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Space in the National Interest: Security in a Global Domain

By Eric R. Sterner

Briefing Highlights

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On paper, the United States has the world's most powerful military. It has the largest navy, the most modern and combat-tested army, and an air force unparalleled in its full-spectrum capabilities. On paper, the United States dominates every potential adversary on the land, sea, and in the air.

But of course, wars do not occur on paper. Location matters. Since the Civil War in the mid-19th century, Americans have fought most of their major wars across vast oceans. What matters when the shooting starts is not what U.S. military forces look like on paper, but how they stack up in the actual theater of war. Only a portion of the United States Navy, for example, is available for deployment at any given time. Of that, an even smaller fraction is available for operations in any single theater due to commitments around the world. Simply, aircraft carriers, cruisers, destroyers, frigates and submarines needed in the Atlantic, Mediterranean, and Indian Ocean are not available for use in the western Pacific. In contrast, our adversaries generally fight closer to their own territories. Consequently, they are likely to have a higher percentage of their forces available for use.

The U.S. Army and Air Force face similar strategic challenges. The physical domains of land, sea, and air present massive geographic challenges that have to first be overcome before the United States military can make itself felt. It has been that way since the beginning of warfare, and will likely be that way forever.

A Vital Domain

In this context, space becomes critical. Space is the only physical domain that spans the globe. Simple physics make it possible to get anywhere on the planet's surface from space. Those with access to it acquire relevant military capabilities, ranging from intelligence and command/control to weapons delivery. A high percentage of space assets are potentially available for these missions. The technological challenge has always been *getting* to space. Ballistic missiles with sufficient power make that possible, and they are proliferating.

What made the Cold War struggle particularly frightening was the prospect of nuclear weapons, many of which would be delivered quickly by space-transiting intercontinental ballistic missiles. The ability to reach space gave the superpowers unprecedent-

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ed access to the world; nuclear weapons gave them the ability to inflict massive damage on their targets. At the dawn of the space age, they could do so without first needing to defeat a target's defensive capabilities. This was truly revolutionary in the history of warfare.

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The same attributes that made space a valuable military domain made it attractive for a range of other economic, political, and scientific purposes. Both superpowers pursued these benefits during the Cold War, as have almost all countries developing the ability to use space since. So far, none have been more successful than the United States.

Space in the National Interest

People are most familiar with the use of space for scientific, political, and other "soft power" purposes, carried out primarily through the nation's civil space program. Winning the space race by putting a man on the moon in 1969 demonstrated the superiority of the American scientific and technical enterprise over that of the Soviet Union. Today, remote exploration of Mars and other planetary bodies generates world attention. Astronomical observation by NASA's "great observatories" is changing the way we understand the universe, and by extension, our place in it. Turned inward, American space capabilities track the weather and improve our general knowledge of the earth's environment and the earth-sun system, with an unparalleled impact across a range of human activities, such as agriculture, urbanization, transportation, resource exploration, and the like.

Because these missions are technically demanding, they often require the development of new capabilities. Challenging space activity can change the state of the art in various scientific and engineering disciplines. As such knowledge improves, it becomes more readily available for non-space applications. NASA and NOAA are the dominant sources of federal spending on civil space programs. NASA's consolidated appropriation for fiscal year 2014 was roughly $17.6 billion. The President's fiscal year 2015 budget baseline requested $17.4 billion, with an $885 million supplement as a component of the Opportunity Growth and Security Initiative, bringing the total request to $18.4 billion. Competing bills in the House and Senate would fund NASA at between $17.6 and $18.4 billion.[1] NOAA's appropriation for fiscal year 2014 was just shy of $1.9 billion.[2] The total budget request for fiscal year 2015 is, of course, roughly $3.9 trillion, making civil space spending roughly one half of one percent of the total federal budget.

Commercial space activity tells a different tale, but is important to the nation's economic well-being and might. The activity itself is difficult to categorize, as there are varying definitions of "commercial." The 2010 *National Space Policy* argues, "The term 'commercial,' for the purposes of this policy, refers to space 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 these goods or services to existing or potential nongovernmental customers."[3] This is slightly different from earlier administrations, which had focused more on the potential of a good or service to be economically viable in a commercial market, without regard to U.S. government spending.[4]

The Space Foundation values the global commercial space industry at roughly $116 billion.[5] Most of the revenue derives from designing, building, launching, and operating communications satellites, but non-telecommunications applications are growing. For example, privately owned and operated satellites collect and distribute high-resolution remote sensing data that once was the purview solely of the superpowers. Firms have begun investing in and developing human spaceflight capabilities for private sector customers, initially in suborbital space with the intent of moving into low-earth orbit, beginning with government customers, but with the intention of deploying private space stations for private customers.

