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Strategic Multilayer Assessment

Space Virtual Think Tank Summary Overview




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Deeper Analyses
Clarifying Insights
Better Decisions

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What is ViTTa®?

NSI's **Virtual Think Tank (ViTTa®)** provides rapid response to critical information needs by pulsing our global network of subject matter experts (SMEs) to generate a wide range of expert insight. For this SMA Contested Space Operations project, ViTTa was used to address 23 unclassified questions submitted by the Joint Staff and US Air Force project sponsors. The ViTTa team received written and verbal input from over 111 experts from national security space, as well as civil, commercial, legal, think tank, and academic communities working space and space policy. Each Space ViTTa report contains two sections: 1) a summary response to the question asked and 2) the full written and/or transcribed interview input received from each expert contributor. Biographies for all expert contributors have been collated in a companion document.

[1] For access to the complete corpus of interview transcripts and written subject matter expert responses, please contact **gpopp@nsiteam.com**

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Introduction

Over the past year, the Strategic Multilayer Assessment (SMA)[2] team employed NSI's Virtual Think Tank (ViTTa®) methodology to reach out to a global network of space subject matter experts (SMEs) from across academia, industry, government, and national security space to elicit expert insight on 23 key questions relating to contested space operations.[3] Responses were received from over 111 experts from institutions in the US, Australia, Belgium, Canada, France, India, Israel, Italy, Japan, Netherlands, Norway, Singapore, Switzerland, and the UK. These written and telephone interview responses were compiled into a robust corpus of expert insights that provided the foundation for Space ViTTa summary reports, which were produced for each of the 23 questions. The Space ViTTa summary reports each contain two sections: 1) a summary response to the question asked and 2) the full corpus of expert contributor responses received for the question.[4]

This report highlights some of the themes and findings that emerge from the Space ViTTa initiative. An abstract of each of the Space ViTTa reports follows the summary overview below. Of course, neither the summary overview nor the report abstracts can fully convey the finer detail of the full Space ViTTa reports and contributor responses, each of which is worth reading in its entirety.

Summary Overview

Our 23 Space ViTTa questions can be broadly categorized into four areas of focus: ally, adversary, and partner use of space; commercial use of space; national security and space; and space law and norms. Throughout nearly all of the contributor responses across each of these categories of questions, a central theme emerges clearly: Space is a domain that is evolving rapidly, and US initiatives, planning, and operations for space require particularly close consideration and attention as a result. Contributors emphasize the vital importance of the US government (USG) deciding how it wants to approach and manage US interests in this rapidly changing domain. Failing to establish a clear and coordinated set of national security and commercial space objectives now will put the United States' decades-old strategic advantage in space at risk in the future. In short, the need for a serious effort to develop a clear and adaptive strategy for achieving US national objectives given a rapidly changing operational environment in space cannot be overstated. The implications of this theme for US space interests and activities across all four of our categories of questions are discussed below.

"Space is a domain that is evolving rapidly, and US initiatives, planning, and operations for space require particularly close consideration and attention as a result."

Ally, Adversary, and Partner Use of Space

A key aspect of the rapid evolution of the space domain is the increase in the number and types of actors operating in space. New actors, both state and non-state actors, are entering the space domain in a variety of capacities, from fully-capable space-farers to launch service providers and owners of small satellites. For many of these actors, space domain activities are viewed as sources of national pride and international prestige, as well as economic opportunity. It is not surprising, therefore, that the

[2] SMA provides planning support to Commands with complex operational imperatives requiring multi-agency, multi-disciplinary solutions that are NOT within core Service/Agency competency. Solutions and participants are sought across USG and beyond. SMA is accepted and synchronized by Joint Staff/J-39 DDGO and executed by ASD(R&E)/EC&P/RRTO.

[3] The Space ViTTa questions were provided by the SMA *Contested Space Operations* effort's sponsor organizations (Headquarters Air Force, United States Strategic Command, and Air Force Space Command).

[4] Completed Space ViTTa reports are posted to the SMA Publications website, here: http://nsiteam.com/sma-publications/

contributors expect these space actors (whether state or non-state actors, whether well-established or new players in space, etc.) to continue to actively pursue and expand space interests and opportunities into the foreseeable future.

In one sense, more actors operating in the space domain presents new and potentially fruitful opportunities for collaboration and cooperation. Several contributors detail space as a domain in which there is considerable cooperation, both between states and between public and private sectors. This cooperation offers states with fewer resources the potential to quickly and cheaply gain access to space technologies and space-based information and services. Contributors suggest that there is great opportunity for the US to take advantage of its strength in the space domain to expand existing relationships with ally and partner nations. Time is of the essence, however, because other states, notably China and Russia, are already moving ahead with partnerships and developing regulatory environments to attract commercial space actors. China, in particular, appears to be committed to building new partnerships in the space domain. Chinese activity here appears to be particularly robust—China is currently working with developing nations to provide space services to those with little independent space capability, as well as with the European Space Agency and individual European states.

