Blurring the lines between military and civilian space missions could prompt a reconsideration of the accepted laws of war. Here, a military small satellite is launched Dec. 7, 2021, from Cape Canaveral, Fla. Now a U.S. Space Force base, both civilian and military launches have been carried out at Cape Canaveral for years.

Resilient Architecture vs. Civilian Risk

The Space Force's strategy to mix military with civilian space raises questions about the law of war.

By Amanda Miller

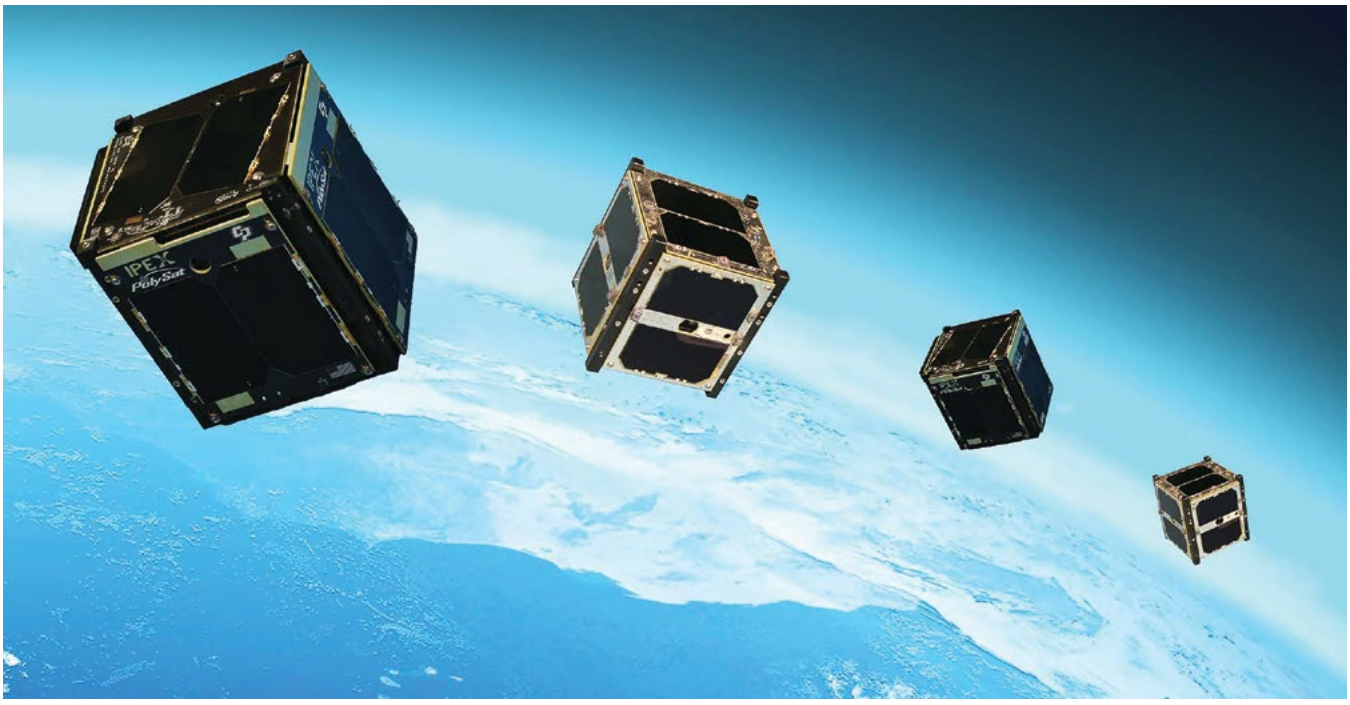
Technological advancements by China and Russia have increasingly focused attention on the relative vulnerability of U.S. military satellites. Since China steered a satellite to grab and move another satellite out of its orbit in January 2022, just months after Russia destroyed a defunct satellite with a ground-launched missile, the risks have only grown clearer.