While the specific sectors of space activity are important, the critical roles of space goods and services in the nation's future are less well defined, in part because they have been commoditized and integrated with the modern, technologically-advanced economy. The latter would not exist without space systems.

Military Applications

While civil and commercial space activities provide a range of applications, create employment, and promote technological progress, use of space for military and intelligence (often referred to as "national security space") purposes remains a priority for the United States—one whose importance cannot be overstated. According to Deputy Assistant Secretary of Defense for Space Policy Douglas Loverro:

> [S]pace remains and will continue to remain vital to our national security. It underpins DOD capabilities worldwide at every level of engagement, from humanitarian assistance to the highest levels of combat. It enables U.S. operations to be executed with precision on a global basis with reduced resources, fewer deployed troops, lower casualties, and decreased collateral damage. Space empowers both our forces and those of our allies to win faster and to bring more of our warfighters home safely. It is a key to U.S. power projection, providing a strong deterrent to our potential adversaries and a source of confidence to our allies.[6]

It may be more useful to think of space capabilities as a pre-deployed global intelligence, surveillance, reconnaissance, communications, command, and control capability, (ISRC3) useful in both wartime and peacetime. By deploying such assets in space, the military is able to operate with a smaller footprint, lessening the logistical strain of operating on a global scale.

Space capabilities are also vital to maneuvering forces and using firepower. Here, the Global Positioning System (GPS) is critical. GPS is a constellation of 24 satellites plus orbital spares (some of which have been incorporated into the constellation's architecture for improved performance), each of which contains a precise clock and emits a regular signal. By measuring one's relationship to the satellites through differences in the timing of the clock signal, it is possible to precisely determine one's position on the planet. Originally developed to aid ship navigation and improve the accuracy of sea-launched ballistic missiles, the advent of microprocessors has enabled even heretofore "dumb" bombs to become precision munitions. The list of non-military applications, meanwhile, is nearly endless.

But such capabilities are expensive. For fiscal year 2014, the Congress appropriated almost $9 billion for space research, development, testing, procurement, operations, and maintenance in its *unclassified* systems. The President requested nearly the same amount for fiscal year 2015.[7] Most of this funding addresses communications, GPS, space launch, and space surveillance, so-called "white" space systems. Budgets for ISR functions, which serve more than the military and are often referred to as "black" programs due to the secrecy that has shrouded them, are generally classified. But, the Space Foundation estimates all U.S. government spending on space at just under $48 billion, the bulk of which will be associated with national security.[8]

"Only three nations (the United States, Russia, and China) possess full-fledged ICBMs, but eleven can launch payloads into outer space, giving them de facto ICBM capabilities."

No other country today approaches the United States in the robustness of its space capabilities. But that is changing.

The Proliferation of Space Technologies

For most of their history, threats to U.S. space capabilities were limited. Only the United States and the Soviet Union possessed significant space assets and the initial spread of technology was to friends and allies which had no intention of threatening either superpower. But, history, and thus technological progress, moves on. Other countries began acquiring the ability to design, build, launch, and operate their own spacecraft. While many initiated ostensibly peaceful programs, space technologies are dual-use, meaning civil and commercial systems also have military applications.

Some 170 countries now either own, operate, rent, or finance the development of satellites.[9] Many are acquiring these systems from more advanced spacefaring nations, but a number are developing them indigenously.

While the bulk of these systems exist for peaceful purposes, they can easily be exploited for military applications. China, Russia, and the European Union all have deployed navigation systems similar to GPS for both military and civil/commercial purposes. According to Scott Pace, Director of George Washington University's Space Policy Institute, Japan has announced plans to sell a radar satellite to Vietnam, and South Korea is marketing optical imaging satellites to the United Arab Emirates.[10] Both deals would improve the recipient's ISR capabilities. And they are but two examples of a growing trend.