In another sense, more actors operating in the space domain brings with it increased risk and potential threats to US security and economic interests, as well as to US infrastructure in space. Moreover, an increasing number of threats in space increases the opportunity for contestation or conflict, whether the result of unintended activities (i.e., an accident) or intentional attack. Contributors agree that the impact of a warfighting event in space would be historic, and would have no comparable precedent. Planning and preparing for increasing risk and potential threats, therefore, is essential, as the immense consequence of a space conflict cannot be overstated.

US, Russian, and Chinese space domain operations over the past decade demonstrate that space is integral to the national security and defense interests of each country.[5] The contributors suggest, however, that other countries, including some that have traditionally conceived of space as a non-military domain, are increasingly starting to demonstrate similar thinking to that of the US, Russia, and China. Contributors cite growing interest in dual-use space technologies and capabilities among space actors across Europe, Asia, and the Middle East as evidence of this shift in thinking. This increasing interest in the national security applications of dual-use aspects of space technologies amongst these states, according to contributors, can be attributed in part to perceptions of instability in their surrounding regions. This is an insight that should not be overlooked. A scenario in which terrestrial instability spreads to a space environment in which a large number of actors consider space as integral to their national security and defense could be prone to rapid and unintended escalation, posing serious threats to US space interests.

Commercial Use of Space

The contributors clearly detail a rapidly expanding and evolving role of commercial actors in the space domain. They caution, though, that it is important to recognize that commercial actors do not have the same interests or objectives in space as those of government and military actors, nor do government

[5] Of the three, however, space is most integral to the national security and defense interests of the United States. US investment in space has, historically, been unmatched, and it has conducted more space operations and developed more assets and infrastructure in space than any other actor. This has helped establish the US as the leading space power. At the same time, however, the US has also developed unmatched levels of space domain dependence and vulnerability, and is universally cited as the international actor with the greatest strategic risk in the space domain by the contributors. Ultimately, while the US is the most capable space actor, it is also the most vulnerable.

and commercial actors always think about security in the same ways. Companies are ultimately focused on the health and success of their business ventures (their key interest), while the US national security community is focused on security and defense and preparing for a conflict or a kinetic attack in space. Contributors from the commercial realm stress that it is imperative that the USG recognizes this difference in thinking, particularly as it continues to expand its reliance on commercial space capabilities for national security purposes. Ensuring that commercial and government actors have a shared understanding of fundamental concepts, such as security, will be critical to avoiding costly misunderstandings and miscommunication. Ultimately, the consensus view among the contributors is that a successful and sustained government-commercial relationship in the space domain is as essential for US national security goals as it is for commercial profits. This, however, will require overcoming the present barriers to cooperation between the commercial space community and US civil and national security space community, namely the barriers posed by undue government red tape, cultural differences between the two communities, and impediments wrought by the bureaucratic organization and structure of the USG.

National Security and Space

The contributors highlight several national security implications stemming from the rapid evolution of the space domain. First, most contributors agree that increasing levels of overall investment in space by both government and commercial actors may enhance space security by providing a disincentive for kinetic military action.[6] This is especially true, contributors suggest, if those investments come in the form of public-private partnerships. Almost every contributor who believes that increased spending disincentivizes kinetic military action argues that regardless of whether the source of the spending is commercial or government, the disincentive to kinetic action would be the same. The few contributors who deviate from this view, however, present concerns about the potential for wasteful spending, adversaries that are less invested in the space domain, increasing the number of targets for the US to defend, and political conflict over the rules of the road governing space cooperation.

Contributors also point out that rapid developments in the space domain present new and significant opportunities for USG collaboration[7] to enhance resilience, most notably in the form of leveraging information (collection and analysis) and launch (infrastructure, vehicles, and services) capabilities.[8] However, as mentioned earlier, more actors operating in space with broadening technological capabilities means more potential threats to USG space interests and infrastructure. The salience of this point is evident when we consider the implications of rapid innovation in space launch. Contributors agree that wide-ranging national security challenges will arise from decreased launch costs that enable a broader array of actors to deliver a wider variety of payloads into space—some of which will inevitably add to the amount of junk in space. They also indicate that changing commercial launch technology alters the monetary costs of the types and timing of deliverables national space programs can produce. These potential transformations of national space programs have significant effects on military procurement patterns, environmental destruction, informational supply chains, and military space operations.

[6] Contributors suggest that increased spending can create disincentives for kinetic action in four ways: increased space situational awareness; the self-interest of space-faring nations and space-operating commercial enterprises in protecting expensive assets; increased cooperation from collaboration among larger coalitions; and commercial actors' interest in order and stability make public-private partnerships a vehicle for reducing militarization and increasing restraint.

[7] Particularly USG and US ally collaboration, and USG and commercial actor collaboration.

[8] Contributors identify over 70 distinct allied and/or commercial capabilities that could be leveraged to enhance resilience. From this, eight categories of service capabilities emerge as potentially being able to be leveraged to enhance resilience, with information being the most frequently referenced category, followed by launch.

