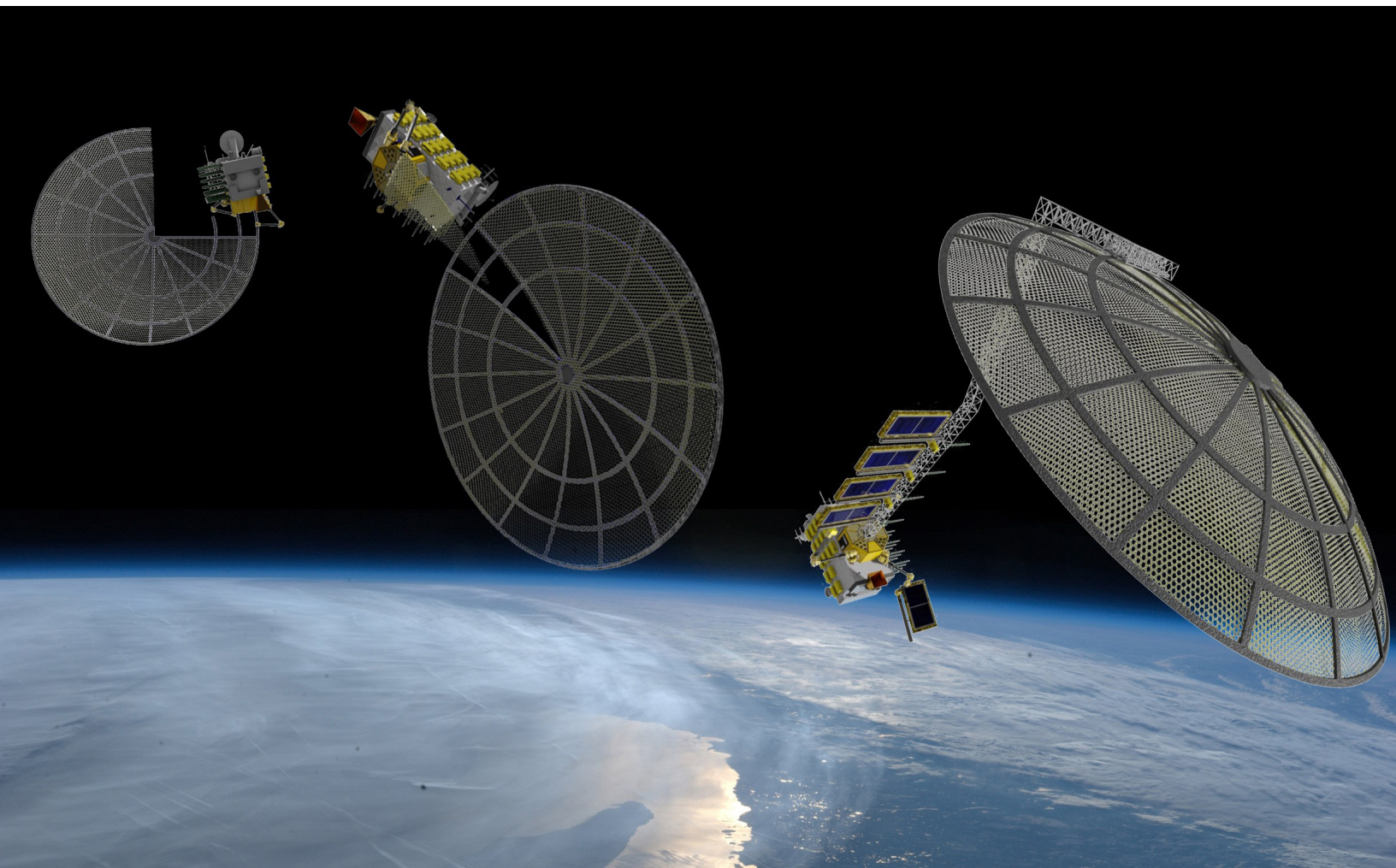


IDA Space Forum:

Utilizing Commercial Space Capabilities in Government Systems

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May 2, 2023

IDA

A. Background

The Institute for Defense Analyses (IDA) hosted an invite-only forum on government utilization of commercial space capabilities on May 2, 2023. The forum brought together 65 space experts from the U.S. military, civil, academic and commercial sectors and facilitated a robust dialogue regarding how the U.S. Government can best utilize commercial space capabilities in government missions and systems. Discussions ranged from identifying challenges space missions face in integrating data, assuring the provenance and accuracy of the data, purchasing commercial services, and developing commercial space policies. The forum was held under the Chatham House Rule; as such, this document summarizes the ideas presented across the panelists and participants but does not attribute individual names or organizations to those ideas.