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Ballistic missiles have long drawn the most concern, largely because they are most closely associated with weapons delivery. Space launch vehicles are just very powerful ballistic missiles with intercontinental ranges. An intercontinental ballistic missile (ICBM) is just a space launch vehicle whose orbit intersects the surface of the earth. Thus, the proliferation of space launch vehicles for peaceful purposes also signifies the spread of intercontinental ballistic missiles. Only three nations (the United States, Russia, and China) possess full-fledged ICBMs, but eleven can launch payloads into outer space, giving them de facto ICBM capabilities.[11] The majority of these countries are not potential adversaries of the United States, but a notable exception is Iran. (A significant number of states have intermediate and short-range ballistic missiles, which threaten U.S. interests and allies and would be able to reach the United States if launched near U.S. territory).

As dangerous as ballistic missiles are in their own right, a growing number of states are developing the ability to threaten U.S. space advantages. They recognize the asymmetric advantages that space systems give the United States, and conversely the strategic vulnerability U.S. dependence on those systems creates. Russia inherited counter-space capabilities from the Soviet Union. China, for its part, has been developing them rapidly, and has used a targeting laser on U.S. satellites, jammed satellites, and demonstrated a working kinetic anti-satellite (ASAT) weapon in a controversial 2007 test. This year, the Director of National Intelligence specifically raised concerns about Russian and Chinese counterspace capabilities in his annual survey of threats.[12]

The threat, moreover, is growing. General William Shelton, Commander of the U.S. Air Force's Space Command, has expressed his concerns about threats to U.S. space systems in *all* orbits, not just the low earth orbit in which China's 2007 ASAT test demonstrated capability.[13]

More indirectly, countries have acquired the capability to jam GPS signals locally and satellite communications links at the satellite, essentially threatening the utility of America's global ISRC3 capabilities. For example, Indonesia, Iran, and Turkey have all jammed satellites, while Iraq employed localized GPS jammers during Operation Iraqi Freedom. Brazilian hackers even reportedly hijacked a U.S. Navy satellite's transponders.[14]

The Obama administration describes this security environment as congested, competitive, and contested.[15] As the number of spacefaring states and their capabilities grows, the dangers to U.S. space capabilities will increase. In that vein, so will the threats to its missile defense capabilities. Space is a critical element in detecting, characterizing, and defeating, ballistic missile attack. Less capable missile defenses will increase the vulnerability to ballistic missiles—meaning the spread of counter-space capabilities will exacerbate the threat of proliferating ballistic missiles.

U.S. Space Strategy

The administration's strategy for dealing with these dangers has five components: 1) promote the responsible, peaceful, and safe use of space; 2) enhance the resilience of DOD space capabilities; 3) pursue partnerships with like-minded international organizations and firms; 4) deter aggression; and, 5) defeat attacks and prepare to operate in a degraded environment. Each of these elements is generally consistent with the space policies of prior administrations, although significant differences exist in the means the Obama administration is using to pursue them. More importantly, however, a critical element is missing from the national space policy: namely, a firm commitment to developing the capability to deny potential adversaries use of space for their own military purposes during times of conflict. This last item is of particular concern in light of the increasing number of states with space capabilities and we will return to it. First, however, the five elements of the administration's strategy must be considered.

Promoting the safe, responsible, and peaceful use of space by many nations has been a long-standing U.S. practice. It has largely been carried out by NASA, which has over 3000 programmatic or scientific relationships with more than 100 countries.[16] Peaceful missions in space can take years, if not decades, to develop and conduct. Through partnerships, the United States plays a role in guiding the expenditures, research, and development of the space capabilities of its partners during this time. U.S. influence may wax and wane for a variety of reasons, but is not negligible. The International Space Station program, for example, began in 1984 and is expected to run through at least 2020, meaning a good portion of the attention and space activity of U.S. partners was focused on human spaceflight (rather than on military activities or partnerships injurious to U.S. national interests) for over one third of a century.