There is noticeable variation in how the contributors envision non-government space actors operating relative to US security interests in the future (i.e., as disruptors or solid partners for national security). Those who currently work in commercial space tend to foresee commercial entities serving as solid partners of the government, whereas those from think tanks and the US national security space community largely view commercial actors as potential disruptors to US security interests. The majority response in fact is that commercial entities might serve as both disruptors and partners. It appears that "disruption" is considered a necessary part of the development of space capabilities and activities. Commercial actors have organizational advantages with respect to innovation that are likely to better enable them to be the dominant innovators in the space domain in the medium- to long-term. The effect this will have on US national security operations involving space will be determined largely by how the USG deals with these changes. Most contributors acknowledge that there are significant potential security benefits to be gained by partnering with commercial actors. At the same time, however, encouraging the growth of the commercial space sector and relying on its capabilities and services reduces the USG's level of direct control. Regardless, the USG may not have much option—commercial space actors are here, and their relative capabilities are growing. Moreover, if the USG attempts to limit or control commercial activities to the point that space companies cannot meet their objectives, there is nothing preventing these companies from relocating to another, more favorable business environment. This would diminish USG influence within the commercial space sector, and could position commercial space actors to disrupt US security interests.

Space Law and Norms

The contributors generally do not view the existing legal regime in space (i.e., current international agreements, treaties, and conventions governing the use of space) to be either overly burdensome or restrictive on US space operations. However, despite overwhelming support for foundational agreements such as the Outer Space Treaty (OST),[9] most contributors see existing space law and norms as insufficient to manage the rapidly evolving nature of space activities and the range of potential threats these activities may present. As space becomes more crowded, the risk of accidental or intentional harm to an actor's assets increases. As space capabilities become more critical to actors' national security, economic, and social well-being, the cost of losing those assets also increases. As a number of contributors note, these conditions create a collective action problem that further refinement of international norms and regulation could help mitigate. With that said, however, most contributors do not think that amending or replacing the OST is either necessary or advisable. Contributors are clear in their warning that opening up the possibility of amending the OST would likely trigger a long and uncontrollable process of negotiation that in itself would create uncertainty and undermine the legitimacy of the OST. Furthermore, there is no guarantee that the final treaty would work as well as, let alone any better than, the current one.

The contributors generally agree on the need to develop norms by way of both informal and formal channels in order to maintain a peaceful space domain. At the same time, however, contributors point out that an increase of diverse actors (global powers, countries recently entering the space domain, commercial actors) with diverse interests (domination, deterrence, profit) increases the difficulty of developing shared norms, since norms by definition imply shared values. Given the historic difficulty in achieving effective formal agreements, several contributors share a hope that less formal norms might be an option for regulating a responsible use of space. Overall, however, contributors often fall back

[9] Contributors generally agree that the Outer Space Treaty (OST) explicitly applies the basic tenets of international law (sovereign equality, non-interference, prohibition on the use of force, right of self-defense, peaceful dispute resolution) to activities in space. The emphasis on accountability, transparency, and coordination of activities reflect the underlying principles of the OST, according to contributors.

upon discussion of the value of formal agreements, exhibiting a bias toward formal rules given their explicitness. In doing so, these contributors largely also stress the need for measurable verification of how space is being used by actors, both to mark norm violations and to support guidelines set forth in formal agreements.

Space ViTTa Report Abstracts

Q1. Taking Up (Outer) Space: An Exploration of Definitional Issues[10]

Author

Sabrina Pagano

Question

Are there any contentious space terms or definitions, or are there any noticeable disagreements amongst space communities about appropriate terminologies and/or appropriate definitions for terms? What are the common understandings and uses of space-related terms, definitions, classes and typologies of infrastructure and access? For example, how do we define different classes of space users (e.g., true space-faring states, users of space technology)?

Abstract

This report explores contentions in space terminology and definitions. Coordination within and across various space communities begins by getting a broad view of the terminological landscape and any terms for which there is current contention. In many cases, contentious terminology may not matter—or ambiguity may even be desirable. In other cases, the stakes are higher. The report calls attention to two space terms where disagreement or misunderstanding has negative implications for US national security: space weapons and armed attacks.

Q2. Ally, Adversary, and Partner Use of Space[11]

Author(s)

Weston Aviles, Belinda Bragg, Nicole Peterson, and George Popp

Question

How does each entity in the following categories conceive of space operations for military and commercial purposes? How do they approach space operations and services? Is there any difference in how their commercial ventures (if any) consider security during peace, crisis, and conflict?

- *PRC, Russia, Iran, North Korea*
- *European Space Agency, Japan, India, South Korea, Israel*
- *Canada, Brazil, Australia, Singapore, Ukraine, others*

Abstract

This report examines how international actors conceive of and approach space operations for military and commercial purposes. Several themes emerge.

- While Russia and China have historically viewed space as integral to national security and defense interests, this attitude appears to be spreading to other space actors across the globe, including some that have traditionally viewed space as a non-military domain. This shift can be attributed in part to perceptions of regional instability, particularly for space actors in Europe, Asia, and the Middle East.
- Space activities are a source of national pride and international prestige for many countries.
- There is growing interest in the national security applications of dual-use aspects of space technologies.
- Other countries have fewer institutional barriers to the military use of civil space capabilities than observed in the US.