An important contextual aspect of the forum was that participants seemed to be operating on different definitions of “commercial space.” In particular, there were distinctions made between traditional prime space contractors and newer space entrants. One common definition used for commercial space was from the 2020 *National Space Policy*:

goods, services, or activities provided by private sector enterprises that bear a reasonable portion of the investment risk and responsibility for the activity, operate in accordance with typical market-based incentives for controlling cost and optimizing return on investment, and have the legal capacity to offer those goods or services to existing or potential non-governmental customers.¹



However, some participants understood commercial space more broadly as “non-government” entities and services.

IDA’s Space Forum centered on solutions to overcome challenges and manage the risk of leveraging and integrating commercial space data, products, and services into governmental missions. The forum emphasized that in the expanding space economy, the U.S. Government and commercial space companies share common goals in leveraging commercial data, products, and services to achieve the strategic objectives for national security and civil space, while developing and maintaining a robust commercial sector.

B. Key Takeaways

1. **Commercial space capabilities are diverse and changing how space missions can be accomplished.**

Commercial companies are rapidly progressing and diversifying their capabilities, which creates new opportunities for the government. In contrast to previous decades in which commercial companies

¹ “National Space Policy of the United States of America” (Executive Office of the President, 2020), <https://trumpwhitehouse.archives.gov/wp-content/uploads/2020/12/National-Space-Policy.pdf>, p. 20.



offered the same services as government-owned platforms (e.g. SATCOM, imaging), commercial companies now offer unique emerging technologies and services. For example, commercial providers may be the first to provide certain In-space Servicing, Assembly, and Manufacturing (ISAM) and debris removal capabilities in space—ahead of the government. The United States Space Force (USSF) has been working to restructure how it interacts with commercial, and has recently stood up the Commercial Space Office. The new office will be responsible for engaging with industry and will serve as the coordinator between commercial satellite operators and various operational commands. In addition, it will have the Space Domain Awareness marketplace, the Space Systems Command Front Door (one-stop-shop for industry engagement), and SpaceWERX. As one speaker noted, the demand for easier access to commercial capabilities is growing, but it also requires an enterprise-wide cultural shift to change the way the USSF does business.

New commercial capabilities offer new avenues of thinking about fulfilling space missions by focusing on delivering capabilities instead of procuring systems. In this manner of thinking, rather than purchasing a particular platform to accomplish a mission, the government instead identifies the “question that needs answering” and lets the commercial sector come up with the way to answer it. This approach leverages the strengths of the commercial players, namely speed and innovation, and supports industry development. Participants mentioned several places where this has been successfully implemented, notably when the Department of Defense and the intelligence community leveraged commercial satellite remote sensing companies to collect and release information on adversarial activities that the government could not, due to either a lack of specific hardware or classification restrictions. Examples of this practice include documenting war crimes occurring in Ukraine, or monitoring Chinese maritime vessels intruding into other nations’ economic exclusion zones.



Commercial and government attendees were excited about the prospects of integrating the emerging commercial market into government missions, but cautioned against complete reliance on commercial capabilities. One panelist commented that the remote sensing market should be 80 percent commercial and 20 percent government solely for the purpose of maintaining government expertise and knowledge. During the discussion, two main reasons for this caution were noted. The first was the existence of critical national security missions, such as nuclear command and control, which panelists agreed should not be removed from U.S. Government ownership. The second was that certain defensive measures, such as countermeasures or low observability features, are not economically viable and so would not be adopted by commercial providers. In the event that a conflict extends into space, space assets to fulfill missions requiring this level of resiliency would therefore have to be acquired or prescribed by the U.S. Government through more traditional acquisition means. Outside of these situations, while the government will wish to build and maintain some exquisite capabilities for itself, it can find areas where commercial companies are “good enough” and leverage those capabilities in a cost-effective and efficient manner.