Using civil cooperation in this manner requires long-term policy and programmatic stability on the part of the United Sates, such that other countries can rely on its leadership, which the Obama administration seems not to recognize. After the loss of the space shuttle Columbia in 2003, the Bush administration developed a strategic program for civil space known as the "Vision for Space Exploration"—a decades-long initiative to return to the moon and eventually send humans to Mars. It went to great lengths to incorporate other nations in this effort, encouraging them to align their planning and budgets with the U.S. agenda. Those potential partners did just that. Unfortunately, in 2010, the Obama administration abruptly reversed the course of the U.S. space program, cancelling the "Vision for Space Exploration" and terminating its flagship programs. The change of direction caught U.S. partners unawares, instantly rendering their long-term plans moot.[17] The White House made a similar reversal in the ExoMars program, suddenly dropping out after committing to a partnership with Europe.[18] Continued turmoil in the strategic direction of the civil program has exacerbated the problem.

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In addition to NASA, the Department of Defense plays a role in promoting the safe use of space. One of the greatest, growing, and relatively new hazards in space is debris, something which is largely a man-made problem. There are over 21,000 things larger than 10 cm orbiting the planet. As many as 500,000 objects between 1 cm and 10 cm in size may be orbiting the earth.[19] Any one of them is capable of destroying a satellite. Indeed, some already have. In 2009, a defunct Russian satellite and an American communications satellite collided, destroying the latter. NASA has led the way in promoting voluntary standards to reduce debris creation, which is routine in launching satellites. More importantly, the Department of Defense provides certain information to cooperating organizations that enables them to maneuver away from threatening debris. Such information sharing represents an important contribution to preserving the utility of the space environment.

The Administration has also adopted a more controversial approach with discussions over a proposed "Code of Conduct" for space. Although not quite a treaty requiring Senate advice or consent, and impossible to verify given the dual-use nature of space technology, the Administration nonetheless hopes that such a code would establish norms of behavior for countries to follow in their space operations. Under international law, such a document would not be binding—yet, having signed it, the United States would likely view itself bound by it and make programmatic and operational decisions accordingly. Under such circumstances, it is more likely that a code would produce more harm to U.S. national security than any real benefit.

Promoting partnerships with like-minded organizations is part and parcel with promoting the safe, responsible, and peaceful use of space. Again, in broad strokes, this is something the United States has done for decades, normally through NASA. As other space powers have risen, however, it has promoted cooperation among private corporations across international borders and through the Department of Defense. To the degree that these partnerships have the potential to expand the number of space powers that align their interests and goals with those of the United States, they will contribute to U.S. national security.

However, if such relationships entangle U.S. space capabilities with those whose interests do not coincide with the United States, they may create new vulnerabilities. Currently, the United States depends on Russia for crewed access to the International Space Station. The decisions to terminate space shuttle operations (made by the Bush administration) and then cancel the replacement program while accelerating controversial partnerships with emerging U.S. companies (made by the Obama administration) have left the United States and other international partners in the program dependent on the Russian Soyuz vehicle, at least in the short term. This was a manageable vulnerability when the United States and Russia were not in engaged in political conflict; it is a dire problem for the civil space program—and thus the United States' posture in space—when they are. As the Administration considers sanctions on Russia over the Ukraine crisis, it must keep in mind the fact that Russia can retaliate by cutting off access to the space station, which Russia's Deputy Prime Minister has obliquely threatened to do.[20] And this is only the beginning of the problem.

The United States relies on the Atlas V space launch vehicle to place its largest payloads in orbit. The rocket incorporates the RD-180, a liquid fuel engine, which provides the kind of "smooth ride" that best serves the national security community's sensitive payloads. The RD-180 is made in Russia, the result of a cooperative partnership started in the 1990s.[21] Consequently, medium-term U.S. space access, and thus security, depends on Russia. This obviously gives Russia an enormous amount of leverage over U.S. national security. The United States does have stockpiles of the RD-180 and an alternative in the Delta launch vehicle, mitigating some risk in the short term. Additionally, one contractor, SpaceX, is developing a competitive heavy-launch vehicle that will help the United States manage its long-term risks vis-à-vis its space partnership with Russia. In any event, the International Space Station and Atlas launch vehicles both highlight the risks that must be taken into account when considering new partnerships and cooperative relationships.

This leaves three elements to the Administration's strategy: enhancing the resilience of U.S. capabilities; deterring aggression; and, defeating attacks while preparing to operate in a degraded environment. The focus in this area has been on securing access to space and developing situational awareness.