[10] http://nsiteam.com/social/wp-content/uploads/2017/12/NSI_Space_ViTTa_Q1_An-Exploration-of-Definitional-Issues_FINAL-FINAL.pdf
[11] http://nsiteam.com/social/wp-content/uploads/2018/01/NSI_Space_ViTTa_Q2_Ally-Adversary-Partner-Use-of-Space_FINAL.pdf

Q3. Motivations and Costs to Contest Uses of Space[12]

Author

John Stevenson

Question

What are the motivations of nation-state and non-state actors (e.g., violent extremists, etc.) to contest use of space in times of peace, instability, and conflict? What are the political, military, environmental, or social costs associated with acting on those motivations?

Abstract

This report explores the motivations of, and costs to, nation-state and non-state actors in contesting the use of space. The contributors generally agree that there are multiple possible motives for nation-states to contest the use of space, including vulnerabilities introduced by cross-domain dependence on space systems; pursuit of space programs for prestige and status; and the yet unresolved rules about how to project national sovereignty into space. While the contributors agree that the costs associated with acting on these motives are very high, they disagree on whether these costs increase or decrease the likelihood of conflict.

Q4. Approaches to Space-Based Information Services Among Actors Without Space Capabilities[13]

Author

Belinda Bragg

Question

What insight can the US and its partners obtain from the space-based information service approaches used by international actors that lack their own space capabilities?

Abstract

This report explores potential insights that the US and its partners can obtain from the space-based information service approaches used by international actors that lack their own space capabilities. Two primary insights emerge. The first relates to the information these actors are seeking, particularly what it indicates about their interests and the potential security implications access to that information has for the US. The second relates to the strategies these states are using to gain access to space-based information, particularly collaboration and reliance on private sector services.

[12] http://nsiteam.com/social/wp-content/uploads/2017/12/NSI_Space_ViTTa_Q3_Contested-Use-Of-Space_FINAL-FINAL.pdf
[13] http://nsiteam.com/social/wp-content/uploads/2017/11/NSI_Space_ViTTa_Q4_Space-Based-Information-Services_FINAL_for_DISTRO-FINAL.pdf

Q5. Exploring the Economic Effects of Conflict in Space[14]

Author

Weston Aviles

Question

Is it possible to realistically quantify the economic impact of warfighting events in space (e.g., increase in insurance costs for commercial satellites, stock market perturbations of a space attack, change in consumer behavior due to disruption of communication or PNT services)?

Abstract

This report explores the potential economic effects of conflict in space. Industry perspectives on this question are surprisingly varied in both their explicit responses and methods used for assessing the fallout from hostility in space. While the contributors offer a variety of useful insights, there does not appear to be an easily accessible and comprehensive analysis of the financial impact of conflict in the space domain. In fact, due to the cascading nature of warfighting events in space, contributors disagree on whether any analysis would produce a satisfactory answer. The clear consensus, however, is that further research needs to be done on this topic. With that said, almost half of the contributors stress that the impact of a warfighting event in space would be a historic event with no comparable precedent (and therefore, extremely difficult to quantify). To further illustrate the magnitude of such a warfighting event, several contributors consider how current political tensions surrounding the space domain are already limiting economic growth, commerce, and cooperation in peacetime. These effects would be magnified several times over in any warfighting scenario, and thus speak to the seriousness of such an event.

Q6. Commercial Companies' Perceptions of Security in Space[15]

Author

Nicole Peterson

Question

How do commercial ventures think about the security of their space assets during peacetime, crisis, and conflict? Do industry leaders think about warfare in or through space differently than military leaders? What are their main concerns? How reliant are they on governments for warning or protection of space? What are their threat priorities?

Abstract

This report explores commercial perceptions of security in space. Industry leaders do not think about security in space in the same way that the military does. Commercial contributors suggest that this is because they are focused on the health and success of their business ventures (their key interest), while the national security space community is more focused on security and defense against kinetic attack. This discrepancy in thinking is something in which the USG must be aware of, particularly as commercial space actors and activities continue to increase in quantity and scope. Moreover, as the USG becomes more reliant on commercial space capabilities for national security purposes, ensuring that both sides have a shared understanding of fundamental concepts, such as security, will be critical.

[14] http://nsiteam.com/social/wp-content/uploads/2018/03/NSI_Space_ViTTa_Q5_Economic-Effects-of-Conflict-in-Space_FINAL.pdf
[15] http://nsiteam.com/social/wp-content/uploads/2018/03/NSI_Space_ViTTa_Q6_Commercial-Perceptions-of-Security-in-Space_FINAL.pdf

Q7. Use of the Commercial Space Industry for Military Purposes by Non-Western States[16]

Author

Belinda Bragg

Question

Are other nations outside the West poised to tap into their own commercial space industry for military purposes in the next 5-10 years?

Abstract

This report examines how non-Western countries capitalize on the commercial space industry for military purposes. It is incorrect to assume that space industries in other countries are organized in a similar manner to the US—with clear delineations among civil, military, and commercial space industries. Many countries, both non-Western and Western, are already taking advantage of the dual-use nature of space technology and tapping into commercial and civil space capabilities for military use. This suggests that a better question on which to focus might be: "Which nations outside the West are tapping into their civil (commercial and/or government run) space industry for military purposes?"