To ensure satellite systems are available and able to perform when needed, U.S. Space Force officials are proposed a "hybrid" architecture that spreads its space-based sensors and communications systems across multiple constellations, only some of which are exclusively Space Force assets. Also in the mix: satellites belonging to allied governments, commercial satellite constellations, and both military and commercial ground facilities. By situating military satellites at multiple altitudes and supplementing them with commercial services and with assets distributed among foreign-owned satellites, U.S. strategists believe they may even be able to render other countries' anti-satellite weapons impotent as a means to disable U.S. space power.

"It's absolutely imperative that we ... get to a force structure that's more defendable."
—Chief of Space Operations Gen. John "Jay" Raymond, USSF

Over the brief two-year history of the Space Force, it has signed "burden-sharing" agreements with partner militaries and talked about a "space superhighway" with commercial entities, offering space transportation services en route to the moon.

Achieving resilience by intermingling military and civilian space activities, whether transportation or satellite services, has broad implications not just for the Space Force, but also for participating commercial and allied partners. Blurring the lines between civilian and military property could turn civilian systems into legitimate military targets



NASA/JPL

The Space Development Agency's plan for a constellation of hundreds of multi-purpose satellites—such as in this illustration of cubesats—with layers of function exemplifies the USSF's new approach to space defense.

under the Law of Armed Conflict—a prospect U.S. officials generally do not discuss publicly.

Writing in Harvard University's National Security Journal, Georgetown law professor David A. Koplow argues that the Space Force's strategy can be viewed as employing the approach infamously employed by Saddam Hussein during the 1991 Gulf War, when he used antiquities, mosques, and civilian neighborhoods as cover for military equipment and activities. Koplow's article suggests that blurring the distinctions between civil and military space poses serious implications for commercial customers and foreign nations.

THE RESILIENCE IMPERATIVE

As Chief of Space Operations Gen. John W. "Jay" Raymond likes to say, space "was a benign, peaceful domain"—until recently. Appearing on a webcast hosted by AFA's Mitchell Institute for Aerospace Studies Spacepower Advantage Center of Excellence, Raymond explained that the risk to a spacecraft has historically been limited to its launch and deployment.

"As long as you could launch a satellite—and it worked and didn't die in infant mortality because it failed when it first got on orbit—you were good to go," Raymond said. "That's not the case today."

China and Russia both see space as a warfare domain, one in which they intend to fight if they get into a war with the United States. China's Shijian-21 satellite can robotically "reach out and grab another satellite," Raymond said last September at AFA's Air, Space & Cyber Conference. Russia has a satellite built like a "nesting doll," which contains smaller satellites hidden within. "It's a satellite inside of a satellite inside of a satellite," Raymond said. "The satellite launches, opens up—another satellite is dumped out. It opens up, and a projectile is shot out to destroy a U.S. satellite and to destroy the advantages that that provides us."

Ground weapons are also a threat. In November 2021, Russia fired a ground-launched anti-satellite missile and successfully destroyed a derelict Soviet satellite. The strike created a debris field of some 1,500 fragments. China, for its part, has developed ground-based laser weapons that can interfere with a satellite in space. Satellites flying predictable orbits are sitting ducks for such weapons.

"It's absolutely imperative that we move away from legacy force structure and we get to a force structure that's more defendable," Raymond said.

The consequences of an attack in space are too great, he said. At present, striking the right satellites could destroy "our ability to sense data from around the globe, to be able to bring that data down to Earth, to be able to fuse that data with data from other domains, and then to use high-speed computing to be able to solve really tough challenges," Raymond said.

The guiding document for where the Space Force is headed is the 2015 Defense Department white paper, "Space Domain Mission Assurance: A Resilience Taxonomy," and the foremost strategy within it for building a resilient "hybrid space architecture" is something called proliferation, said said Space Force Col. Eric Felt, director of the Air Force Research Laboratory's Space Vehicles Directorate, in an interview.

Felt explained in an interview that proliferation means building larger constellations of smaller satellites, while at the same time employing "commercial capabilities that can do parts of your mission."

