacity constraints), Space Middle powers (which is explained in more detail in this paper), and established space States—i.e. States which have a long history in the exploring and shaping the space domain, are heavily

1. A Middle Power in the space domain is highly reliant on space-based services, with limited autonomy in space activities.

The benefits from space-based services have the potential to revolutionize nearly every facet of society from agriculture to resource extraction from telecommunications to banking. Through their wealth and technological advancement, Middle Powers have already harnessed this potential and benefited greatly. Governments have acknowledged these benefits and enacted policies that facilitate access to and continued utilization of space-based services which provide national benefit.

However, many Middle Powers experience limited autonomy in their access to space. The simple solution to this would be for a State to become fully autonomous and vertically integrated in their space activities—meaning pursuing the technology to build, launch, monitor, operate, troubleshoot and decommission relevant infrastructure to ensure sustained and independent access to this service. However, the costs of a vertically integrated space programme are often unaffordable or unpalatable to many States. As such, reliance on the wider space-faring community for the provision of space services in the short to medium term is a defining characteristic of Middle Powers.

2. A Middle Power in the space domain enjoys a high level of economic resources.

A key feature of Space Middle Powers is the ability to bring significant economic resources to bear, at both the governmental and civilian levels, to acquire space assets or services. This paper focuses on States that have the ability to make and execute strategic choices in the space domain without being severely confined by financial considerations.

3. A Middle Power in the space domain will have a substantial, established global diplomatic presence (on all diplomatic matters, not necessarily space matters) and a respected opinion on the international stage.

It has been suggested that Middle Powers involve themselves in multilateral processes not solely to promote unilateral policies but as a result of an acknowledgement of their need for “global stability, controllability and predictability”.⁵ The degree to which a State engages with multilateral discussions on many policies can reflect their stake or interest in the conversation; it can also reflect a State’s understanding of their agency in driving such discussions. For example, major space States are often able to influence a given outcome in a particular process, given their experience and their significant diplomatic reach. They have various tools and levers of power at their disposal to achieve specific outcomes including leveraging existing or potential economic, political and military partnerships to build consensus or allies. However, by and large other powers are unable to achieve similar results unilaterally. The unique position of Middle Powers—States with significant diplomatic capabilities—allows them to take leadership in supporting international legal processes

space reliant and often have access to independent launch capabilities. This categorization is not definitive but rather designed to give a broad overview of the purposes of examining group similarities, needs and equities.

5 E. Jordaan, “The Concept of a Middle Power in International Relations: Distinguishing between Emerging and Traditional Middle Powers”, *Politikon*, vol. 30, no. 2, 2003, pp. 166–167.

and international organizations as a means of pursuing stability in the global system, and consequently mitigating threats to their national equities.⁶ For this reason, Middle Powers often have an investment in acting as a bridge-builder or metaphorical peacemaker on specific issues as they have an investment in a functioning international system which arrives at equitable solutions and allows various voices to be present. Combined with their established diplomatic presence, this last component often draws respect from a broad range of States.

The above characteristics are not exhaustive but provide the general framework used by UNIDIR to identify relevant States and to target analyses.

1.2.2 Space Security

This research study focuses on the strategic options available to Middle Powers as regards ensuring long-term access to space-based services, with a focus on space security. The explicit focus on space security requires an explanation of how space security itself is conceptualized. This is expressed succinctly by Bruce W. MacDonald:

The core of the space security problem is that the substantial economic and national security benefits that space assets provide is accompanied by their substantial vulnerability to both natural and man-made threats.⁷

As each State utilizes space-based services differently, space security is thus conceptualized differently by each State. It can be influenced by national and international security objectives, national usage of space-based services, economic benefits from national space industries, presence of a sustainability strategy for securing long-term access to space, traditional military doctrine, and so on.

The definition of space security itself is a frequently debated topic within multilateral forums, and often it is erroneously used interchangeably with space safety. For the purposes of this study, a conceptual line was drawn between space security and safety on the basis of intent.

In general, efforts aimed at ensuring **space safety** pertain to activities which seek to limit *unintended* incidents in space which may damage the overall stability of a State or the world's access to space-based services; an example would be ensuring compliance and adherence to the United Nations Space Debris Mitigation Guidelines (henceforth referred to as the Space Debris Mitigation Guidelines) to limit the risk of unintentional collisions of space-based assets with one another or with space debris.⁸ Though the focus of this study is on space security not safety, in ensuring long-term sustainable access to space-based services, comments will be made on how such States can engage with relevant space safety processes and procedures.

In contrast to space safety strategies, efforts aimed at ensuring **space security** pertain to activities which seek to limit *intentional* incidents in space which may damage the overall stability of a State or the world's access to space-based services; an example

6 Ibid., p. 169.

7 "Steps to Strategic Security and Stability in Space", *Disarmament Forum*, UNIDIR, no. 4, 2009, p. 18.

8 For more information, see www.iadc-online.org/References/Docu/Space_Debris_Mitigation_Guidelines_COPIOS.pdf.

would be seeking clarified norms for State behaviour such as appropriate responses to intentional satellite interference, and established conflict escalation controls.

1.3 Methodology

Researchers at UNIDIR conducted a qualitative analysis of actions and policies of Middle Powers in the space domain, focusing on three aspects:

- ***Comportment in the Space Domain***: research focused on the ways in which Middle Powers operate in and engage with other actors in the space domain, with particular attention paid to involvement in space security efforts.
- ***National Policymaking Trajectory and Process***: national policies on space exploration and utilization were examined as well as any systemic changes that may have indicated a shift in national approach or understanding of a given subtopic in the space domain.
- ***National Concept of Reliance***: researchers conducted an analysis of current national policies and objectives in space in order to extrapolate a national concept of reliance.

By focusing on both domestic and international activity in the space domain, the research was able to clearly identify common concerns and opportunities for Middle Powers as they engage with the space-faring community.

1.4 Envisaged Outcomes

The goal of this study is to provide a replicable and implementable framework for conceptualizing available options on national strategic positioning that can be applied by diverse national governments and their disparate structures. It is envisaged that Middle Powers, and to a lesser degree any space-faring nation, will obtain a unique perspective on their usage and positioning through the analysis provided in this study. States will then be able to integrate this information into their strategic thinking.

1.5 The Value of this Study to the Space Community

A fundamental goal of UNIDIR is to support pragmatic, informed participation in its respective fields of work. In the context of the space security portfolio, this translates to engaging space-faring nations, emerging and established powers alike, in innovative and critical thinking on how they can situate themselves to contribute to and benefit from a collaborative, productive and secure space domain.

2. Strategic Outlook for Middle Powers in the Space Domain

In the space domain, strategic decisions for Middle Powers are a balancing act based on a multitude of factors which are larger in number than for States with autonomous space access. Among the tools available to Middle Powers are those which can be employed to secure their interests and to pursue their objectives. In this regard, it is important that States understand how their interests and objectives relate to such levers, and how and when best to employ them.

When Middle Powers undertake the exercise of setting objectives on space matters, it involves a consideration of national equities, strategy in the space domain and overall national direction. Domestically, strategic decisions on space activity are made based on a variety of motivations and national equities such as economic incentive, national prestige, workforce development, and national and international security objectives. At the policy level, these motivations can manifest as R&D for peaceful purposes or for military applications, fostering a civil commercial space industry, concluding international partnerships, securing independent access to specific space-based services, and engaging in multilateral processes seeking to govern State activity in the space domain. These policies, and the motivations behind them, bolster Middle Power space-related objectives and provide direction for the State in its space activity.

During the establishment of national objectives in the space domain, all Middle Powers will encounter the issue of reliance on foreign providers for space-based services, and the need to integrate this into national strategic thinking. It is therefore beneficial to understand the notion of reliance and how this augments the policymaking process. In principle, reliance can be understood as the acknowledgement of what a given State has deemed necessary—a need often defined through a policy objective. This need results in a recognition of what a State is willing to exchange in order to achieve the aforementioned need. The issue of reliance may therefore become an integral part of Middle Power strategic thinking on all matters pertaining to the securing of long-term access to space-based services.

The process of integrating the issue of reliance into national policymaking and external action is a challenging prospect which often does not occur in a coordinated fashion. However the close examination of this process is imperative for any State reliant on others in the space domain as the loss of access to space-based services can destabilize many key industries and have wide-reaching impacts on society and national security. As such, this section includes a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis which explores one central question: how are Middle Powers able to engage with the space domain, domestically and internationally, in an effort to secure optimal, long-term sustainable access to space-based services? The question of “ability” will be explored through the inherent characteristics that come with their status as a space Middle Power, in other words, their strengths and weaknesses. Beyond that, there needs to be a consideration of the situational realities of that engagement with the space domain, namely the opportunities and threats.

