CSIS BRIEFS

Commercial Space Remote Sensing and Its Role in National Security

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THE ISSUE

Over the past two decades, the pace of innovation in the commercial space remote sensing industry has accelerated. The capabilities provided by commercial firms can be used to complement government space systems across a wide range of national security missions and fill in gaps in capabilities where the U.S. government has lagged. The challenge for the military and intelligence community is understanding how to leverage commercial capabilities for military advantage while protecting national security and maintaining the health and competitiveness of U.S. companies in the global remote sensing market. This CSIS brief examines how the paradigm for space remote sensing has changed within the U.S. government, the ways commercial systems can support this new paradigm for national security missions, and the roles commercial systems can play in strategic competition. The brief concludes by looking at alternative acquisition approaches and key policy issues that should be addressed to fully leverage the innovation, capabilities, and additional capacity offered by commercial space remote sensing companies.

INTRODUCTION

As early as the launch-and-catch CORONA satellite program of the late 1950s, the United States' strategy to gain insights from space remote sensing has hinged on three paradigms: government-developed satellites, human-based processing, and agency data ownership. These approaches served the United States well during the cat-and-mouse years of space sensing competition with the Soviet Union when exquisite satellite sensors and space launch capabilities were the exclusive purview of the government. Similarly, the need to process modest amounts of analog and digital satellite images fit well with highly experienced human analysts whose contextual knowledge of normal activity at Russian airfields, training ranges, and submarine pens could quickly spot anomalies. These analysts, who closely guarded their information, created much-needed concentrations of highly competent intelligence experts.

The first hint of a challenge to these three paradigms emerged in the early 2000s with the expansion of commercial remote sensing. The commercial market for satellite imagery dates to the passage of the Land Remote Sensing Policy Act of 1992. This law replaced the Land Remote-Sensing Commercialization Act of 1984 and created the regulatory framework through which U.S. commercial companies could launch, operate, and sell space-based remote sensing data. However, the market remained relatively small until the early 2000s when privately owned U.S. companies began selling high-resolution satellite images to the government. Major government investment in commercial remote sensing, as seen in the 2010 EnhancedView **contract,** enabled commercial capabilities to augment government-owned sensing. Unclassified imagery from commercial satellites was quickly vacuumed into the Intelligence Community's (IC) classification vortex of human processing. This

system held images and analysis in IC abeyance until operators made requests to access snapshots of data.

Meanwhile, the growing complexity of the unipolar post-Cold War world led to an increasing need for remote sensing that targeted rogue states such as Iran and North Korea as well as an emerging China and revanchist Russia. The limited capacity of exquisite government remote sensing often failed to keep pace with emergent Combatant Command needs for intelligence, surveillance, and reconnaissance (ISR). The interagency image request process—while effective for methodical Cold War competition—consistently frustrated operational users and foretold the need for a new approach. Throughout the 2010s, the capability and capacity of commercial sensing continued to increase and rival that of the U.S. government. Concurrently, several government efforts to harness the power of machines for remote sensing detection and processing combined with a concept of unlocking previously enclaved data. Programs such as **Project Maven**, under the undersecretary of defense for intelligence and security, sought to rethink the three remote sensing paradigms with a new approach: privately-owned space-based sensing, machine-aided processing, and common cloud-based data sharing. These new paradigms all leveraged the power of commercial companies to achieve a speed of development and innovation unmatched by contemporary government sensing capabilities.

Top: Now declassified image of the Pentagon from a Corona spy satellite from 1967. Bottom: Image of the Pentagon from the GeoEye-1 commercial satellite in 2011.

Source: National Reconnaissance Office (Top); GeoEye (now DigitalGlobe)/The National Security Archive (Bottom)

NATIONAL SECURITY APPLICATIONS

Several remote sensing and data technologies matured in the early 2000s, and commercial investment in these technologies fueled innovation that better aligned commercial space remote sensing capabilities with government needs. Specific to sensing, the traditional on-orbit electro-optical and infrared imagery that fueled Cold War awareness of Russian actions began to rapidly increase in quality with the debut of commercial satellites such as **QuickBird** in 2001 and **GeoEye-1** in 2008. Where 60 cm resolution was top-tier in the early 2000s, 25 cm resolution or better was the norm by the mid-2010s.