Access has already been mentioned in the context of international partnerships. Equally important from the perspective of maintaining access in the face of declining budgets has been the challenge of balancing affordability, reliability, and performance. In the near- to mid-term, the Air Force has focused on reliability in the Evolved Expendable Launch Vehicle, while improving affordability through contract reforms and process improvements. Additionally, new developments in rocketry, most notably the growth of SpaceX and its Falcon launch vehicle, may further improve U.S. access.

While the focus has been on the rockets themselves, they are not the only elements of a nation's assured access to space. Ground infrastructure plays an important role. Here, the United States faces real challenges. Most of the infrastructure is decades old; the immediate priority has been maintaining it operationally rather than modernizing it. It often functions as a chokepoint through which our space traffic must flow. Cuts to operations and maintenance funding have led to its downsizing, further tightening the chokepoint. While this is not a crisis in peacetime, it could be if U.S. space assets come under assault or experience a series of sudden failures. Even the rise of new launch vehicles, such as the Falcon, will not alleviate this problem.

Space situational awareness (SSA) comes from the data that "allows us to understand what is on orbit, where it is, and how it is being used."[22] Without it, the United States may not even know when its space assets are under attack, let alone be able to identify, characterize, and respond to active threats. For much of its history, the United States relied on technologies for early warning of missile attack to collect this data, which is inadequate for a modern SSA capability. Today, it is developing new technologies and relying on new systems specifically for the SSA mission, as well as integrating data streams from foreign and commercial partners.

While gaps in space surveillance still remain, particularly in the southern hemisphere, the Air Force is moving to address these by deploying U.S. assets in Australia. More importantly, it is deploying a S-band radar known generally as the "space fence" to monitor objects in space and developing the Space-Based Space-Surveillance (SBSS) satellite for low-earth orbit. Space fence and a successor to SBSS have both run into problems, however; funding uncertainty and budget cuts have led to programmatic delays and the United States faces gaps in its future space surveillance architecture. So, in this area, it is not at all clear that the United States has made SSA the priority it needs to be. Instead, it is simply one among many programs competing for resources and attention within a declining defense budget.

Together, improved access and space situational awareness along the lines laid out by the Administration address today's limitations. They do not fundamentally change the *status quo*, although they can improve it substantially. Nevertheless, space assets will remain vulnerable under current plans. Consequently, they will continue to invite attack as a critical weak-point in the U.S. national security posture. Should they come under attack, they are not easily or quickly replaced. In short, U.S. space assets are not resilient, which invites attack, which in turn undermines deterrence of attacks on space assets as an asymmetric vulnerability.

The Missing Pieces

For most of the Cold War, the United States focused on building high-performance satellites. The high cost of launching spacecraft meant that opportunities for flight were limited. This incentivized engineers to pack as much capability as possible into each one, resulting in ever larger, and ever more expensive, satellites. Even then, our space posture was optimized against the Soviet Union. With the exception of a nuclear war, U.S. space architects largely assumed a relatively benign space environment, making the overall architecture rather brittle. Even today's space architecture traces its philosophical heritage to the Cold War approach to space. Rather than changing that philosophy, the Department of Defense has focused on making those brittle assets more useful to the warfighter outside of the Cold War context. Pentagon officials have long been aware of this and know that it is not affordable, or acceptable, in the long run.

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For the better part of two decades, an insurgent minority has sought to address these problems by making space systems themselves, and not just their application, more responsive to the needs of the warfighter and the changing threat environment. It has adopted the phrase, "operationally responsive space" to capture the philosophy, but in fact the traits of ORS have their roots in missile defense and the late 1980s. It has been clear for decades that space is critical to missile defense, so this should not come as a surprise.

Launching missiles are most vulnerable in their launch phases, when they are slower, their bright plumes make them readily identifiable targets, decoys have not been deployed, and any fallout or debris from an interception falls on the launching country. The best place from which to reach them at that point is space. In the 1980s, the technology of the day led analysts to consider building massive satellites, the launching of which were largely beyond existing U.S. capabilities. Moreover, such platforms were vulnerable to attack and impossible to replace in a timely fashion. The U.S. space industrial base and infrastructure were too fragile, too complex, too slow, and too expensive to contemplate such systems without major reform.