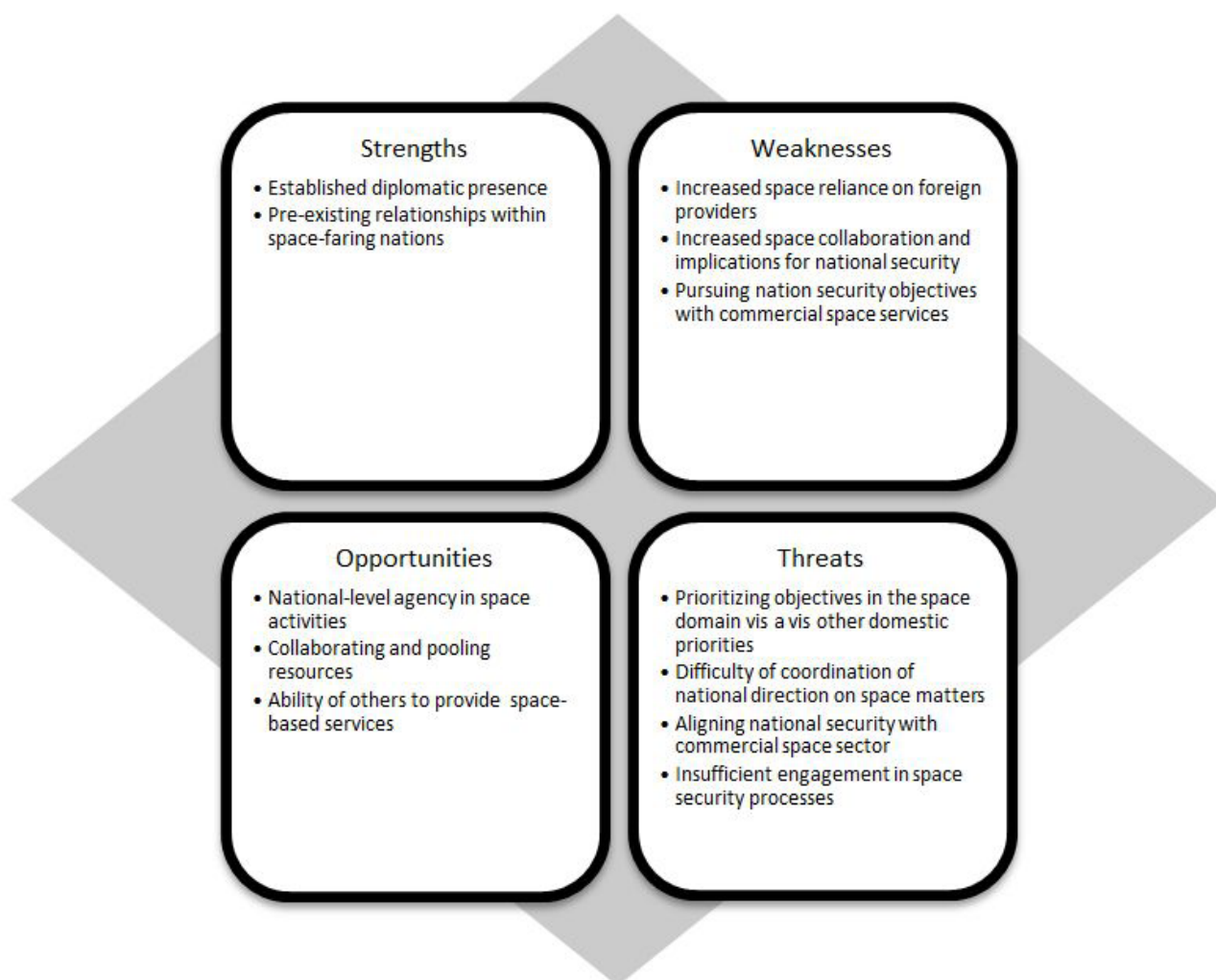
Below is a description of each SWOT category and how it manifests in the space domain:

- **Strengths** can be understood as characteristics that inherently provide the State with a position that is ripe for securing and sustaining long-term access to space-based services. Middle Powers have at their disposal a wide range of levers of power for interacting and engaging the global space community in a constructive and productive manner. Fundamentally, a Middle Power's strength, in this analysis, comes from its established diplomatic presence and respected opinion on the international stage, access to a pre-existing network of space providers, and economic power.
- **Weaknesses** can be understood as characteristics that limit or restrict a State's ability to secure access to space-based services. It is often noted that a fundamental weakness of a Middle Power, in any domain, is their status as a policytaker rather than a policymaker—meaning they have limited ability to influence global policy development on issues that may be central to their national objectives or activities. In the space domain, this reality manifests as an inability to directly control or dictate the direction of international dialogue on key space matters. Additionally, the limited size of a Middle Power, which can lead to substantial reliance on foreign providers for space-based services, and the possible need to collaborate with others on matters of national security, can be seen as weaknesses.
- **Opportunities** can be understood as realities Middle Powers experience that can be maximized or better utilized to increase overall benefit to the State as regards securing long-term access to space-based services. Reliance on other States for the provision of space-based services includes increased engagement with other space-faring nations on a technical and political level. This provides Middle Powers with an opportunity to strategically shape those engagements to advance national objectives. It is important to note that many of the weaknesses described in the previous bullet can also be counted as latent opportunities for a Middle Power in the space domain, if appropriate strategic thinking and positioning is applied.
- **Threats** can be understood as factors that can endanger or limit the success of securing long-term access to space-based services. These add weight to particular strategic decision-making processes as they highlight gaps in space security efforts. Such threats are particularly pertinent for Middle Powers because they are still in the process of developing coordinated and cohesive strategies for engagement with the space domain yet are already reliant on the domain itself. As such, issues can range from the inability to effectively coordinate national strategic direction on space matters domestically which can threaten effective responses to space security emergencies, to not engaging with multilateral processes on space debris mitigation or space security which can, if not properly managed, endanger global access to space.

Dividing Middle Power decision-making into a SWOT analysis illustrates the complex web of concerns, capabilities and issues that must be considered and addressed as Middle Powers continue their engagement with the space domain. It is envisaged that this analysis will provide targeted thinking for such States seeking a greater

understanding of the options available to them and the pitfalls they may encounter along the way.

A Middle Powers SWOT Analysis



2.1 Strengths

In the international business that is the space domain, Middle Powers enjoy various strengths which can be utilized in pursuit of securing access to space-based services—these are a respected international opinion on the international stage combined with an established diplomatic presence, pre-existing relationships with space-faring nations, and a high level of economic resource.

2.1.1 Respected Opinion on the International Stage Combined with an Established Diplomatic Presence

Middle Powers have an established diplomatic presence on the international stage on a range of issues, not only on space matters, which enables them to influence the tide of multilateral affairs. Additionally, as diplomatically engaged States, the positions of Middle Powers can carry political weight which enables them to express their national objectives and vision for the international system with the attention of

the international community. Through diplomatic interactions, Middle Powers engage the international community, express their national positions and perspectives, and strategically influence the development of relevant processes—all of which are done at a level higher than their size may suggest was possible. For example, as end-users of space-based services concerned with the security and long-term sustainability of such services, many Middle Powers have leveraged their diplomatic presence and valued opinion to push international dialogue in a constructive and collaborative direction. The creative exploitation of this inherent characteristic of a Middle Power underpins many of their strategic decisions and, in essence, allows them to “punch above their weight”.

2.1.2 Pre-existing Relationships with Space-faring Nations

As part of the core definition of a space Middle Power, a key component is an often high degree of reliance on space-based services provided by entities outside of their domestic control. Such reliance engenders established existing relationships with foreign service providers, thereby giving space Middle Powers a potential advantage should they decide to increase their level of access to such services. In addition, the strength of a pre-existing relationships with established space-faring nations is that it is both easier and potentially faster to engage a State with which one has a previous history than to begin with a clean slate. This is a notable asset in conversations on security policies and concerns that can often require pre-existing trust and confidence between partners. Following this logic, Middle Powers are already intertwined in the international business of the space domain and therefore have a higher likelihood of gaining traction and achieving objectives.

2.2 Weaknesses

Inherent in the position of a Middle Power in the space domain is their reliance on and need to collaborate with foreign providers for space-based services, which can devolve into a weakness and vulnerability as this reliance increases, specifically within the context of national security.

2.2.1 Increased Space Reliance

Increased space reliance implies a greater usage of space-based services outside of one’s national control which can limit one’s ability to ensure the security of such services. The general risk of increased space reliance for any State is a consideration that must be calculated in conjunction with the perceived benefits that such reliance provides. Access to space-based services in the short-, medium- and long-term are not constants in a given equation, they are variables subject to change based on, among other things, varying levels of space debris and related costs of insuring space-based assets, natural hazards, cyberthreats to space-based assets (such as satellite interference, denials of service, hacking or spoofing), or instability in the space domain which creates a period of sustained loss of access to space-based services. In short, the more a State utilizes services with a space-based component to advance national objectives, the greater the reliance and therefore the risk of heightened vulnerability in the event such services become temporarily or permanently inaccessible.