2. The need for government and commercial burden sharing is driven by increasing space threats.

Participants agreed that the space environment is becoming increasingly complex, contested, and threatening. The specifics of operating in the space domain—distance, velocities, orbital trajectories—mean that defending against threats is particularly challenging. Participants noted that while the government has consistently put forth the position that it will “protect and defend” U.S. space assets, the details regarding exactly how that will be accomplished are yet to be clarified. However, participants and panelists generally agreed that as the government integrates commercial capabilities, the burden of risk should be shared between the commercial operators and the government. The core issue is liability and indemnification. Participants discussed that the level of protection afforded to commercial companies should be dependent upon the service, and could perhaps be included as part of the original contract.

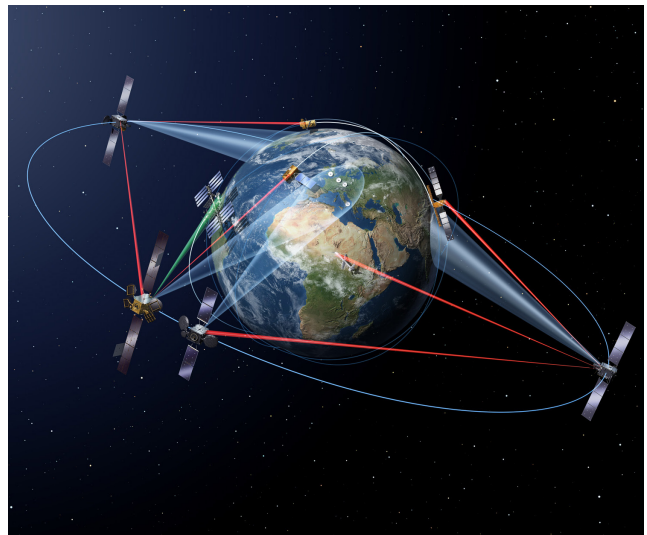
As the discussion evolved around this topic, a number of common themes emerged. Chief among them was the paramount importance of space situational

awareness and providing verification and attribution for space activities. To defend space assets, one must be able to detect that an attack is taking place and attribute its source before acting. This is a nontrivial task given the vast orbital distances and extremely high velocities involved. Second was that any defensive policy must not be limited to one type of action: the full gamut of options available must be considered, including economic, diplomatic, and military. One notable analogy regarding this approach was the United States defending commercial airliners. It would be impractical to provide each passenger jet with its own fighter defense; instead, protection is provided through deterrence (threat of response, both kinetic and non), situational awareness, and avoidance of hot-conflict areas.

Lastly, and perhaps most importantly, participants identified that any defensive measures employed should be proactive, not reactive. During peacetime it is necessary to build the contract structures, relationships, training, and trust, so that all entities are prepared in the event that a conflict does escalate into space.

3. Data Interoperability and Assurance: Integrating commercial space data into government missions remains challenging.

The audience and panel discussed the challenges and approaches of incorporating commercial data products, services, capabilities, and systems into U.S. Government space architectures, highlighting pitfalls of interoperability between systems and ways to avoid them. A recurring theme throughout the forum was the need to keep the end user in mind when purchasing and integrating commercial services, meaning that procurement offices and operators should understand the needs of users and the problems that need to be solved. If the end user is not considered, the service and data might not be optimally utilized. Questioning how the data will be used in the context of mission requirements



guides the approaches for both government and commercial companies. For example, creating and applying data standards can be challenging for data interoperability when the company, the country, mission requirements, units, and file formats can differ. Developing data standards used by the community mitigates these challenges and requires more engagement between all stakeholders.

Regarding the sale of commercial data to governments, there was debate among participants about the need and manner for the government to set standards and metadata field requirements. Some participants said this could represent a barrier to entry for many companies. Current standards require optimization to encourage greater commercial participation and make product differentiation and quality the main competitive goal. Some participants discussed that standards or meta-data requirements that are too strict, confusing, or difficult to implement could prevent smaller companies from participating. However, if the government sets too broad or wide-ranging standards, companies with tight or focused configurations may be less adaptable if the standards change to meet future mission needs. Participants did however largely agree that there is a need to write clear specifications and standards in order to streamline the commercial integration and interoperability process. Industry and the U.S.