By the first Bush administration, system architects realized that they needed to build a system that addressed these limitations as a function of the whole architecture, rather than maximizing the performance of individual platforms. Facing the same problems that plague today's space systems, they crafted an architecture known as Brilliant Pebbles, which would be a constellation of individual interceptors incorporating microelectronics and capable of being manufactured on an assembly line. Individually, each spacecraft could intercept just one ballistic missile, but overall, the constellation was less expensive, more robust, and more flexible than the alternatives. Loss of a single satellite, or even a small group, would not render the entire capability inoperative and the constellation was scalable.

This notional constellation led to a new approach to developing space technology, which focused on making it affordable and responsive to a changing threat. Three test programs: Clementine, the Miniaturized Sensor Technology Integration initiative, and the DC-X launch vehicle, flowed from this approach. The first demonstrated missile interceptor technologies; the second advanced assembly line and spacecraft bus processes, and the last promoted low-cost ground operations capabilities in a reusable launch vehicle.

"We must consider different architecture options that will provide adequate and resilient capability at an affordable cost." The buzz phrase is "disaggregation"—essentially breaking up the major systems and distributing their payloads across a mix of multiple platforms."

All three programs followed a "build-a-little, test-a-little" philosophy that meant developing and testing technologies on an incremental basis, rather than attempting a full-scale development program from concept to deployment. All three programs met with varying degrees of success. The Clinton administration completed those already approved for development, but discontinued the space activity as it reoriented missile defenses toward terrestrially-based systems. Nevertheless, the missile defense program's space successes pointed in a new direction: focusing on rapidly-prototyped systems with distributed architectures that, collectively, perform the mission, rather than high-performance systems concentrated in a smaller number of platforms. The approach spread; seeds planted in NASA and the military space community evolved into a number of different approaches to performing space missions in ways that are truly robust, responsive, and more cost-effective.

Although current architectures, which still focus on enhanced functionality and performance in individual satellites, will last through the mid-2020s, Air Force Space Command acknowledges that "we must consider different architecture options that will provide adequate and resilient capability at an affordable cost."[23] The buzz phrase is "disaggregation"—essentially breaking up the major systems and distributing their payloads across a mix of multiple platforms. These could include dedicated spacecraft, hosted payloads on other government systems or commercial spacecraft, greater use of third party data streams, and even technological partnerships with other countries.

According to General Shelton, the Air Force needs to "complete ongoing studies" soon enough to affect post-2025 development timelines. The Government Accountability Office echoes the conclusion, arguing that past studies and tradeoffs were incomplete.[24] Therein lies considerable risk—not necessarily in disaggregation itself, but in the studies. It is always possible to collect more information and undertake one more study. Often, the terms of reference for the study will mean more to its outcome than the underlying analysis. To the degree that the threat is changing faster than the acquisition process can respond, delay involves risk of its own.

It is possible to "study a problem to death," with the expectation that study will produce a single correct answer to then pursue, without ever truly reaching for a solution. This is not the "build-a-little, test-a-little" approach to learning and developing or deploying technology that worked so well in the Clementine, MSTI, and DC-X programs. Indeed, the Air Force did not request separate funding for fiscal years 2013 through 2015 for the Operationally Responsive Space office, which Congress created for the purpose of rapidly developing new technologies and capabilities because it sensed institutional resistance to change. A separate office may not be the correct answer. To the degree that the Department of Defense can embrace institutional and cultural change and incorporate a new approach to national security and space, a separate organization may be unnecessary. But, it will take some years to know whether this is the case. The great concern is the pace of external change is moving much faster.

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The last missing piece in the Administration's space posture concerns space control. The 2006 *National Space Policy* explicitly directed the development and deployment of capabilities to sustain U.S. freedom of action in space while denying such capabilities to adversaries. The 2010 *National Space Policy* quite publicly dropped that latter portion of the guidance. Instead, it limited the direction to the Secretary of Defense to developing capabilities to "deter, defend against, and, if necessary, defeat efforts to interfere with or attack U.S. or allied space systems."[25] It is silent about how to deal with extant adversarial space capabilities in times of conflict. Regrettably, so is the 2011 *National Security Space Strategy*, focusing capabilities on preventing attacks and operating in a degraded environment; it also fails to address the need to deny adversarial use of space in times of conflict.[26]

We can only speculate about the rationale and intentions of this important language change. At the time the policy was announced, most security-related attention was directed to the administration's new-found interest in international agreements, whether the aforementioned code of conduct or, perhaps, the terms and conditions under which formal treaties might be acceptable. (The Bush administration had ruled them out as unverifiable.) It may be that the Obama administration moved the guidance to a classified annex, seeking to separate itself from its predecessor's public statements, which generated heated condemnation from groups and individuals concerned about the "weaponization of space." It may also be the case that the White House saw the development of counter-space capabilities as akin to weaponizing space, which it opposed on principle. Both interpretations prompt a brief examination of "space weaponization."