2.2.2 Increased Collaboration as Regards National Security

Increased space collaboration, particularly on matters of national security, can endanger specific aspects of national security which include a space-based component outside of national control. Space-based services are frequently incorporated into the operations of a State's military through applications ranging from surveillance, data collection, reconnaissance, navigation, communications, operations planning, to tactical weapons delivery. The proliferation of these services throughout military operations ensures rapid communication and response to issues as they develop across a given State's territory and abroad. While section 2.2.1 flagged the risk of overall increased reliance on any given State or consortium of States, this section highlights the risk of increased collaboration with other States and how this may expose sensitive information on national security. Navigating a partnership between two space-faring nations while still maintaining necessary confidentiality can be challenging if one State is reliant on another for sensitive data that relates directly to matters of national security.

2.2.3 Pursuing National Security Objectives with Commercial Space-Based Services

Many Middle Powers actively pursue national security objectives through space-based services which allows them to "share" the full cost of such programmes with commercial space providers. However from the security perspective, this creates an inherent weakness as the State does not have complete control or authority over a facet of their national security. One of the largest actors in space, the United States, has a series of programmes and systems that are used solely by the military to achieve security objectives such as the five Defense Support Program (DSP) satellites which constitute the Satellite Early Warning System⁹ (SEWS) for intercontinental ballistic missile launches.¹⁰ As part of SEWS, there are five satellites that cost an estimated USD 400,000,000 each.¹¹ For many Middle Powers, the financial burden of dedicated military systems may be beyond their means, even if it could significantly contribute to security objectives. However, the civilian commercial space sector may be able to share the financial burden as commercial operators may be pursuing or have already achieved a technology that advances given security objectives—for example, a case where a State obtains remote-sensing data from a commercial source that contributes to military operations.¹² The military was not required to develop and launch a dedicated satellite with remote-sensing capabilities, instead it purchased the information from a commercial provider at a substantially lower cost. However, there is an inherent risk in relying on services outside of government space programmes. Not only is the risk in not having long-term access to this data but there also exists a risk of this data being obtained for nefarious purposes by other actors.

9 "DSP Satellites: Supporting America's Early Warning System", *Defense Industry Daily*, 22 July 2014, www.defenseindustrydaily.com/dsp-satellites-supporting-americas-earlywarning-system-02650.

10 United States Air Force, "Defense Support Program (DSP) Satellites", 2014, www.losangeles.af.mil/library/factsheets/factsheet_print.asp?fsID=5323&page=1.

11 "DSP Satellites: Supporting America's Early Warning System", *Defense Industry Daily*, 22 July 2014, www.defenseindustrydaily.com/dsp-satellites-supporting-americas-earlywarning-system-02650.

12 See, for example, Charles V. Peña, "U.S. Commercial Space Programs: Future Priorities and Implications for National Security", Center for Nonproliferation Studies Occasional Papers, 2002, no. 10, p. 10.

2.3 Opportunities

Middle Powers are unable or unwilling to secure autonomous access to space-based services in the short- and medium term. This may lead to opportunities for such States to strategically position themselves in the space-faring community in an effort to maximize and secure long-term access to such services.

2.3.1 National-Level Agency

The long trajectory of space exploration means that Middle Powers are able to strategically engage with the space domain at a relatively low cost. For more than six decades, States have been developing and improving space technologies. This means that a Middle, or emerging, Power can increase their strategic engagement in the space domain at a fraction of the historical cost of R&D and exploration. States can capitalize on this by determining the best angle for entry or exploitation based on national objectives and degree of technological advancement. As a Middle Power, reliance will be a factor for the foreseeable future, therefore rather than pursuing full independence and autonomy, States can focus and specialize in specific markets within the space industry such as Earth observation, telecommunication technology, infrared sensor development, and so forth. The decision of where and on which market to focus national resources can be determined through an analysis of, among others, existing technological expertise, security objectives, economic climate, and existing foreign trade agreements.

2.3.2 Space Collaboration

Collaborating with other space-faring nations allows for the creative exploitation of each State's respective expertise and capabilities, and provides the opportunity to form partnerships based on shared interests. This can advance collective security objectives, reduce costs, and promote best practices as regards space security through, among others, information-sharing and technology transfers. With whom a given State may choose to collaborate may be determined by an assessment of national space policy objectives, national and international security objectives, existing partnerships, international relations and available partners.

For many, collaboration is often determined on a project-by-project basis which means that national space authorities will have multiple partnerships for their many programmes. For example, the Israeli Space Agency has concluded cooperation agreements with the US National Aeronautics and Space Administration (NASA), the European Space Agency (ESA), the Italian Space Agency, the French National Centre for Space Studies, the Canadian Space Agency, the Indian Space Research Organization, the National Space Agency of the Republic of Kazakhstan, and the Russian Federal Space Agency. The agency is also pursuing agreements with the Brazilian Space Agency, the Korea Aerospace Research Institute, the Netherlands Space Office, the State Space Agency of Ukraine, and the EU.¹³ This extensive suite of partnerships provides the Israeli Space Agency with access to a global community of space industries and professionals for which to advance their respective objectives.

¹³ Israel Space Agency, <http://most.gov.il/English/space/international/Pages/default.aspx>.

In addition to collaboration between national space agencies, State militaries can collaborate in the space domain to advance common security objectives. As a contemporary example, as of October 2014, Japan and the United States have increased information-sharing and military cooperation in space to counter perceived threats from the People's Republic of China.¹⁴ This type of collaboration exemplifies the direct contribution of partnerships with a space component and how they can contribute to the achievement of shared national and international security objectives between States.

2.3.3 Acquisition of Space Technology and Services

In contrast to collaboration which involves an exchange of technological or substantive expertise on a given programme of work, Middle Powers can also purchase access to specific and services. This provides Middle Powers with the ability to circumvent the costs associated with R&D and the production of a specific technology, pay a set cost, and access the benefits. In a similar way to collaboration, reliance enables a State to technologically advance at speed. For example, in 2004, the Nigerian National Space Research and Development Agency (NASRDA) concluded an agreement with the China Great Wall Industry Cooperation to launch and operate a communications satellite NigComSat 1.¹⁵ In the provisions of the agreement, 15 years of “operational support” and a “comprehensive training program” were provided to NASRDA.¹⁶ NigComSat 1 was the first African geosynchronous communication satellite.¹⁷ Agreements like this enable emerging and Middle Powers to enter the space domain at a high level of technological advancement, then build off that technological foundation through the provision of training programmes, encouraging greater autonomy in the long-term.

2.4 Threats

As Middle Powers increase their utilization of space-based services, they may encounter threats to their continued use of such services. These can originate from domestic issues which hinder their ability to pursue coordinated approaches to space security matters or external issues which may be out of national control, but still constitute a consideration which must be acknowledged and mitigated.

2.4.1 Prioritizing Strategic Objectives in Relation to Space-based Services

Specific strategies should be devised for Middle Powers operating in the space domain. However the success of these strategies depends, in part, on the ability to prioritize strategic objectives in relation to space-based services. This will vary from one State to the next and be contingent on, among others, national and international security objectives, viable economic benefits from space, the level of technological advancement/development, the presence of a strong commercial space industry, and

14 “US, Japan to Bolster Space Cooperation over Chinese Threat”, *Russian Times News*, 22 October 2014, <http://rt.com/news/198072-usa-japan-space-cooperation/>.

15 *Satellite Communication, In-Orbit Delivery, Nigcomsat-1 Program*, China Great Wall Industry Corporation, www.cgwic.com/CommunicationsSatellite/project.html.

16 Ibid.

17 “Nigeria: NigComSat1 1r Commercial Launch—Matters Arising”, *AllAfrica*, 8 March 2012, <http://allafrica.com/stories/201203080103.html>.

the level of public and governmental interest in securing space access in the medium- and long-term.

Overall, the process of prioritization is determined by a State's conceptualization of what the space domain means for its established objectives and prosperity. For example, the Grand Duchy of Luxembourg's SES satellite group currently operates over 50 geostationary satellites that provide broadband and telecommunication services capable of reaching 99% of the global population.¹⁸ In 2013, SES reported revenues of USD 2,111,000,000,¹⁹ a substantial contributor to Luxembourg's USD 60,130,847,624 gross domestic product for the same year.²⁰ It is therefore understandable that two of Luxembourg's four strategic objectives for their national space plan were:

- "To consolidate and valorise the existing competencies in the domain of medias and telecommunications";
- "To contribute to reinforce the competitive position of industry and public research organizations in the space sector".²¹

Luxembourg has determined, based on existing interests and capabilities, that the economic success of the commercial sector is a primary concern for their national space strategy. Other Middle Powers may not enjoy the success and reputation that Luxembourg does in the field of broadband and telecommunications provision. However, that reality also factors into the prioritization process.