Q8. Allocation of Commercial Space Industry Components[17]

Author(s)

Belinda Bragg and Sabrina Pagano

Question

How are the components of the commercial space industry allocated outside of the US? Which countries have which types of market interests on the commercial end (e.g., tourism, imagery, navigation, etc.)?

Abstract

This report presents two infographics to visualize the extent to which the commercial space industry, which accounts for about three-quarters of the global space economy, is globalized. Perhaps unsurprisingly, the US, Russia, and China have the most diversified commercial capabilities in launch, satellites, and science and exploration. However, India and the European Space Agency (ESA) have very similar levels of coverage in launch, satellite, and science and exploration. Other countries, such as Israel, Singapore, South Korea, and the UK, are choosing to invest in research and development in niche areas. Luxembourg is a surprisingly active and competitive actor in commercial space as well.

As the number of countries developing their own commercial space industries grows, so does the potential for partnerships. Although space is becoming more crowded and congested, it is a domain in which there is considerable cooperation, both between countries and between public and private sectors. This cooperation offers countries with fewer resources the potential to quickly and cheaply gain access to space technologies and space-based information and services. The US has the potential to take advantage of its strength in the space domain to broaden and strengthen existing relationships with ally and partner nations. However, it needs to act fast. Other countries, notably China and Russia, are already moving ahead with partnerships, and developing regulatory environments to attract commercial space actors. China has been particularly active, working with developing countries to provide space services to those with little independent space capability, as well as with the European Space Agency and individual European countries.

[16] http://nsiteam.com/social/wp-content/uploads/2017/12/NSI_Space_VITTa_Q7_Military-Use-of-Commerical-Capabilities_FINAL.pdf
[17] http://nsiteam.com/social/wp-content/uploads/2018/05/NSI_Space_ViTTa_Q8_Allocation-of-Commercial-Space-Components_Final.pdf

Q9. The Barriers to Successful Government-Commercial Relations[18]

Author

Allison Astorino-Courtois

Question

What are the biggest hindrances to a successful relationship between the private and government space sectors? How can these be minimized?

Abstract

This report examines the barriers to successful government-commercial relations in the space domain. The consensus view among the contributors is that a successful and sustained government-commercial relationship in the space domain is as essential for achieving US national security goals as it is for achieving commercial profits. At present, however, contributors view the ways in which US civil and national security space communities operate as barring the attributes that make for an attractive business environment. Four themes related to US public and private space sector relations emerge: there is good news, red tape, cultural differences, and bureaucratic organization and structure. While one of the themes (there is good news), focuses on positive aspects of the relationship, the other three themes (red tape, cultural differences, and bureaucratic organization and structure) focus on types of barriers in place. Steps that can be taken to help overcome this include:

- Clear requirements and data exchange between government and commercial partners.
- Persistent and predictable funding and cash flow.
- Non-onerous and consistently implemented export controls.
- Synchronization of internal government agendas and decision making with regard to space.

Q10. Effects of Investment on Pathways to Space Security[19]

Author

John Stevenson

Question

Does substantial investment and heavier commitment by both governments and commercial interests provide an avenue of approach for space 'security' and disincentive for kinetic military action?

Abstract

This report explores the effects of investment on pathways to security in space. Most contributors agree that substantial investment provides an avenue of approach for space security and disincentive for kinetic military action, especially if those investments take the form of public-private partnerships. Almost every contributor who supports increased spending as a disincentive for kinetic military action argues that spending from both commercial and government actors would have predicted positive effects, and that neither type of spending would be more efficacious than the other. The few contributors who deviate from the consensus raise concerns about the potential for wasteful spending, adversaries that are less invested in the space domain, increasing the number of targets for the US to defend, and political conflict over the rules of the road governing space cooperation.

[18] http://nsiteam.com/social/wp-content/uploads/2018/01/NSI_Space_ViTTa_Q9_Barriers-to-Successful-Government-Commercial-Relations_FINAL.pdf
[19] http://nsiteam.com/social/wp-content/uploads/2018/04/NSI_Space_ViTTa_Q10_Effects-of-Investment-on-Pathways-to-Space-Security_Final.pdf

Q11. Leveraging Allies and Commercial Capabilities to Enhance Resilience[20]

Author

Belinda Bragg

Question

What opportunities are there to leverage ally and commercial capabilities to enhance the resilience of space services for commercial and national security critical space services? What are the major hurdles to doing so?

Abstract

This report explores opportunities for leveraging ally and commercial capabilities to enhance US resilience in the space domain. The contributors agree that the USG has plenty of opportunities for collaboration with allies and commercial actors. They identify over 70 distinct allied and/or commercial capabilities that could be leveraged to enhance resilience. From this, eight categories of service capabilities emerge as potentially being able to be leveraged to enhance resilience, with information (collection and analysis) being the most frequently referenced category, followed by launch (infrastructure, vehicles, and services). Contributors also highlight barriers (within the USG or between the USG and allies or commercial actors) to such cooperation, and ways in which they might be overcome, such as: improving the relationship between the defense community and commercial space community; developing regulatory and policy frameworks and lines of authority; and providing technical and funding support to build a strong, stable commercial sector.