Commercial companies began to see the potential for a multi-billion-dollar market providing commercial images to the government for national security, and the **2011 National Security Space Strategy** clearly identified the emerging competitive market. Reductions in the price per pound to orbit through reusable rockets and the use of small CubeSats that could allow for more satellites per launch, larger constellations of satellites, and therefore more frequent passes over areas of interest, made commercial systems the new sensing high ground. Commercial companies began combining advances in microelectronics, small satellites, and low cost to orbit to create proliferated low Earth orbit (LEO) sensing constellations: hundreds or even thousands of satellites in multiple orbital planes allowing for rapid revisit and a range of low- to high-resolution images.

These commercial advances combined with the ability to sense outside the visible and infrared (IR) spectrum

through synthetic aperture radar (SAR) and radio frequency (RF) mapping to create new commercial and security applications, from moving target indication to rapid geolocation of jamming. The promises were not just for national security: commercial companies saw the potential utility for natural disaster response and even increased awareness of changes in market conditions by observing the live movement of global rail, maritime, and truck transportation. For example, a low-resolution, high-revisit-rate SAR image of several major soybean rail yards in the Midwest could help predict changes in the market based on early warning of supply changes or supply chain disruptions.

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Some national security organizations began to see the potential uses of these new capabilities as well. Rather than relying only on low-revisit-rate exquisite national systems, the addition of commercial remote sensing could help analysts gain a better understanding of changes in adversary pattern of life at key operating areas. For example, an increase in conventional bomber assets at a forward deployed location, viewable in traditional sensing, could now be augmented with commercial images from several other bases and support locations. Additionally, higher revisit rates meant more ability to see nuanced changes in adversary posture at multiple locations. Moreover, data products derived from commercial SAR and RF satellites could augment electro-optical imagery to better characterize what an adversary is doing and how forces are operating.

At the same time as these advances in commercial space and sensing capabilities were progressing, advances were also occurring in how data was stored and analyzed. Data that was traditionally stored on hard drives and on-premises storage began to find a new medium: the cloud. The ability to move from data silos and stovepiped storage to common cloud-based environments was a key enabler for the commercial remote sensing revolution. Within the U.S. government, the data stovepipes of the past were replaced as common data access began to show utility for analysts across government agencies. One set of new commercial images could provide some value, but these images, held in a system disconnected from other sets of images, would require human copying and translation between systems. If those images could instead be combined with all other commercial and government images and then made available to all IC agencies, the new commercial data could have a non-linear impact on decision speed and capabilities. Cloud-based storage and retrieval proved not only important for access to data but also for the emerging use of machine learning to gain insights from the data.

The amount of data being collected began to increase beyond the point where a human or group of humans could process all the imagery and other data products derived from space remote sensing systems. By the late 2010s, artificial intelligence, and specifically computer vision object detection and categorization in images, was approaching performant levels. While AI was not yet on par with human analysts, key efforts such as **Project Maven** began to ask if machines, in the aggregate across hundreds of images over days, weeks, and months, could begin to determine patterns of maneuver, massing, or force posture. Whereas human cognition can quickly identify large changes across a few variables, such as numbers of aircraft, machines can detect subtle changes across hundreds of seemingly disparate variables. A change in the number and disposition of missile-loading vehicles across an adversary's military bases, while perhaps not interesting in one image, could become compelling when correlated with small changes in movements of support aircraft across many other operating locations. It is these data-based insights over large areas that machines can provide to humans to highlight possible changes in patterns of life—changes that could provide early warning of adversary activities and intent.

STRATEGIC COMPETITION

The revolution in commercial space remote sensing has the potential to shatter the paradigms of how national security professionals think about indications and warnings of adversary actions. Rather than relying exclusively on high-demand, low-density government-owned national assets, commercial sensing offers orders of magnitude more coverage and revisit rates that can augment and queue the sensing capabilities provided by more exquisite government-owned and government-operated systems.

Artificial intelligence can unburden human analysts from tediously numbering bombers and tanks in images,

and machines can begin looking at adversary actions in aggregate across vast areas at a scale and speed not possible with humans. Where humans can cultivate expertise in understanding how adversaries normally operate in a few key areas, machines can gather data from across all domains, operating locations, and intelligence sources simultaneously to inform their algorithms. Subtle changes in market prices for logistics goods that may indicate a major military movement, overlooked by human analysts in the noise of data, could be flagged by machines and combined with other open-source data to create actionable insights. These machine insights, provided to humans via alerts, place analysts in their most effective role: making decisions and recommendations based on the full context of the situation. AI systems can process the raw data to produce data products that enhance early warning awareness and enable humans to make more informed decisions to drive a U.S. deterrence action.