Government should consider alternatives for U.S. Government standards, such as those that are being developed by international organizations, to create accessibility and remove barriers for smaller players. That said, some situations require a format that is not what the industry envisions, but what the government needs to ensure interoperability and assurance.

In regard to data assurance, participants agreed that building trust in data is one of the biggest challenges for commercial integration. One method to address this challenge was data fusion to increase confidence and reliability of data, meaning that users and analysts increase trust by corroborating information across multiple sources of data. By using multiple sources of data, sourced from both within and outside of government, analysts and decision makers can reduce the risk of making decisions based on inaccurate data. However, this is a weak strategy when an analyst does not have more than two data sources, because it is impossible to know which source is correct if they differ. One participant asked the panelists whether government users preferred raw, unprocessed data sets or a processed, polished product from commercial entities. The panel responded that for raw data, users can access and manipulate it to their specific queries, yet this expertise does not always exist in a consumer's office. For finished products, it is important to build trust through verification processes, but once the trust is established, the finished product can be utilized by a wider audience.

4. Legal and policy implications for conduct in space are understudied and misunderstood.

Despite the advantages of utilizing commercial companies, there are important legal and policy implications that need to be considered. This discussion centered on the Outer Space Treaty of 1967 and the Law of Armed Conflict. Participants addressed questions surrounding the legal obligation to “protect and defend” commercial space companies,

the U.S. Government response to U.S. space companies deploying capabilities that run counter to U.S. interests, and obligations between the U.S. Government and commercial companies during crisis and conflict.

To start, one panelist expressed concern that the U.S. Government is in violation of the principle of distinction between combatants and non-combatants from the Law of Armed Conflict. This principle requires the military to separate itself from non-combatants to reduce collateral civilian damage, both lives and infrastructure. Commercial space intermingling with the U.S. Government and military could be interpreted as violating this principle. A counter argument is to consider space assets in a similar manner to how militaries use terrestrial communications, power, transportation, and other infrastructure. In this thinking, if space comingling violates the principle of distinction, then the use of these terrestrial infrastructural commonalities violates it as well, a position that is clearly not maintained by any nation on Earth. Additionally, questions were raised regarding the point at which commercial satellites become legitimate military targets, and whether non-kinetic attacks rise to the level of *armed* attack or use of force. This is because the United Nations right of self-defense only applies when there is an *armed* attack: the use of the word “armed” creates ambiguity surrounding many antagonistic space actions. This can lead to the conclusion that when defending space-assets the U.S. Government may not be able to invoke the right of self-defense in all circumstances—for example, in response to cyber-attacks or frequency jamming.

Another legal consideration is Article 6 of the Outer Space Treaty of 1967, which stipulates the responsibility of government “oversight” of all space activities. Many construe “oversight” to imply “protect and defend.” However, that is not necessarily the case. Further, the manner in which one implements “protect and defend” is a policy judgement, not a

legal requirement, that must be clarified in advance. Attendees felt that the U.S. Government's statement of "protect and defend" implies a more active role, wherein threats are intercepted and eliminated, which does not accurately reflect the predominant space threat of non-kinetic attacks. This debate concluded that ultimately commercial companies have a choice that must be risk-informed and made in coordination with the government.

C. Conclusion

The IDA Space Forum was the third in an ongoing series of annual events hosted by IDA on current issues facing the U.S. space community. As the space environment continues to become increasingly "congested, contested, and competitive," it is

imperative that actors across the commercial, civil, and military sectors come together to identify and discuss the challenges ahead. Events such as these ensure that stakeholders are discussing how to integrate commercial capabilities into government missions, and that the data, products, and services they provide are assured to fulfill the government's need. On the other side, the government must continue to strive to foster a competitive and innovative space industry, work to remove the barriers to entry for new players, and ensure that commercial companies are able to conduct their business in space unimpeded.

This forum was funded by IDA's Central Research Program, "Space Issues Working Group."

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