Q12. Commercial Space Actors: Disruptors or Solid Partners for National Security[21]

Author(s)

Allison Astorino-Courtois and Belinda Bragg

Question

Will major commercial space entities likely serve as disruptors or solid partners in terms of state national security interests? In the short-term (5-10 years), mid-term (15-20 years), and long-term (25+ years)?

Abstract

This report explores whether commercial space actors are likely to serve as disruptors or solid partners to US security interests in the future. Contributors vary in their assessments. Those from commercial space tend to foresee commercial entities serving as solid partners of the government, whereas those from the US national security space community largely view commercial actors as potential disruptors to US security interests. The majority response, however, is that commercial entities might serve as both disruptors and partners.

Disruption appears to be considered a necessary part of the development of space capabilities and activities. Commercial actors have organizational advantages with respect to innovation that are likely to better enable them to be the dominant innovators in the space domain in the medium- to long-term. The effect this will have on US national security operations involving space will be determined largely by how the USG deals with these changes. Contributors acknowledge that there are significant potential security benefits to be gained by partnering with commercial actors. At the same time, however, encouraging the growth of the commercial space sector and relying on its services reduces the USG's level of direct control. Regardless, the USG may not have much option—commercial space actors are here, and their relative capabilities are growing. Moreover, if the USG attempts to limit or control commercial activities to the point that space companies cannot meet their objectives, there is nothing to prevent them from relocating to a more favorable business environment. This would diminish USG influence, and could position commercial space actors to disrupt US security interests.

[20] http://nsiteam.com/social/wp-content/uploads/2017/12/NSI_Space_ViTTa_Q11_Allied-and-Commerical-for-Resilience_FINAL.pdf
[21] http://nsiteam.com/social/wpcontent/uploads/2018/02/NSI_Space_ViTTa_Q12_Commercial_Space_Actors_as_Disruptors_or_Solid_Partners_FINAL.pdf

Q13. National Security Implications of Space-Launch Innovation[22]

Author(s)

George Popp and John Stevenson

Question

What are the national security implications of increasingly accessible and affordable commercial launch services? Are these the same for the US and near-peers or states with emergent space capabilities?

Abstract

This report explores the national security implications of innovations in space launch. Contributors agree that there will be wide-ranging national security challenges from decreased launch costs. These challenges are largely derived from two structural changes to the space domain: more actors and a wider diversity of payloads. The main national security effect of this, according to the contributors, is that cheaper launches enable a greater number of actors to send a wider range of payloads—some of which will be junk—into space.

Q14. Space and US Deterrence[23]

Author

Allison Astorino-Courtois

Question

How should space feature in US deterrence strategy? How do space operations, policies, and investments impact multi-domain deterrence? What changes to US deterrence thinking are required to incorporate the space domain? To what extent should space adopt deterrence strategies from other domains (e.g., maritime)? Considering return-on-investment in general terms, which is the most critical US national security objective: deterring aggression from space, though space, or in space?

Abstract

This report explores how space features in US deterrence strategy. Strikes against space and cyber assets (whether on orbit or on the ground) will almost certainly feature in the earliest stages of future conflicts. Consequently, the contributors generally agree that space systems should be a prominent feature of US deterrence thinking and policy. There is no doubt that space systems are now integral to the United States' economic strength and defense in all conflict domains, and are essential facilitators of cross-domain operations. The contributors diverge, however, over the implications of this on US defense posture and policy involving space. Two schools of thought emerge regarding whether the exceptionality of the space domain requires a deterrence strategy specifically for space (i.e., "space deterrence") or whether talking about deterrence of space assets independent of deterrence in all other domains is meaningless (i.e., "deterrence involving space"). Contributors also split on what they consider to be reasonable and achievable goals regarding defense of space assets. Some argue that space superiority or dominance in space is critical to US and ally defense, and thus demands a space policy and posture directed toward retaining US military hegemony there. Others argue that achieving space hegemony, dominance, or superiority is not only infeasible, but the act of pursuing such a goal itself is likely to reduce, rather than enhance, US security. Overall, however, while there is disagreement on some of these issues, contributors universally agree that space plays a prominent role in US deterrence and strategic options.

[22] http://nsiteam.com/social/wp-content/uploads/2018/01/NSI-Space-ViTTa_Q13_National-Security-Implications-of-Space-Launch-Innovation_FINAL.pdf
[23] http://nsiteam.com/social/wp-content/uploads/2018/01/NSI_Space_ViTTa_Q14_Space-and-US-Deterrence_FINAL.pdf

Q15. Insights From Pre-Space Age Approaches to Military Capabilities[24]

Author

George Popp

Question

What insight on current space operations can we gain from understanding the approaches used for surveillance, reconnaissance, navigation, communication, timing synchronization, and indications and warning before the advent of the space age?

Abstract

With the emergence of the space age, capabilities such as surveillance, reconnaissance, navigation, communication, timing synchronization, and indications and warnings have expanded exponentially, both in power and precision, as well as in importance to national security and defense objectives. Pre-space age approaches provide the foundation for the way in which we approach these capabilities today. While space-based manifestations of these capabilities have brought about clear advancements, new vulnerabilities have materialized as well. This report explores the insights on current space operations that can be gained from understanding the pre-space age approaches to military capabilities. Ultimately, four central insights on current space operations emerge from the contributors' reflection:

- Controlling the "high ground" is still important.
- Space domain advancements can and should be capitalized on to maximize military effectiveness.
- There are risks and vulnerabilities associated with being too dependent on space.
- More efficient and effective space systems and processes are needed.