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Human-centric early warning today often results in late awareness and reactive decisions. In the landscape of global strategic competition where actors seek decision advantage to gain and exploit initiative, reactive nations will struggle to achieve or regain dominance. By contrast, capabilities that enable faster understanding of adversary actions enable a country to proactively deter and counter aggression. For example, if commercial remote sensing SAR capabilities indicate that an actor is beginning rail movements consistent with a buildup of forces to seize disputed territory, this awareness opens the opportunity for the United States and its allies and partners to take diplomatic actions or move forces to complicate the adversary's calculus before the final invasion decision is made. In an era of grey zone competition where, according to Russian chief of staff Valery Gerasimov, "wars are not declared, and having begun, proceed to an unfamiliar template," it is vital to understand these subtle cues that reveal an adversary's intent. The vast quantity and ubiquity of commercial space remote sensing data combined with algorithms and cloud computing that use this data to detect the **subtle cues** underlying grey zone actions may provide an outsized impact on strategic competition—especially considering that competition's global nature.

Since commercial remote sensing mainly leverages emerging **LEO** constellations, the terrestrial footprint of these satellites is inherently global in nature. This fact aligns well with the increasingly global strategy of competitors such as China, which, through investments including the Belt and Road Initiative, seek leverage well outside the Western Pacific. Understanding how China is taking actions to gain influence throughout the globe becomes a key aspect of understanding the subtle cues inside grey zone warfare.

U.S. Combatant Commands have recognized the value of commercial remote sensing and the global integration opportunity that it offers. Through a **series of recent experiments** involving all 11 regional and functional

Representatives from all 11 U.S. combatant commands participate in the third series of Global Information Dominance Experiments (GIDE) at North American Aerospace Defense Command and U.S. Northern Command Headquarters, July 13, 2021.

Source: U.S. Air Force photo by Tech. Sgt. Tommy Grimes

Combatant Commands, USNORTHCOM advanced the use of commercial space remote sensing to gain an understanding of how adversaries were moving globally and how the Joint Force could rapidly collaborate across the globe to create dilemmas and achieve deterrence. These efforts are now partnered with Deputy Secretary of Defense Kathleen Hicks' recently announced **Artificial Intelligence and Data Accelerator** program to jump start effective data-sharing efforts and scale them across the Combatant Commands. This program comes on the heels of **Secretary Hicks' data decrees** instructing the Department of Defense (DoD) to move off its paradigm of well-intentioned agencies, preventing siloed data from being shared across the force. Sensing data, in particular, falls prey to the tendency to protect what is owned rather than provide it across the government. Commercial space remote sensing is primed to be a first example of the power of common data access across government agencies for decisionmaking and use by AI for generating new insights. Rather than several disparate agencies enacting their own commercial agreements and then holding their newfound sensing data hostage, combining this sensing in common cloud environments can unlock new insights for strategic competition. While commercial remote sensing is central to enabling a national security enterprise that can dominate in strategic competition, the way that the government integrates these commercial capabilities is key.

ACQUISITION APPROACHES

One of the biggest obstacles for the U.S. government to effectively access commercial space capabilities is the acquisition and contracting system. Many pathways exist for how DoD and the IC can leverage commercial systems depending on whether they want to buy capabilities as a product or as a service, and the way the government chooses to acquire these capabilities can in turn affect what companies are willing to offer. The U.S. government has traditionally procured space systems as products, where it specifies requirements (often unique to the military or intel community), assumes ownership of the satellites and ground systems, and operates these systems, albeit with support from contractors. This approach is appropriate for capabilities that are truly unique to the government, where the technologies involved are highly sensitive or exquisite, and where the potential for a commercial market does not exist (i.e., there are no other potential customers). But for space capabilities where commercial companies can compete or may even have an advantage, the product-based approach can make it difficult for commercial companies to work with the government.