2.4.2 Coordinating National Strategy Domestically

After defining national strategic objectives for a given State, the challenge of coordinating these objectives and a national strategy internally becomes key—as the failure to do so would threaten the success of any strategic approach. Many States establish interdisciplinary or interdepartmental working groups which can aid in the coordination and information-sharing process as regards strategic objectives and direction. In the case of Switzerland, it carries out such efforts through its Interdepartmental Coordination Committee for Space Affairs (IKAR), chaired by the Swiss Space Office, which is responsible for implementing and allocating government funds for the R&D direction of Swiss space activity. This information-sharing committee—mandated to "prepare governmental positions and reinforce interdepartmental cooperation in the space domain"²²—has benefited Swiss space policy and direction by expanding the conversation to involve a broad range of government offices able to contribute their respective needs, concerns and perspectives. In the context of space security, Switzerland also established the subcommittee IKAR-SEC to identify national space security risks and explore ways in which to mitigate them. Ensuring that States have a dedicated forum to discuss national approaches to the space domain can only

18 "SES Global Access Services", SES, www.ses.com/15932159/global-access-services.

19 The original figure is EUR 1,862,500,000 calculated on the UN Operational Exchange rate for February 2015 of EUR 0.882 to USD 1.

20 GDP (current USD), The World Bank, http://data.worldbank.org/indicator/NY.GDP.MKTP.CD?order=wbapi_data_value_2013+wbapi_data_value+wbapi_data_value-last&sort=asc.

21 *Per Aspera Ad Strata, Preparing Luxembourg's Future in Space*, Grand Duchy of Luxembourg: Ministère de l'Enseignement Supérieur et de la Recherche du Luxembourg, Final Report 5, 2012, p. 19.

22 *Ibid.*, p. 20.

strengthen the development of effective policies and improve chances of reaching security objectives.

2.4.3 Aligning National Security with the Commercial Space Industry

Pursuing national security objectives in collaboration with the commercial space industry can pose threats to national security if not properly managed. For Middle Powers, the cost implications of developing dedicated technologies for solely military purposes can be infeasible. At this juncture, Middle Powers are faced with the challenge of pursuing security objectives with the technological assistance of space-based services owned and operated by the commercial space industry, while also ensuring that national export regimes acknowledge the sensitivity of a given technology.

In recent years, hosted payloads—a secondary piece of technology attached to a commercial satellite which provides a service separate from the satellite’s mission—have allowed many space-faring actors to access the benefits of the space domain at reduced costs. This has become an increasingly popular option for emerging and Middle Powers as it lowers the barriers to entry into the space domain. However there are various policy challenges that need to be overcome internally within a government, and between government and the commercial space industry, pertaining to national security, intellectual property protection, liability and export controls.

2.4.4 Access to Space as Regards Space Security Processes

Securing long-term access to space is a key task for any space-faring nation. However there is a larger, overarching concern to which all States should pay attention: ensuring that the domain itself is accessible for human use. Engaging processes which seek to address space security is an illustrative example of how States work to ensure global access. For Middle Powers, the threat is two-fold: not only do they experience the same threat that all States do as regards human access to space, but within these space security processes such States need to ensure that their particular needs are being addressed.

Section III will explore Middle Power engagement in various processes in more detail. It is important to note that such processes contribute to the overall viability of the space domain as a “benefit for all peoples irrespective of the degree of their economic and scientific development”.²³ This is particularly relevant for Middle Powers who may not be a party to terrestrial instability which then manifests as instability in space, yet would still be adversely impacted. It is the fact of their reliance on others in the space domain, and the domain itself, that means they have a substantial equity in the success of space security processes: the greater the reliance and usage, the greater the equity.

Space debris mitigation—a subset of multilateral space security processes—is another key issue which Middle Powers should take note of, given that space debris may pose a threat to their access to the space domain. Space is becoming increasingly congested, with that trend showing no signs of slowing. There are more than 1,000 operational satellites in Earth’s orbit, controlled by the 60 “States, government consortiums and

²³ United Nations Office for Outer Space Affairs, *Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, UN document ST/SPACE/61/Rev. 1, 1967, p. 3.

other entities” active in space.²⁴ Many of these satellites will inadvertently release fragments or pieces into orbit, which then become space debris. Generally, space debris can be understood as inanimate, man-made objects “in Earth orbit or re-entering into Earth atmosphere.”²⁵ Many models estimate that debris will increase exponentially over the coming decades due to collisions on orbit.²⁶ As technology continues to become more accessible to current non-space-faring entities, the space domain will experience greater congestion and an increased probability of collisions. This provides further justification for maintaining space debris mitigation efforts at the fore of any long-term space sustainability conversation.

As per the Space Debris Mitigation Guidelines, space debris mitigation efforts are divided into two categories: those that address the current body of space debris and those that limit the creation of debris in the future.²⁷ As end users of space-based services, Middle Powers have a strong interest and equity in supporting and contributing to both categories through remaining active in multilateral efforts which seek to limit the proliferation of space debris and decrease the probability of collision through Space Situational Awareness initiatives.

2.5 Conclusion

The position of a Middle Power in the space domain is highly complex and requires creative thinking to overcome the realities of operating as a State reliant on others for space-based services. The SWOT analysis provided a breakdown of these realities and laid the foundation for understanding what tools Middle Powers have, and what challenges they face, and where to focus national energy in order to exploit opportunities or mitigate threats. In many ways, this analysis leads to more questions than it answers for Middle Powers as regards securing long-term sustainable access to space based assets through national and international measures. It is important to assess how a State perceives their reliance that determines their specific opportunities and threats: will a State pursue increased autonomy in the space domain at the risk of not achieving specific objectives in the near term due to prohibitive costs?²⁸ Will a State pursue interconnectedness and cooperation with other space-faring nations to advance shared regional or bilateral objectives? Will a State pursue a mixture of the two, housing various facets of national space activities under government control while engaging in strategic partnerships based on common needs? Will a State explore other creative options, leveraging multilateral relationships, at the global level?

24 *General Assembly, Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities*, UN document A/68/189, 29 July 2013, p. 4.

25 European Space Agency, “Space Debris”, 20 April 2013, www.esa.int/Our_Activities/Operations/Space_Debris/FAQ_Frequently_asked_questions.

26 Center for Orbital and Reentry Debris Studies, Aerospace Corporation, “What is the Future Trend?”, www.aerospace.org/cords/space-debris-basics/what-is-the-future-trend/cords_future_chart2/, 5 April 2012.

27 United Nations Office for Outer Space Affairs, *Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space*, p. 1, www.iadconline.org/References/Docu/Space_Debris_Mitigation_Guidelines_COPUOS.pdf.

28 It is important to note that increased autonomy in the space domain can and often is a national objective.

3. Middle Power Engagement with Multilateral Processes

In order for Middle Powers to strategically maximize their ability to secure an identified need for long-term access to space-based services, without becoming fully autonomous in their space activities, they must leverage their inherent characteristics and capabilities to influence outcomes in the space domain at the level of national partnerships and multilateral engagement. Middle Powers rely on an international system which supports multilateral cooperation and dialogue on key space security issues. For example, the Brazilian representative to the 2013 United Nations Group of Governmental Experts meetings on Transparency and Confidence-Building Measures in Outer Space Activities (the GGE on Space Activities) saw the fact that many States' are unable to independently access space coupled with the disparate levels of technological advancement among space-faring nations as justification for supporting international cooperation as "an important vehicle for promoting the right of each nation to achieve its legitimate objectives to benefit from space technology for its own development and welfare."²⁹ The notion of reliance can thus be understood as an incentive to support and engage in continued multilateral processes which seek to govern State behaviour in space and increase long-term sustainability and security of space-based services. With this in mind, multilateral processes are a key area where Space Middle Powers can influence the nature and parameters of space security discussions and protect national equities. Participation can come in the form of:

- **Presence at multilateral space forums** such as the prevention of an arms race in outer space (PAROS) discussions at the Conference on Disarmament, meetings of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)—meetings such as the long-term sustainability of outer space activities segment or the Scientific and Technical Subcommittee, and Legal Subcommittee—or UNIDIR's annual Outer Space Security Conference.
- **Substantive contribution to multilateral space processes** such as submitting background documents on national positions, perspectives and strategy.
- **Regional organization membership** contingent on geographic location. Middle Powers can increase their regional engagement and connections through regional organization membership in bodies such as ESA or the Asia-Pacific Multilateral Space Cooperation Organization.

This section will explore current multilateral space processes initiatives and review how Middle Powers can and should engage with such processes in an effort to influence multilateral decision-making on space matters.