Concerns over weapons in space nominally revolve around a normative desire to preserve space as a domain free of conflict, forgetting that conflict is a function of interaction among people, not the domain in which it occurs.[27] In any event, the concern is misguided. Space has been weaponized since the advent of long-range ballistic missiles, which transit the domain in order to strike targets on the ground. Moreover, as discussed earlier, so-called non-lethal capabilities, such as ISRC3, are instrumental in improving the lethality of military systems. Systems such as the Global Positioning System have a direct connection to the maneuverability and firepower of military units. In short, space is already integral component of a modern weapon system. The speed with which other countries are developing counter-space capabilities clearly indicates they understand that, even if the Obama administration's *National Space Policy* does not.

Oddly, the debate over space weapons comes into clearest focus in arguments over missile defense, not over counterspace capabilities. In 2002, Russia and China proposed a draft treaty, popularly known as a treaty on the Prevention of an Arms Race in Outer Space (PAROS). The draft text included provisions to prohibit the placement of weapons in space, notwithstanding the difficulties of defining "weapon" in dual-use technology. However, the language did not cover terrestrially-based counterspace space systems, which Russia possessed and China was developing. While clearly proposed for propaganda reasons, the exemption of their own counterspace capabilities makes it clear that China and Russia were not seeking to restrict conflict in space, but to limit U.S. options in an area where it has technological advantages. More importantly, the language would have prohibited space-based defenses, which, as mentioned earlier, are best suited to intercept long-range ballistic missiles during their boost phases. In that light, the Russo-Chinese proposal likely signified concern about their strategic nuclear forces more than the possibility of conflict in space. In short, it is possible to interpret the debate over space weaponization as a debate over missile defense and, by implication, nuclear deterrence and the Cold War concept of Mutually Assured Destruction. It is worth noting that the United States was not, and is not, pursuing programs that would place weapons in space, either for counterspace or missile defense missions, although such systems are well within its technological capabilities.

Space and America's National Security Future

Space as a domain and the systems that use it are integrated with American power, whether the soft power of culture, reputation, diplomacy and economics or the hard power of armed force. For that reason, it is no longer possible to stovepipe strategic thinking about space and national security. Developments in one area directly affect others. From civil space programs that help shape foreign spending on space and trade arrangements that impact access to space and have diplomatic consequence to military systems that civilian users have come to rely upon, policymakers must approach developments in space as an integrated whole, a single phenomenon that requires expertise across the range of space activities.

"Prevention of an Arms Race in Outer Space (PAROS) draft text included provisions to prohibit the placement of weapons in space...the language did not cover terrestrially-based counterspace space systems, which Russia possessed and China was developing."

Moving forward, it will be important for America's space activities to adopt a consistency and predictability that other countries looking to the United States for leadership can follow, particularly in the area of civil space, where drift and uncertainty in priorities can only encourage other spacefaring countries to go their own way, without the United States. In many ways, the national security community faces a larger challenge. It cannot afford to continue on its current path. Simply, the United States cannot keep building large, expensive, fragile, high-performance satellites that trace their design philosophy to the Cold War. Sequestration has already caused it to defer necessary activities, while future cuts and sequestration threaten capabilities that already may be inadequate to the tasks they must perform. The Defense Department and other relevant agencies will have to move in the direction of responsive, distributed systems, just as the information technology industry left mainframe computers behind decades ago. For too long, the U.S. space program—both civilian and military—has relied upon the same bureaucracies and practices that brought it so much success over the last half century. America's potential adversaries may not be so burdened, and find it easier to move more swiftly, thereby raising the possibility of surprising us with potentially devastating consequences.

Endnotes

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