The Space Development Agency (SDA) is attempting to modify the product-based approach in several ways. It is actively working with industry to leverage commercial capabilities for satellite components, such as satellite buses and intersatellite links, by prioritizing commercial off-the-shelf (COTS) capabilities. It also plans to **use commercial firms to operate its Tranche 1 satellite constellation**, making it a government-owned, commercially operated (GOCO) space system. And it is **streamlining the contracting process** by using a contracting mechanism known as other transaction authority (OTA) rather than following the traditional procurement process under the Federal Acquisition Regulations (FAR). According to **SDA director Derek Tournear**, this approach is intended "to make sure that anyone that would like to bid and compete has the opportunity to submit a proposal."

However, buying space systems as products does not fully access the innovation and capabilities in the commercial space remote sensing market. Many commercial space companies are built around a services-based business model where the data collected can be sold to more than one customer. The product-based model puts relatively more risk on the government in terms of up-front costs, technology obsolescence, operating costs, and capacity limitations. Buying remote sensing as a service allows the government to leverage private capital and put more of these risks on the companies involved and, by extension, their investors. Buying space services rather than satellites gives commercial firms a higher incentive to drive down operating costs and continually improve capabilities to win more work. And companies that are successful at selling the same services to other customers (e.g., commercial as well as allied and partner governments) can use this additional revenue to invest in better capabilities, additional capacity, or lower prices to gain greater market share.

Many different approaches are available for the U.S. government to buy commercial space services in ways that are compatible with commercially oriented businesses. The most basic approach is to buy images or other data products on a pay-as-you-go basis, with the government being one of many potential customers. For example, the government can ask that a particular location be sensed at a particular time or request data from prior passes and pay a negotiated fee for each request. A more comprehensive approach is to buy subscription access to a company's catalog of data, giving the government full (but not

exclusive) access to current and historical data. In addition to having full catalog access, the government could also include contract options to direct satellite tasking as necessary to ensure certain locations or activities are sensed at specified times or to place a period of exclusivity on when certain data can be made available to other users. Importantly, the government would need to negotiate fair and equitable pricing for these options so that it does not undermine the business model and financial health of the companies it is working with.

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A different approach would be to contract for exclusive use of a certain fraction of a space systems' capacity, which would effectively be a time-sharing approach. During the periods in which the government has use of the system, it could direct taskings and retain exclusive use of the data collected. For example, the government could contract for 50 percent of the daily capacity of a satellite constellation and work with the contractor to specify collection priorities and taskings. The data collected during the government's time using the system would be passed to the government for its sole use, but data collected during the other half of the satellites' operational capacity each day could be used by the company for other customers.

The military and intelligence community have also explored the idea of creating a space equivalent of the **civil reserve air fleet (CRAF)**. CRAF allows U.S. Transportation Command (USTRANSCOM) the ability to access additional airlift capacity quickly in an emergency when the need for airlift exceeds the capacity of U.S. military aircraft. Air carriers are incentivized to commit aircraft to the CRAF program because it gives them the opportunity to compete for regular airlift contracts—and their priority for bidding on task orders is higher the more aircraft they commit to CRAF.

A **draft request for proposals** (RFP) issued by the National Reconnaissance Office (NRO) in July 2021 proposed a contract clause that appears intended to create something akin to a civil reserve space fleet. But the contract clause as proposed differs from the CRAF model in several important ways. CRAF is fundamentally designed to expand the capacity available to the government in a crisis. The wording in the NRO's RFP, however, is designed to not only expand the government's collection capacity but also to restrict capacity available to other users. When activated, this contract clause would require the contractor to "permanently withhold all imagery collected by the Contractor's satellites over the designated area from resale or exposure to a public domain or interface, and shall make the imagery available only to users approved by the Government." Such a clause could potentially undercut some commercial applications that are based on change detection and consistent monitoring over time because the data would be permanently restricted (rather than temporarily withheld). It also would be ineffective in preventing space remote sensing over certain regions of the world in a crisis—the ostensible reason for the restriction—because companies not participating in the program (including foreign-operated space remote sensing systems) would still be free to collect and distribute data without restriction. It would only limit the companies participating in the program, potentially placing them at a competitive disadvantage.

When acquiring commercial space remote sensing services, the government must also be mindful of how it sets requirements and the secondary effects this can have on the market. In a truly commercial market, buyers exert influence over sellers through patronage. They choose whom to buy from based on what companies are offering, and the price buyers are willing to pay is a function of how well the services provided meet their needs. When a dominant customer, such as the U.S. government, attempts to impose requirements on an industry, it can distort the market and limit the ability of companies to differentiate themselves. Government-imposed requirements can undercut the diversity of capabilities being offered and the unique characteristics that may make some companies more competitive for other customers, which can ultimately narrow the market and limit the incentives for commercial investment and innovation.