Q16. Strategic Risk in the Space Domain[25]

Author

George Popp

Question

Which international actors currently have the greatest strategic risk in the space domain? What affordable non-space alternatives are there to mitigate or avoid that strategic risk?

Abstract

This report examines strategic risk in the space domain. The consensus view among the contributors is that the US is the international actor with the greatest strategic risk in the space domain. The United States' levels of dependence on space and space domain vulnerability are the two primary factors cited to explain its unmatched strategic risk. Other actors (Russia, China, US allies, and nuclear powers in general) are also highlighted as having noteworthy levels of strategic risk in space, albeit less than that of the US. Diplomatic activities are the most frequently cited affordable non-space alternative for mitigating strategic risk in the space domain. Several other non-space, terrestrial alternatives for mitigating strategic risk in space are also identified, but the affordability and applicability of such alternatives is not always as clear.

[24] http://nsiteam.com/social/wp-content/uploads/2018/03/NSI_Space_ViTTa_Q15_Insights-From-Pre-Space-Age-Approaches_FINAL.pdf
[25] http://nsiteam.com/social/wp-content/uploads/2018/02/NSI_Space_ViTTa_Q16_Strategic-Risk-in-the-Space-Domain_FINAL.pdf

Q17. Multi-Domain Conflicts: Is US Success Contingent on Dominance in Every Domain[26]

Author

Sabrina Pagano

Question

As we move into multi-domain conflicts will our success hinge on being successful in every domain or can we lose in one and still be successful in the overall campaign?

Abstract

This report explores multi-domain conflict, and the requirements for US success in future multi-domain conflicts. The contributors vary in their response. About half of the contributors suggest that campaign success in a multi-domain conflict is not solely a question of US need to dominate in all domains (or not), but instead is contingent on contextual factors that are likely to vary from one conflict to the next. Broadly, these factors can be grouped into three categories, which can be examined individually or in concert: aspects of the conflict, aspects of the adversary, and aspects of the domain. Contributor responses as a whole focus on only one of these contextual factors—aspects of the domain. Specifically, contributors emphasize the degree of domain interdependence. Multiple contributors imply that space in particular is a crucial domain without which the US currently cannot win in any serious conflict. A loss or extreme degradation in the space domain is likely to significantly affect capability in other domains (though the opposite does not necessarily hold true, with the exception of cyber). At the same time, absolute dominance in space is not required in order to maintain some degree of capability in other domains.

Within the context of this broader discussion of domain interdependence emerges a more concrete articulation of whether US campaign success in a multi-domain conflict necessarily hinges on success in every domain. The picture that emerges is that the US can lose in one domain—even if that domain is space—and yet succeed overall. However, this statement comes with important caveats. While the US can lose space dominance and prevail, given the degree of domain interdependence, the US cannot lose its entire capability in space and still prevail. The US must retain the ability to maneuver throughout space and other domains. However, continuing to operate (or "succeed") in the face of partial degradation of space capabilities will come at a high cost (e.g., in national treasure or human capital). In order to continue fighting and ultimately succeed, the US will need to become more agile overall. This agility includes ensuring that there are appropriately robust plans and infrastructure in place to enable continued operation, whether conditions are ideal or suboptimal (e.g., domain degradation). As such, the answer to this question can be reformulated as follows: Success is not required in every domain, as long as the US becomes and remains agile.

[26] http://nsiteam.com/social/wp-content/uploads/2018/02/NSI_Space_ViTTa_Q17_Multi-Domain-Conflicts_FINAL.pdf

Q18. Principles of Response to Aggression in Space[27]

Author

John Stevenson

Question

What are the principles (e.g., flexible v. controlled response, proportionality, etc.) upon which international policy makers should develop response options for aggression in space?

Abstract

This report explores the principles upon which international policy makers should develop response options for aggression in space. Several contributors argue that this question in itself is confusing or even misleading. These contributors point to the ambiguity of the language used in the question and the ambiguity of existing space treaty law as the two primary reasons for this confusion. Noting the inherent contention in the legal realm of space, the contributors as a whole nonetheless work to articulate how the US might derive a set of principles for response to aggression in space. Contributors divide into two camps: those who argue that principles already exist that can be used to guide a response to aggression, and those who argue that these principles are—and must be—emergent. Although distinct reasons are given between the two camps, the chief principle on which all camps agree is the principle of precaution, largely due to the potential for suboptimal outcomes resulting from the low-information environment of the space domain.

Q19 & Q23. Governing in a Crowded Space: The OST and Development of the Legal Regime for Space[28]

Author

Belinda Bragg

Question(s)

What international legal codes or norms are needed to govern the increasingly crowded space domain?

Fifty years of space has seen much change. Which aspects of the Outer Space Treaty of 1967 are still valid and which need updating? Is it better to add to/amend the 1967 Treaty or to establish a new framework for the 21st century?