²⁹ Submission by the Member of the Group of Governmental Experts from Brazil on international cooperation, United Nations Office for Disarmament Affairs, *Transparency and Confidence-Building Measures in Outer Space Activities*, Study Series 34, 2013, p. 91.

3.1 Membership in Regional Organizations

Regional organizations offer space-faring nations a substantial opportunity through combined resources and expertise in the pursuit of shared objectives. However membership in such organizations is not the end-all-be-all solution to a States' budgetary constraints or limited expertise in aspects of space utilization. Seeking membership to or increased engagement with a regional organization is a complex decision which requires a comprehensive analysis of the benefits such membership brings in contrast with the compromises such membership may entail.

3.1.1 Benefits of Regional Organization Membership

One of the benefits of regional organization membership is the ability to pool resources and expertise, advancing strategic objectives in space at a pace faster than unilateral action. For example, ESA's 2015 budget is EUR 4.433 billion,³⁰ which enables States with limited R&D space budgets to enter into competition with the larger space-faring nations—such as NASA's USD 17 billion³¹ budget or the Indian Space Research Organisation USD 1.2 billion budget.³² Furthermore, States often contribute their respective expertise to regional organizations, which gives all member States access to a wide range of experts and industries for partnerships and collaboration. In the field of R&D, this results in an exploration and achievement of goals which otherwise would have not been possible to achieve independently.

To use an example of the benefits of regional organization membership from outside the space domain, in February 2015 the North Atlantic Treaty Organization (NATO) announced an initiative³³ which will allow for weapons-sharing among NATO members as part of its Smart Defence Program.³⁴ One of the core components of this programme is the lowering of the financial barriers for member States to acquire advanced military technology through the pooling of resources.³⁵

3.1.2 Dilemma of Regional Organization Membership

The inherent balance between regional and national objectives in space, and what a given State is willing to finance, are important elements of regional organization membership which all States should factor into their considerations to join or increase engagement with such groupings. As an illustrative example, one can look to the early 1970s when, within the context of ESA, member States were evaluating whether the decision to continue reliance on the United States for satellite launch capabilities or to

30 European Space Agency, "ESA 2015 Budget by Domain", 15 January 2015, www.esa.int/spaceinimages/Images/2015/01/ESA_Budget_2015_by_domain.

31 OECD, *The Space Economy at a Glance*, 2014, p. 138.

32 Ibid, p. 114.

33 P. McLeary, "Washington Unveils NATO Weapon-Sharing Plan", *DefenseNews*, 10 February 2015, www.defensenews.com/story/defense/land/weapons/2015/02/04/nato-weapons-sales-stste-department/22871267/.

34 North Atlantic Treaty Organization, "Smart Defence", 8 January 2014, www.nato.int/cps/en/natolive/78125.htm.

35 Ibid.

36 "Start of Sentinel-1A Mission", State Secretariat for Education, Research and Innovation SERI—Swiss Space Office SSO, p. 1, www.news.admin.ch/NSBSubscriber/message/attachments/34299.pdf.

37 Ibid.

38 *Laying of the Cornerstone*, Speech by Secretary Mauro Dell'Ambrogio, RUAG Emme, 2014, p. 2.

develop an ESA autonomous launch programme. At the national-level, the autonomous pursuit of such a project was untenable. However through ESA, the “Europeanization” of the project “was a necessity because the financial burden needed to be shared”.³⁹ The United Kingdom and Federal Republic of Germany favoured continued reliance on US satellites and launchers as the less costly option, the Italians showed little interest in autonomy as such a programme “would not guarantee appropriate industrial return to its industry”, while France and Belgium were steadfast in their support for launch capabilities independent of the United States.⁴⁰ This process eventually successfully established the autonomous launch service provider Arianespace, which is widely considered a technological success throughout Europe.⁴¹

In this example, various dilemmas emerged which can be applied to current strategic options associated with membership in regional organizations. Firstly is the aforementioned balance, or in the case of the previous example the tension between national and regional objectives. When a State becomes party to a regional body, its own national objectives no longer become the only political and economic consideration. In some cases, States forego the establishment of a national space programme or agency, opting instead to utilize a regional organization with its substantial pool of resources and expertise, as was the case with many smaller European States. This creates two key realities:

(1) there is an incentive for States to influence the policies of the regional body so as to maximize national benefit; and

(2) member States may need to negotiate between national and regional objectives, recognizing that consensus (or shared objectives) may not always be possible.

The crux of both of these issues is the dilemma of limited national autonomy and authority over a regional organization’s policy development, a consideration which States must analyse with their needs and abilities when considering membership or increasing engagement.

Viewed in the opposite direction, regional organizations must also structure regional objectives with national ones in mind. Xavier Pasco noted most succinctly in the context of France and its involvement in European space programmes: “[t]he challenge then remains to make [European space undertakings and programmes] sufficiently ambitious to foster interest at the national level without having it become a specifically national type of program unable to keep its European identity.”⁴² Therefore it is important that member States clarify their national desires vis-à-vis regional organization membership to provide the highest probability of such desires being incorporated into the organization’s policy and process.

39 J. Krige, A. Russo and L. Sebesta, *A History of the European Space Agency: 1958-1987*, European Space Agency, 2000, p. 145, <http://cds.cern.ch/record/448045/files/volume1.pdf?version=1>.

40 Ibid.

41 D. Johnson and A. Levite (eds.), *Toward Fusion of Air and Space: Surveying Developments and Assessing Choices for Small and Middle Powers*, Rand Corporation, 2003, p. 52.

42 Ibid.

3.2 International Processes on Space Security

For both emerging and Middle Powers, the space domain is constantly increasing in strategic value, meaning such powers can benefit from participating in any multilateral discussion that seeks to influence State behaviour in space and to contribute to the development of “rules of the road”. States can use such forums to express national positions and interpretations on the essential questions in today’s space security discussions, such as space debris mitigation, international law and its application to space, and the development of appropriate norms of behaviour for State activity in space. Engagement in such forums is also a fundamental part of the international business that is the space domain. States, particularly Middle Powers, who focus on cooperation and collaboration, should take the opportunity to create strategic linkages with others based on shared policy objectives and respective capabilities.

3.2.1 International Telecommunication Union on Radio Frequency Regulations

The International Telecommunication Union (ITU) is the global authority for frequency spectrum allocation for various types of radio communication services.⁴³ Satellites require radio communication capabilities to transmit data from a satellite to Earth (downlink) and commands from Earth to a satellite (uplink). Every State which operates a satellite or utilizes a service associated with a satellite has a stake in discussions on frequency spectrum allocation and, by association, relevant processes within the framework of the ITU. The ITU’s Radio Regulations operate on the basis of the World Radiocommunication Conferences’ principles for “efficient use and equitable access” to “interference-free radiocommunications”.⁴⁴ Furthermore, as the radio-frequency spectrum continues to grow more saturated with users,⁴⁵ Middle Powers have a particular interest in ensuring such evenly distributed access.

In the context of space security, the issue of intentional satellite interference⁴⁶ is a chief concern for satellite operators and States alike, and for frequencies allocated for safety purposes, the ITU.⁴⁷ As stated by the members of the GGE on Space Activities in their consensus report, Middle Powers, and all States, can support the outcomes of the GGE by “enhancing the transparency” of their space activities through greater information-sharing and consultative mechanisms which can limit the risk of conflict escalation due to misperception in events of satellite interference (i.e. interpreting the event as intentional when it may have been unintentional).⁴⁸ Additionally, States can engage

43 *ITU Radio Regulatory Framework for Space Services*, International Telecommunication Union, p. 1 www.itu.int/en/ITU-R/space/snl/Documents/ITU-Space_reg.pdf.

44 *Ibid.*, p. 3.

45 *Code of Conduct for Outer Space Activities*, European Union External Action, 2014, http://eeas.europa.eu/non-proliferation-and-disarmament/outer-space-activities/index_en.htm.

46 A way of temporarily or reversibly disrupting the normal functioning of a satellite without resorting to actual destruction of the satellite and the chance of creating long-lived space debris, according to “Radio Frequency Interference”, Secure World Foundation, 6 February 2015, <http://swfound.org/space-sustainability-101/radio-frequency-interference/>.

47 *ITU Radio Regulatory Framework for Space Services*, International Telecommunication Union, p. 2, www.itu.int/en/ITU-R/space/snl/Documents/ITU-Space_reg.pdf.