The acquisition strategy used for commercial space remote sensing also needs to ensure it creates on-ramp opportunities for new companies to bid and compete as their capabilities come online. The commercial space market is fast-paced, with new companies emerging frequently. If the government wants to move fast and innovate more rapidly, it needs to create opportunities for new companies to get on contract and begin competing for task orders on a rolling basis rather than waiting months

or sometimes years for contract opportunities. Smaller firms can have cash-flow issues, and investors often want to see a demonstrated ability to earn revenue before committing more funds. The government can facilitate this by allowing companies to begin earning revenue as soon as their capabilities warrant it by offering contract on-ramps more frequently.

POLICY ISSUES

The U.S. government is not just a dominant buyer (or potential buyer) of commercial space remote sensing data. It is also a regulator that controls what capabilities U.S. companies can build, how they operate, and what they are allowed to sell. Commercial licenses for space-based remote sensing are processed, approved, and supervised by the Department of Commerce's National Oceanic and Atmospheric Agency, in consultation with the military, IC, Department of State, and other relevant government agencies. However, the U.S. government can only regulate the activities of U.S. companies and U.S. personnel. It cannot regulate foreign companies or control what kind of data they collect, when they collect it, or how the data is stored and distributed. For example, a foreign-owned company can collect data over sensitive locations where U.S. companies are restricted. Conversely, a foreign government could stop one of its companies from selling data to the U.S. government during a crisis. The United States therefore has a vested interest in maintaining a competitive advantage in commercial space remote sensing so that the most capable companies remain within its jurisdiction and accessible to the U.S. government. The challenge, however, is balancing the need to protect national security interests with the desire to promote a more competitive commercial sector.

The are several tools through which the U.S. government can establish a favorable balance between security and commerce. The **National Space Strategy**, last updated in March 2018, establishes four pillars that are intended to drive a whole-of-government approach for space. One of the four pillars calls on the government to "foster conducive domestic and international environments" for space by streamlining "regulatory frameworks, policies, and processes to better leverage and support U.S. commercial industry." This overarching strategy was complemented two months later by **Space Policy Directive-2** (SPD-2), which provided greater detail for how the streamlining of commercial space regulations should proceed. Section 3 of SPD-2 called for a review and update of regulations pertaining to commercial remote sensing to "encourage American leadership in space commerce." The Department of Commerce began the review and update process shortly thereafter, and the **updated regulations** were issued in 2020. Despite these updates to strategy and regulations, the **U.S. Commercial Remote Sensing Policy (NSPD-17)** has not been updated since April 2003.

The Biden administration appears to be continuing many of the key elements of the previous administration's space strategy and policy initiatives. In its **U.S. Space Priorities Framework**, which was released at the first meeting of the National Space Council under the new administration, the Biden administration outlined several policy priorities for space. One of its priorities is to foster a "regulatory environment that enables a competitive and burgeoning U.S. commercial space sector." It intends to do this in part by working "with allies and partners to update and harmonize space policies, regulations, export controls, and other measures that govern commercial activities worldwide."

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A move toward more consistent regulations across allies and partners is essential to creating a level playing field for commercial space companies. U.S. regulations for commercial space remote sensing have traditionally set thresholds for the level of resolution allowed by U.S. commercial satellites based on the best resolution available from foreign sources—or what is expected to be available in the near future. This holds back U.S. companies until foreign competitors advance their capabilities, creating what is effectively a perpetual second-mover disadvantage. Setting regulations in concert with other countries—rather than in reaction to what they are doing—can break the United States out of this dilemma.

The Space Priorities Framework includes export controls among the list of items it intends to harmonize with allies and partners. This is important because export controls can serve as a "back door" means of regulating commercial space activities. Export controls can be used to restrict commercial space activities that are already licensed or

do not require a license under existing U.S. laws and regulations by restricting the release of data products (e.g., images) derived from these systems.

The Space Policy Framework also states that "the United States will leverage new commercial space capabilities and services to meet national security requirements." This policy could potentially be a boost to commercial space remote sensing companies if DoD and the IC follow through with new programs and contract opportunities.