Felt transfers to the Pentagon this summer, where he will become deputy executive director of USSF's new Space Architecture, Science, and Technology Directorate. By leveraging commercial satellites, the military can spread its bets, he said. The goal: "Even if all of your military capabilities are taken out," you can still "get the mission done."

The Space Development Agency's plan for a multipurpose constellation of hundreds of satellites with "layers" of functionality orbiting at varying altitudes exemplifies the approach.

Proliferation also makes it harder for rivals to understand what capabilities live where and how they might work together. Lt. Gen. B. Chance Saltzman, in a November 2021 Mitchell Institute presentation, summed up the approach this way:

"If they don't know what to shoot at, then what's the benefit of shooting?"

LEVERAGING PARTNERS

Sharing space intelligence and assets, co-hosting sensors, and other collaborative work with allies and commercial partners brings "a value to all of us," Raymond says. "We have to look across all of the capabilities that we operate in and make this transition from a small number of very exquisite satellites to a more defendable architecture" with many more nodes, according to Raymond in January in a conversation at the Center for Strategic and International Studies.

Commercial and international participation in a hybrid architecture are not limited to leveraging existing satellite constellations or putting sensors on other nations' assets. It could also include ride-sharing missions and contracts for commercial services. Relationships with international military forces, in particular, have now "matured … much more significantly," the Space Chief said. That's enabling "this force design work we're doing now: We've shared that with our closest partners to say, 'OK, where might we build this collaboratively?' "

Norway, Japan, and Britain have all agreed to host American payloads, and the economic benefits are significant. The deal with Norway saved the Space Force time and money: It's "providing Arctic communications two years sooner than we could do it—and $900 million cheaper," said Space Force Director of Staff Lt. Gen. Nina M. Armagno at a Washington Space Business Roundtable event.

Col. Raj Agrawal, chief of the Space Division in the Secretary of the Air Force's International Affairs Office, described the agreements his office works on as "burden sharing." It is no different from what nations do today to spread out the development costs of a weapon such as the F-35 fighter jet, Agrawal said.

The strategy "gives us an opportunity to work with allies and partners to optimize what they're able to do," he said.

Indeed, Saltzman speculated that having many countries share a satellite asset could deter an attack, dissuading a potential adversary from risking conflict with not just one, but with a slew of allied nations. If "so many nations are affected by a single satellite's destruction," he suggested, it "would raise the threshold for an adversary to take that kind of action."

THE LAW OF WAR

Koplow's article in the January 2022 Harvard National Security Journal challenges the concept of proliferation on several fronts.

The Law of Armed Conflict was developed to protect civilians from the effects of war. No military operations or activities take place without staff judge advocates commenting on legality under U.S. and international law, including the Law of Armed Conflict, sometimes called "the Law of War." A 1977 addition to the Geneva Conventions codifies drawing distinctions between military and civilian objects: "In order to ensure respect for and protection of the civilian population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives."

The United States never ratified the 1977 protocol, but Koplow asserts in his article that U.S. policy "accepts much of its content, including the principle of distinction, as binding customary international law."

Koplow writes that the purpose of this law is to ensure a combatant can "fulfill its primary obligation under the distinction principle, i.e., to direct its hostile fire exclusively against … military [targets]."

Koplow's article uses provocative examples to illustrate the distinction principle. For instance, he cites Saddam Hussein, who "ostentatiously parked fighter jets in front of a famous archaeological temple, apparently for the purpose of deterring U.S. strikes against those tempting assets."

Explaining the justification behind the principle, he writes:

National Space Policy Secretariat, Cabinet Office, Japan/Courtesy

USSF signed a memorandum of understanding on Dec. 15, 2020, with Japan's Office of National Space Policy to launch two U.S. payloads on Japan's Quasi-Zenith Satellite System in 2023 and 2024. Many countries sharing a space asset could deter potential adversaries since it would prompt conflict with not just one but many allied nations.

"Excessive co-location of civilians and combatants would inevitably jeopardize the former, as the opponent would be frustrated in attempting to attack only lawful targets that were too intermingled with immune persons and property."