48 General Assembly, *Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities*, UN document A/68/189, 2013, p. 15.

in international frequency coordination, which, according to some, has contributed to collision avoidance.⁴⁹

3.2.2 Proposal for an International Code of Conduct for Outer Space Activities

The draft International Code of Conduct for Outer Space Activities is a non-legally binding code designed to “enhance the safety, security and sustainability of activities in outer space”.⁵⁰ The original document was proposed by the EU in 2008 and has since gone through various iterations as States contribute their substantive input. The initiative is commendable in that it codifies various transparency and confidence-building measures (TCBMs) that seek to contribute to the overall stability and security of the space domain through greater information-sharing and interstate cooperation. It is worth noting that the initiative has experienced challenges from “emerging space powers” who felt excluded from the drafting process and were concerned with the multilateralisation of the process.⁵¹

3.2.3 Proposal for a Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects (PPWT)

The draft PPWT was first proposed in 2008 by the Russian Federation and the People’s Republic of China as a legally binding treaty governing the placement of weapons in outer space. The current draft PPWT was released in 2014. In the context of space security, the draft treaty is important as it sets forth a possible legal framework for exploring arms control regulation in the space domain. Much like the EU initiative, the PPWT has not escaped criticism. The United States has consistently rejected the draft treaty on a variety of grounds including concerns with definitions and a possible exclusion of ground-to-space kinetic anti-satellite weapons, while many other States have questioned its verification mechanisms⁵² and lack of provisions to limit the “possession, testing, and stockpiling of weapons” which some States feel at some point could be placed in space.⁵³

3.2.4 Conference on Disarmament

The Conference on Disarmament (then the Committee on Disarmament) was formed in 1979 as the single multilateral disarmament negotiating body in the international community as an outcome of the UN Special Session on Disarmament of 1978. The CD has worked on the outer space issue, framed in terms of the Prevention of an Arms Race in Outer Space (PAROS), since 1984, initially through an *ad hoc* committee tasked as a first step, to consider issues relevant to PAROS (1984-1994). Due to fundamental

49 Submission by the Member of the Group of Governmental Experts from Japan on transparency and confidence-building measures in outer space activities, United Nations Office for Disarmament Affairs, *Transparency and Confidence-Building Measures in Outer Space Activities*, Study Series 34, 2013, p. 96.

50 *Code of Conduct for Outer Space Activities*, European Union External Action, 2014, p. 2, http://eeas.europa.eu/non-proliferation-and-disarmament/outer-space-activities/index_en.htm.

51 C. Johnson, *Draft International Code of Conduct for Outer Space Activities Fact Sheet*, Secure World Foundation, 2014, http://swfound.org/media/166384/SWF_Draft_International_Code_of_Conduct_for_Outer_Space_Activities_Fact_Sheet_February_2014.pdf.

52 M. Listner and R. P. Rajagopalan, “The 2014 PPWT: A New Draft but with the Same and Different Problems”, *The Space Review*, 11 August 2014, www.thespacereview.com/article/2575/1; and *Outer Space: Militarization, Weaponization, and the Prevention of an Arms Race*, Reaching Critical Will, www.reachingcriticalwill.org/resources/fact-sheets/critical-issues/5448-outer-space#processes.

53 *Ibid.*

differences on approach and a suggestion of linking the PAROS issue to discussions on a Fissile Material Cut-off Treaty (FMCT), the committee was not re-established in 1995.

Since then a variety of proposals to re-establish the ad hoc committee, working papers on TCBMs in outer space, and proposals for legally binding instruments have been submitted. On PAROS, the short-lived 2009 CD programme of work adopted in CD/1864 would have created a working group to “discuss substantively, without limitation, all issues related to the prevention of an arms race in outer space.” Given the rapid failure of the CD/1864 agreement when consensus evaporated and the return of the CD to deadlock, this did not come to pass. PAROS, however, remains one of the “core” agenda items for the CD and annual discussions still take place on PAROS, as a formal agenda item of the CD.⁵⁴

Given the lack of movement in this forum, the value of extensive engagement of space Middle Powers would seem limited. However, as it is currently the only specialized body within the UN system that formally links international security and space, it may play a role in shaping discussion the future. Space-faring nations, and particularly those who consider themselves Middle Powers that are not already members of the CD, should seek membership, or at least observer status, in order to participate in the work of the forum, if and when, it is revitalized In the near-term, however, the value of CD outcomes on outer space would seem to be questionable.⁵⁵

3.2.5 Group of Governmental Experts Meetings on Transparency and Confidence-Building Measures in Outer Space Activities

The GGE meetings and subsequent reports often become the foundation for future discussions and multilateral processes on the meetings’ respective topic. United Nations General Assembly resolution A/RES/65/68 in January 2011 established a GGE to explore possible TCBMs in the space domain.⁵⁶ A series of meetings were held as part of this process and the subsequent report was submitted to the sixty-eighth session of the General Assembly in 2013.⁵⁷ This particular GGE included 15 State-appointed experts who agreed on the final report by consensus.⁵⁸

The focus of the GGE reflects a global trend on space security matters: the pursuit of TCBMs among States. Such measures are useful for the establishment of “better conditions for the introduction of more stringent measures generally”,⁵⁹ for socializing States on best practices in the space domain,⁶⁰ and for mitigating inadvertent,

54 *Fact Sheet: Conference on Disarmament*, Secure World Foundation, 28 July 2009, http://swfound.org/media/1794/cd_factsheet.pdf.

55 For further background, see “Conference on Disarmament and Outer Space”, *Disarmament Insight: Thinking Differently about Human Security*, 11 June 2012, www.disarmamentinsight.blogspot.ch/2012/06/conference-on-disarmament-outer-space.html.

56 General Assembly, *Transparency and Confidence-building Measures in Outer Space Activities*, UN document A/RES/65/68, 13 January 2011.

57 General Assembly, *Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities*, UN document A/68/189, 2013, 29 July 2013.

58 *Ibid.*, p. 8.

59 “Submission by the Member of the Group of Governmental Experts from Italy on the Response to New Threats and Developments”, United Nations Office for Disarmament Affairs, *Transparency and Confidence-Building Measures in Outer Space Activities*, Study Series 34, 2013, p. 92.

60 *Ibid.*, p. 93.

preventable crises and conflict through limiting the risk of miscalculation and misunderstanding.⁶¹ Many Middle Powers were present at this GGE which allowed for an expression of their interpretation of various aspects of international cooperation and engagement in space. In the lead up to the meetings, some States submitted expert papers which explained the value and understanding of TCBMs, the interests of each submitting party, and an interpretation of the best way forward. Below are summaries of the some of the most relevant submissions:⁶²

- The Government of Australia sees a key TCBM as the recognition of the applicability of international law in space, including the Charter of the United Nations. The government is desirous of a concerted effort to develop a common understanding of the applicability of international law and its consideration in national planning and execution of space activities.⁶³
- The Brazilian Member of the GGE envisages international cooperation as a key facet of the interconnected space domain. In the representative's opinion, the notion of reliance (not dissimilar to the one discussed throughout this paper) is one which drives States to cooperate internationally to achieve national benefit from the space domain. The representative focused on two measures which increase the exchange and proliferation of space technologies around the world to support "sustainable economic and social development": bilateral, regional and multilateral capacity-building programmes and free satellite data dissemination initiatives.⁶⁴
- The Italian Member of the GGE drew a distinction between TCBMs and other legal and political frameworks which seek to disarm or control arms proliferation in space. Regarding safety, security and sustainability processes in the space domain, the representative saw the development of TCBMs as facilitating and "embodying the process, rather than creating it". This representative also highlighted the danger of collapse in relevant processes should States seek major structural changes to State behaviour in the space domain; instead he suggested opting for a gradual approach to confidence-building.⁶⁵
- The Government of Japan explained that the most important TCBMs in space are those which seek to increase information-sharing on matters such as space launch planning, collision avoidance, hazards to space flight safety, operational safety matters, and re-entry impact avoidance matters.⁶⁶

61 "Submission of the Government of Japan on Transparency and Confidence-building Measures in Outer Space Activities", United Nations Office for Disarmament Affairs, *Transparency and Confidence-Building Measures in Outer Space Activities*, Study Series 34, 2013, p. 95.

62 It is important to note that these summaries do not necessarily represent national policies or positions vis-à-vis the space domain.

63 "Submission by the Government of Australia on Building Confidence through Transparency on International Law Applicable to International Security Issues in Outer Space", United Nations Office for Disarmament Affairs, *Transparency and Confidence-Building Measures in Outer Space Activities*, Study Series 34, 2013, p. 80.

64 "Submission by the Member of the Group of Governmental Experts from Brazil on International Cooperation", United Nations Office for Disarmament Affairs, *Transparency and Confidence-Building Measures in Outer Space Activities*, Study Series 34, 2013, p. 91.

65 "Submission by the Member of the Group of Governmental Experts from Italy on the Response to New Threats and Developments", United Nations Office for Disarmament Affairs, *Transparency and Confidence-Building Measures in Outer Space Activities*, Study Series 34, 2013, pp. 92-94.