The United States is at a critical point in how it regulates commercial space remote sensing. The policy and regulatory **missteps of the 1990s** for commercial SAR satellites should serve as a lesson for policymakers today. The U.S. government stifled the development of commercial SAR satellites by U.S. companies and effectively ceded the market to Canada and Germany. To maintain U.S. leadership and a level playing field in this critical market segment, U.S. policies and regulations must continually adapt to ensure that U.S. companies are not held back in terms of their capabilities until foreign companies catch up or exceed them. While the regulatory updates in 2020 were a step in the right direction, a key factor in whether these changes will be effective is how the new regulations are interpreted and applied.

The House and Senate Armed Services Committees have actively pushed the executive branch to use commercial space remote sensing for national security missions in recent years. **Section 1612 of the FY 2021 National Defense Authorization Act** (NDAA) requires DoD and the IC to leverage commercial space remote sensing capabilities "to the extent practicable." It specifically requires the NRO and NGA to consider in their analysis of alternatives for future capabilities "whether there is a cost-effective domestic commercial capability or service available that can meet any or all of the geospatial-intelligence requirements of the Department of Defense, the intelligence community, or both." If such a capability is available, the law directs that the NRO and NGA will "give preference to using such domestic commercial capability or service to meet requirements."

The FY 2022 NDAA also included several provisions related to DoD's use of commercial space services. The **report accompanying the House version of the bill** included language reinforcing the committee's emphasis on leveraging commercial capabilities. It directed DoD, in consultation with NRO and NGA, to submit a report to Congress "identifying each commercial vendor that provides global imagery to support Department of Defense combatant commands," "any gaps" in meeting current demands for ISR, and "an assessment of how commercial capabilities can be integrated into the current and planned sensor-to-shooter programs across the services." It also requires a separate report detailing how DoD is implementing the policy guidance in the FY 2021 NDAA, specifically with regard to leveraging commercial space-based RF capabilities. The final version of the FY 2022 NDAA also included a provision requiring the service acquisition executive for space to "determine whether existing or planned commercially available capabilities could meet all or a portion of the requirements" for space acquisition programs before they are formally established as a program of record. Overall, the language in the House report and the text of the FY 2022 NDAA suggest that the defense committees continue to take a keen interest in this issue and may legislate further—potentially through appropriations as well as policy—if the reports requested and the FY 2023 budget submission do not satisfy congressional objectives.

CONCLUSIONS

Space remote sensing has been an important component of U.S. intelligence collection and power projection capabilities for more than six decades. While the paradigms that initially developed for space remote sensing (government-developed satellites, human processing, and siloed data) served the nation well throughout the Cold War, advances in commercial space remote sensing offer the potential to alter these paradigms in ways that provide new advantages. The commercial space remote sensing industry is advancing rapidly in terms of satellite technology, advanced sensors and sensing methods, large constellations, and high revisit rates. Moreover, the industry is leveraging AI systems to rapidly process raw sensing data into actionable products for human analysts, and it is using secure cloud-based systems for storage and dissemination to eliminate data silos. To be sure, commercial systems will never be a replacement for exquisite government-owned and government-operated space remote sensing capabilities, and some missions may not be appropriate for commercial sensing capabilities. But as both Congress and the National Space Council have recognized, commercial space remote sensing should be an important component of the overall ISR architecture for DoD and the IC.

As this report has noted, one of the main obstacles to

effectively leveraging commercial capabilities is the acquisition and contracting system within the U.S. government. The traditional approach of buying space remote sensing capabilities as a product rather than a service is incompatible with the business model of many commercially oriented firms. Moreover, the multiyear requirements development and funding process typically used by DoD and the IC for acquisition programs is far too slow to keep pace with the innovation cycle of commercial space companies and the capabilities of U.S. allies and adversaries alike. To fully leverage the innovation, capabilities, and additional capacity offered by commercial space remote sensing companies, the U.S. government will need to adjust its acquisition approaches to focus on buying services rather than products and creating contract on-ramp opportunities on a more frequent basis.

There appears to be agreement among members of Congress and the Biden administration that a robust commercial space remote sensing sector is important for U.S. national security and that the military and IC should more effectively leverage commercial capabilities. The real measure of commitment, however, is whether these policy objectives manifest themselves in contracts and funding opportunities over the coming months and years. ■

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