The "ever-increasing entanglement" of military and private-sector space programs has evolved over the course of three presidential administrations and has bipartisan support, Koplow said, driven by a combination of motivations including cost and time savings. But he suggests there is "a less frequently acknowledged motivation," one that he sees as wrong: "the desire to complicate the task confronting any enemy that might seek to attack U.S. national security satellites."

"While this melding of the functions and identities of spacecraft may carry tactical advantages," he asserts, "the greater proximity is both illegal and unwise in the longer term."

The Space Force, in a statement responding to a query on this charge, said DOD "follows the law of war during armed conflict in every domain, including in the space domain." It continued: "While we engage in commercial activities in other domains as well, we recognize the value of commercial space as outlined by statute."

Capt. Sunderlin Jackson

An AFRL technician working on the Ascent spacecraft in the Space Vehicles Directorate's laboratory on Aug. 13, 2020. ASCENT is a demonstration mission to explore various CubeSat operations in geostationary orbit.

SCENARIOS

Koplow sees several scenarios proposed by the Space Force as challenging. A military payload hosted on a commercial satellite, for example, could be "a deliberate insinuation of a military asset into an erstwhile civilian environment," he writes. "The civilian modules, which should remain immune from targeting, are unnecessarily exposed."

Yet this is essentially the same scenario posed by a civilian power grid that also serves a military base, or a transoceanic commercial data cable that transmits both civilian and national security data. If a national government is using a commercial satellite for targeting in a conflict with a second state, for example, that second state would have a legitimate reason for targeting the commercial satellite. The result, Koplow writes, makes the civilian operator's satellite "vulnerable to attack at all times, imperiling its ability to serve civilian functions."

Brian Weeden, director of program planning at the Secure World Foundation, is a former Air Force space and missile officer now engaged in drafting the "Woomera Manual on the International Law of Military Space Operations." He reviewed Koplow's paper before it was published.

"It's a really important question, particularly since there's been a big push recently for the Pentagon to leverage more commercial products and services," Weeden wrote in an email to Air Force Magazine. "I think that's still important to do, but we need to think through the legal and policy implications, including the issues around distinction but also issues like liability."

Commercial assets support military activity in many ways, from highways and railways to aircraft and telecommunications. "But those activities exist under special legal regimes where we've answered a lot of these questions, or at least taken steps to mitigate them," Weeden said.

Retired Air Force Maj. Gen. Charles J. Dunlap, executive directory of the Center on Law, Ethics, and National Security at Duke Law and a former deputy judge advocate general of the Air Force, weighed in on Koplow's arguments for Air Force Magazine, diverging on some points but fully in agreement on one.

The military's use of commercial assets does not constitute necessarily an "anticipatory breach" of the Law of Armed Conflict, Dunlap said. "Determining if something is 'feasible' can properly include the cost and practicality of creating a parallel system," he wrote in an email. "In theory, a government might be able to create a separate road system, electrical grid, petroleum refineries, internet, and so forth for its armed forces. However, doing so for such major systems that serve both civilian and military needs would be so enormously costly as to be impractical."

Dunlap and Koplow do agree on one thing: What would make it illegal is the intent to use "a 'dual-use' system simply in the hopes that its civilian uses might help shield it from lawful attack," argues Dunlap.

In 2016, then-Deputy Secretary of Defense Robert O. Work laid out the strategy this way: "Our allies and partners allow us to add redundancy and resiliency, and they offer opportunities for hosting payloads that will proliferate what we have on orbit," he said in a speech at that year's Space Symposium. "This offers huge advantages—as it's one thing to have to deny the U.S. the use of a few government-owned imagery systems; it's quite another to take on tens or even hundreds of allied and U.S. government and commercial remote sensing systems all at the same time."

Work continued: "By enhancing the resiliency of our own constellation, improving our space [battle management, command, and control], operating as a space coalition, and investing the resources necessary to capitalize on and strengthen our own space-based capabilities and capacities, as well as those of the commercial space … we're going to be able to survive any type of concerted attack, and continue to provide the space-based support that our warfighters need."