Abstract

This report examines the Outer Space Treaty (OST) and legal regime of space to explore whether existing laws and norms are suited to govern and increasingly crowded space domain. Regardless of their stance on the OST, all of the contributors see existing space law and norms as insufficient to manage the rapidly evolving nature of space activities and the current and potential threats these activities present. As space becomes more crowded, the risk of accidental or intentional harm to an actor's assets increases. And, as space capabilities become more critical to actors, the cost of losing those assets also increases. Both of these conditions create a collective action problem that the further articulation of international norms and regulation could potentially mitigate for all. However, most contributors do not think that amending or replacing the OST is either necessary or advisable. These contributors warn that opening up the OST would likely trigger a long and uncontrollable process of negotiation that in itself would create uncertainty and undermine the legitimacy of the OST. Furthermore, there is no guarantee that the final treaty would work as well, let alone any better.

[27] http://nsiteam.com/social/wp-content/uploads/2018/02/NSI_Space_ViTTa_Q18_Principles-of-Response-to-Aggression-in-Space_FINAL.pdf
[28] http://nsiteam.com/social/wp-content/uploads/2018/04/NSI_Space_ViTTa_Q19-Q23_Legal-Regime-in-Space_Final.pdf

Q20. International Rules and Norms: Constraints on Space Operations[29]

Author

Belinda Bragg

Question

What are the current international agreements, treaties, conventions, etc. governing the use of space, and what specific limitations and constraints are placed on space operations?

Abstract

This report explores the current international agreements, treaties, and conventions governing the use of space, and the limitations and constraints they place on space operations. The contributors overall do not view the existing legal regime in space to be overly burdensome or restrictive. Starting from the basic tenets of international law—sovereign equality, non-interference, prohibition on the use of force, right of self-defense, peaceful dispute resolution—contributors suggest that the Outer Space Treaty (OST) explicitly applies these to activities in space. Moreover, the emphasis on accountability, transparency, and coordination of activities reflect the underlying principles of the OST, according to the contributors.

Q21. Developing Verifiable Norms in Space: Enforcement as Verification, and the Problem of Dual-Use[30]

Author(s)

Larry Kuznar and John Stevenson

Question

What can the US do to best facilitate development of verifiable norms that maintain a peaceful space domain?

Abstract

This report describes the contributors' views on the existence and non-existence of space norms, and the challenges and opportunities norms represent for peaceful space use. At the broadest level, norms are informal but generally accepted rules of behavior that are recognized and understood by a community, in this case a community of nations. Norms can emerge from either formal or informal channels. The contributors generally agree on the need for norms from both informal and formal channels to maintain a peaceful space domain.

After considering whether norms are necessary for a peaceful space domain, the contributors address how enforcement applications of norms could provide an avenue for verification. They generally agree that an increase of diverse actors (global powers, states recently entering the space domain, commercial actors) with diverse interests (domination, deterrence, profit) increases the difficulty in developing shared norms, since norms by definition imply shared values. Given the historic difficulty in achieving effective formal agreements, the contributors share a hope that less formal norms might be an option for regulating a responsible use of space. However, they often fall back upon discussion of the value of formal agreements, exhibiting a bias toward formal rules given their explicitness. Another issue the contributors stress is the need for measurable verification of how space is being used by actors, both to mark norm violations and support guidelines set forth in formal agreements.

[29] http://nsiteam.com/social/wp-content/uploads/2018/03/NSI_Space_ViTTa_Q20_Legal-Limitations-on-Space-Activities_FINAL.pdf
[30] http://nsiteam.com/social/wp-content/uploads/2018/04/NSI_Space_ViTTa_Q21_Developing-Verifiable-Norms-in-Space_Final.pdf

Q22. Effectiveness of International Agreements in Space[31]

Author

John Stevenson

Question

Can international agreements effectively protect high-value space assets in time of crisis and/or conflict? How could such a treaty be sufficiently verified? How would it be enforced? How would dual-use technologies be treated?

Abstract

This report explores the effectiveness of international agreements in space. The contributors divide nearly evenly over whether international space agreements can provide protection to space assets, with half arguing "yes," and the other half arguing "no." The most effective international agreements, according to the contributors, would require continued flexibility as well as clear verification to be enforceable and designed for the long-haul. As such, agreements that focus on prohibited activities, such as the generation of space debris, rather than prohibited technologies, both increase the enforceability and verification of effective international space agreements, as well as mitigate the dual-use feature that almost all space technologies evince. To enforce is to verify: Ultimately, from the point of an effective agreement, it does not matter what states build, it really only matters how they use what they put into space and how easily other states can confirm that what a state says it is doing is what it is in fact doing.

[31] http://nsiteam.com/social/wp-content/uploads/2018/02/NSI_Space_ViTTa_Q22_Effectiveness-of-International-Agreements-in-Space_FINAL.pdf

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- Anonymous[32]
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[32] This contributor elected to remain anonymous.
[33] Two contributors responded on behalf of a commercial entity but elected to remain anonymous.
[34] This contributor is an executive of a space launch company but elected to remain anonymous.

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