66 "Submission of the Government of Japan on Transparency and Confidence-building Measures in Outer Space Activities", United Nations Office for Disarmament Affairs, *Transparency and Confidence-Building*

Reviewing the disparate directions for TCBMs and the way in which the international community should proceed exemplifies not only the value of national-level contributions to increased understandings but also the difficulties ahead in establishing a best way forward for a global regime governing State behaviour in space. As States with substantial engagement in the space domain, the position of Middle Powers is an essential piece to the space security puzzle and the expression of such positions through a mechanism such as GGE is a positive contribution.

3.2.6 Committee On the Peaceful Uses of Outer Space

COPUOS, as the oldest dedicated space forum in the UN system, is a key forum for ongoing space security discussions. Historically, the Committee has interpreted its mandate rather strictly, maintaining a strong division between space activities for peaceful purposes (civil/commercial) and other space activities i.e. military. Over the last few years however, there would seem to have been a realization that space safety and space security are cross-cutting topics that affect all space activities, regardless of the nature of a mission. For the last few years, COPUOS has been working on space security issues, most notably through the Working Group on the Long-term Sustainability of Outer Space Activities (LTSSA) which was established in 2010 under the aegis of the COPUOS Scientific and Technical Subcommittee.⁶⁷ Currently, the LTSSA Working Group is working on the elucidation of voluntary guidelines which are hoped the finalized soon.

The LTSSA Working Group, and the guidelines it is producing, are a key component of the future multilateral space security architecture. The tone of discussions within COPUOS has in general also changed, and now the topics of space security and sustainability are often discussed in the full Committee. As regards Middle Powers, often with limited military space engagement, COPUOS is a key forum where the future foundations of the space security regime can be shaped. As such, engagement with the Committee and its processes should be actively pursued. Additionally, Middle Powers that take part in COPUOS and other space-related processes, such as the PAROS discussions at the CD, are in a strong position to assess the holistic overview and the connections, gaps and overlaps between different space security processes.

3.3 Conclusion

For any emerging or Middle Power in the space domain, cooperation and engagement with the international community is an undeniable necessity. The forums listed above are a summary of the critical venues where space security topics are currently being discussed at the multilateral level. It is clearly of critical importance that the direction and shape of these discussions reflect the equities of Space Middle Powers, and indeed emerging space States, if they are to contribute to creating a resilient and effective space security regime that serves the needs of all. The shape of such engagement will vary from State to State based on national considerations and needs. However, it

Measures in Outer Space Activities, Study Series 34, 2013, pp. 95–96.

⁶⁷ For Further information, see “The UN COPUOS Guidelines on the Long-term Sustainability of Outer Space Activities”, *Secure World Foundation Factsheet*, December 2014 http://swfound.org/media/189048/SWF_UN_COPUOS_LTS_Guidelines_Fact_Sheet_December_2014.pdf.

is important to acknowledge, as many Middle Powers have, the value of a cooperative and collaborative policymaking process on space issues at the multilateral level. It is critical that Middle Powers ensure that they are well represented and take a leading role in such processes as they are the States which rely not only on others for their access to space-based services but also on a functioning international system of governance for State activity in the space domain.

4. The Way Forward

In a national-level strategic conversation, a Space Middle Power must determine their own most optimal position in space and the desired parameters of a secure space climate for all. Through their diplomatic aptitude and extensive partnerships, a Space Middle Power's unique position in the domain draws the attention of all space-faring nations, emerging and established. It is paramount that such powers realize their agency in influencing the mentality of actors in the space domain, particularly as regards space security. Political gridlock is a genetic trait of power politics, and this very much resonates in the space domain; however example-setting by highly advanced and interconnected Space Middle Powers—for example through responsible, independent implementation of TCBMs aimed at increased cooperation and information-sharing in the pursuit of a stable space domain—is a formidable tool to push international dialogue in a positive and productive direction.

This section will explore the concrete steps Middle Powers can take domestically and internationally to maximize their access to space-based services and contribute to the development of a stable and secure space security regime. The recommendations provided in this section were designed to be replicable and implementable across national governments and their disparate structures. Rather than providing specific recommendations on how to implement programmes or processes domestically, the study sought to produce a set of desired outcomes for Middle Powers as well as the provision of some concrete examples of what implementation has looked like across various government structures. The goal of this section is to provide “food for thought” for States as they continue to develop and augment their national positions and approach to space utilization.

4.1 National-Facing Recommendations

4.1.1 Engage in Multilateral Cooperation

Middle Powers in the space domain should be interested in maximizing and securing their access to space-based services through extensive external engagement with other governments and foreign space programmes. The central thrust behind such engagement can be an acknowledgement that collective exploration produces higher returns with lower investment. Engagement in the form of partnerships enables Middle Powers, which often have a substantial civil commercial space sector, to contribute their relative expertise and to benefit from the expertise of their partners.

Many space-faring nations have already acknowledged the value of multilateral cooperation and incorporated it in their space policies and strategies. For example, one of the five mission goals of the South African National Space Agency policy is to “nurture space-related partnerships”;⁶⁸ while the Australian Government has utilized

68 South African National Space Agency (SANSA), *Vision, Missions and Values*, www.sansa.org.za/overview/vision-mission-values.

international cooperation to secure sustained access to specific space-based services.⁶⁹ Such approaches contrast with, for example, the European Union's space policy which pursues "technological non-dependence and an independent access to space" as one of its five core objectives.⁷⁰ While a Middle Power may, in the long-term, desire to become fully autonomous in their space activities, in the short- and medium-term they should acknowledge the realities of their reliance and thus pursue a strategy that seeks to strategically exploit the fact that many space services can currently be purchased via the internationalized commercial sector.

4.1.2 Revise National Space Policy, Strategy and Direction with Foundational Core Values

National interests and objectives frequently change depending on geopolitical stability and tension, economics, and other considerations. It is imperative therefore for national space policies and policies which include a space component to be governed and directed by core values established by a national government through a comprehensive analysis of national needs, capabilities and objectives. However the policies themselves should be subject to alteration and change to allow adaptability to emerging realities. This approach of reactive policymaking governed by established core values can acknowledge the current political and security climate and ensure that maximum benefit is achieved through policymaking. Additionally, the revision process itself can create a culture of fact-checking within policymaking which consistently poses introspective questions about the current validity of previous policy decisions.

4.1.3 Coordinate National Strategy Domestically through Information-Sharing Bodies

For Middle Powers reliant on others for access to space-based services, it is imperative for the entire government apparatus to be cognizant of the national direction, their respective roles, and the overall chain of command. However, the task of coordinating national strategy and direction on space matters, particularly in the context of space security, is a challenge for even the most efficient of governments. As space-based services contribute—either directly or indirectly—to the daily tasks of each government department and are intrinsic to the success of many objectives, a "whole-of-government" approach is needed.

As a method of engaging space policymakers in interdepartmental dialogue, many governments have established bodies mandated to coordinate and share information. Many Middle Powers have and should continue to encourage such information-sharing and increased dialogue between departments. Such activity has the potential to maximize exploitation of space-based services as each office articulates their unique capabilities and competencies, allowing for cross-pollination of ideas, creative thinking and collaboration, and increased national-level capacity on space programmes.

69 *Australia's Satellite Utilisation Policy*, Space Coordination Office, Australian Government, 2013, www.space.gov.au/INTERNATIONAL/Pages/default.aspx.

70 J. Robinson and M. Romancov, *The European Union and Space: Opportunities and Risks*, EU Non-Proliferation Consortium, Non-Proliferation Papers, no. 37, 2014, p. 2.

4.1.4 Manage National Security Objectives in the Commercial Space Context

The way in which a government addresses national and international security objectives that utilize a space-based service provided by the commercial sector will be contingent on the nature of the objectives themselves. Upon reviewing such objectives, policymakers can determine where and how to best direct national policies to ensure that the question of commercial sector involvement is adequately addressed. For example, in 2013, the Australian Government established a Space Coordination Committee responsible for “[s]eeking advice on national security dimensions of Australian civilian space activities when relevant.” Creating the conditions for cross-sectorial dialogue, in this case between the government/security community and the civilian commercial space sector, can enhance coordination and cooperation, and encourage governments to jointly manage the inherent risks in utilizing commercial assets in the pursuit of security objectives.

4.1.5 Develop Policies for Responsible Behaviour vis-à-vis Space Debris Creation and Mitigation

As previously mentioned, the space domain will continue to face increased congestion, heightening the risk of collision and creation of space debris. It is the responsibility of all States active in space—regardless of their level of reliance—to engage with space debris mitigation processes and pursue responsible behaviour in the space domain vis-à-vis space debris creation. At the national-level, Middle Powers can enact policies which contribute to global Space Situational Awareness initiatives, increase information-sharing on space activity to limit collisions, and facilitate and support terrestrial diplomatic processes on the subject.

4.1.6 Harmonize National Policies with Regional Organization Policy

Middle Powers party to regional organizations can improve interoperability between national and regional organization policies through increased cooperation, dialogue and information-sharing on relevant programmes. Middle Powers, with established space expertise and activities, intending to benefit from, and contribute to, regional organizations should conduct analyses on how their national policies impact on interoperability including, but not limited to, import/export regimes, data protection, intellectual property rights, liability, and protecting competitiveness of the national civil commercial space sector.

4.1.7 Promote Civil Participation and Interest in Space Activities

While not directly connected to the space security conversation, Middle Powers would benefit from engaging civil society and promoting interest in national space exploration. Establishing centres of excellence on space activities, fellowships or training programmes can increase international interconnectivity and enhance national status on the international stage. Many States have sought to position their universities and research centres as intellectual hubs for space R&D. The 2014 COPUOS report noted the importance of space education opportunities and made mention of Italy,⁷¹

⁷¹ General Assembly, *Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities*, UN document A/68/189, 2013, 29 July 2013, p. 12.

and Germany,⁷² all of which had established or continued to support fellowships on space studies. Another example would be the non-government affiliated Singapore Space and Technology Association's Singapore Space Challenge, an annual national design competition for students to “inspire space interest among youths and encourage participation in space-related activities”.⁷³ These types of soft power tools are particularly relevant for Middle Powers as they help to maintain, and potentially extend, a comprehensive, international presence on all aspects of space.

4.2 International-Facing Recommendations

4.2.1 Utilize Diplomatic Prowess for Progressing Space Security Processes

Many Middle Powers have significant political weight in certain space forums. This can be leveraged to increase support for compliance and cooperation in space security processes, particularly through the wide range of partnerships that Middle Powers have throughout the space community. Political processes pushed by larger space-faring nations may be subject to other geopolitical influences or default responses from those with different and entrenched ideological positions. However, processes endorsed and supported by Middle Powers may have the possibility to drive greater collaboration on space security issues that threaten the domain as a whole, not simply a given State's access.

4.2.2 Conclude Responsible Strategic Partnerships

As expressed multiple times throughout this study, the military benefits of space-based services are numerous, yet pursuing independent access to such services is cost-prohibitive for many Middle Powers. As such, strategic partnerships—which are either directly utilized for achieving a military or national security objective, or contribute to a technology which will be utilized for the pursuit of military or security objectives—will be concluded with other space-faring States. States may consider conducting a horizon scan of the available providers of the required space component and to establish strategic partnerships with “responsible nations, international organizations, and commercial firms”.⁷⁴ Determining who is deemed responsible will be contingent on existing partnerships, bilateral or regional cooperation agreements, current geo-political climate, geographic location, and so on.

As an illustrative example, the Australian Satellite Utilisation Policy has made two key policy-related decisions which codify the way in which the government will determine external partners and partnerships:

- Maintain a system of export controls that, consistent with Australia's international trade and counter-proliferation obligations, facilitates trade in space-related

⁷² Ibid.

⁷³ “Singapore Space Challenge 2014”, Singapore Space and Technology Association, 2014, www.space.org.sg/index.php/ssc.

⁷⁴ *National Security Space Strategy: Unclassified Strategy*, US Department of Defense and Office of the Director of National Intelligence, January 2011, p. 8, www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf.

goods and services while regulating trade that raises national security sensitivities.

- Maintain foreign investment regulatory frameworks that ensure investment in space-related infrastructure is consistent with Australia's national security interests.⁷⁵

In these two decisions, Australia has tethered the pursuit of external partners to national security and existing policy realities. This example also shows the recommendation in section 4.1.1 in implementation as these realities and their consideration become the foundation for satellite utilization policies which, themselves, may be subject to change as technology advances.

4.2.3 Actively Pursue Responsible Behaviour vis-à-vis Space Debris Mitigation

At the national level, Middle Powers can take initiative and autonomously implement the aforementioned guidelines and engage in increased information-sharing and coordination with other space-faring nations. The GGE on Space Activities report endorsed a series of non-legally-binding TCBMs which are, in the context of space debris mitigation efforts:

measures related to establishing norms of behaviour for promoting spaceflight safety such as launch notifications and consultations that aim at [...] limiting orbital debris and minimizing the risk of collisions with other space objects.⁷⁶

Ensuring that national-level policies address and seek to mitigate the possibility of collision can contribute to multilateral space debris mitigation processes and provide a commendable step towards globally recognized best practices and productive State behaviour as regard space debris mitigation.

4.3 Conclusion

The way forward for Middle Powers in the space domain is, in many ways, paradoxical. The inherently international nature of the space domain means that Middle Powers should continue to pursue the policies of interconnection that are a function of their reliance. Yet the various mechanisms for developing norms of behaviour at the multilateral level are currently under consideration with little sign of global consensus emerging in the near future (though the political will has been expressed). In the absence of such consensus, this situation can motivate space-faring nations to implement policies that encourage responsible behaviour in the space domain to ensure that hazards, both man-made and natural, are mitigated and managed. The paradox is one where the international nature of the space domain demands cooperation yet the nature of multilateral consensus-building mean that States need to act independently to set an example and build momentum internationally.

⁷⁵ Commonwealth of Australia, *Australia's Satellite Utilisation Policy*, Department of Innovation, Industry, Science and Research, 20 April 2013, p. 16.

⁷⁶ General Assembly, *Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities*, UN document A/68/189, 2013, 29 July 2013, p. 13.

Through the recommendations provided, it is envisaged that Middle Powers and their policymakers can better visualize the options available to them for maximizing and securing their access to space-based services, increasing multilateral engagement and also exercising their substantial agency to produce change in the highly international space domain.

77 For further thinking on Swiss resilience policy see “Resilience in Switzerland: Present and Future”, CSS Analyses in Security Policy, *Resilience in Security Policy: Present and Future*, CCS ETH Zurich, no. 142, 2013, p. 3.

5. Concluding Thoughts

This paper has aimed to lay out thinking on the unique circumstances of Space Middle Powers when developing future policy and direction at the national and international level. Given the growing level of dependence on space assets and the fact that space is a truly globalized domain with profound national security implications, having widespread engagement and participation of as many members of the international community as possible is essential to developing a reliable space security regime.

Space Middle Powers can play a critical role in shaping future global direction on space security. Our research highlighted the importance of understanding what level of resilience is needed and how to work towards that through national and international policy mechanisms. For middle power States specifically, with their high degree of space reliance, such an understanding of the true picture of national equities in space and how current international space security processes, and other political developments, may affect them is critical. This paper is in no way comprehensive but it is hoped that it can form a basis for further discussions on how best to improve stability in space particularly for the heavily invested, but particularly vulnerable, Space Middle Powers.

List of Acronyms

CD	Conference on Disarmament
COPUOS	United Nations Committee on the Peaceful Uses of Outer Space
CSS	Center for Security Studies
DSP	Defense Support Program
ESA	European Space Agency
ETH	Eidgenössische Technische Hochschule Zürich
FMCT	Fissile Material Cut-off Treaty
GDP	Gross Domestic Product
GGE	United Nations Group of Governmental Experts
GMES	Global Monitoring for Environment and Security
ICOC	International Code of Conduct
IKAR	Interdepartmental Coordination Committee for Space Affairs
IPPNW	International Physicians for the Prevention of Nuclear War
ITU	International Telecommunication Union
LTSSA	Long Term Sustainability of Space Activities
MIKTA	Mexico, Indonesia, Republic of Korea, Turkey and Australia
NASA	National Aeronautics and Space Administration
NASRDA	National Space Research and Development Agency
NATO	North Atlantic Treaty Organization
OECD	Organisation for Economic Co-operation and Development
PAROS	Prevention of an Arms Race in Outer Space
PPWT	Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects
R&D	Research and Development
SANSA	South African National Space Agency
SEWS	Satellite Early Warning System
SSO	Swiss Space Office
SWOT	Strengths, Weaknesses, Opportunities, Threats
TCBMs	Transparency and Confidence-Building Measures
UN	United Nations
UNIDIR	United Nations Institute for Disarmament Research



UNIDIR

The Realities of Middle Power Space Reliance

Daniel Golston with Ben Baseley-Walker

Space Middle Powers are uniquely reliant on space-based services outside their direct national control; this reliance combined with the fragility of and lack of stability in the space domain lead to a series of key vulnerabilities that need to be addressed and managed.

Today's space domain is increasingly complex. As more and more actors become invested in space assets and services, the management of man-made risks is becoming more challenging. One of the groups that is most exposed to such risks are those States that are highly space dependent yet have not traditionally played a central or direct role in exploiting space resources and do not fully control all elements of the full life cycle of assets that they rely on. For the purposes of this paper, these are being defined as Space Middle Powers.