Vol. 35, April 2022

MITCHELL INSTITUTE
Policy Paper

## Key Points

Global RPA exports continue to grow as developed and developing states take advantage of these multi-mission unmanned systems. Over 95 countries operate RPA, and more than three dozen militaries employ armed RPA variants.

RPA exports are a valuable means to advance U.S. security interests, strengthen partnerships, and encourage greater burden-sharing.

Highly restrictive policies for exporting U.S. RPA have created a vacuum in the global market that China and others are exploiting. They weaken U.S. relationships with its security partners, hurt efforts to improve coalition interoperability, and incentivize competitors to export RPA that are not under U.S. end-use restrictions.

Restrictive U.S. RPA export policies are based on a misunderstanding of how these systems operate and how their employment impacts regional stability and other security dynamics.

The United States can responsibly export armed RPA to its allies and partners by defining them as aircraft and treating their export like other U.S. military aircraft exports. Removing RPA from the Missile Technology Control Regime (MTCR) is a critical step toward this end.

# Building Alliances and Competing with China: The Imperative for UAV Export Reforms

by Heather R. Penney
Senior Resident Fellow, Mitchell Institute for Aerospace Studies

### Abstract

The era of remotely piloted aircraft (RPA) proliferation is here, yet the United States remains reticent to export these capabilities to support its allies and build partnerships critical to integrated deterrence. As a result, it is falling behind its competitors as global leaders in this capability.

Overly restrictive U.S. RPA export policies persist because of concerns over how these aircraft could be used, how they might impact regional stability, and their potential to contribute to regional arms races. The fact is, RPA technologies are no longer at risk of uncontrolled proliferation; they have *already proliferated*. Furthermore, America has ceded control of RPA exports to adversaries like China, Russia, and Iran, which are not governed by the same kind of end-use restrictions and oversight policies that accompany U.S. military exports. In other words, overly restrictive U.S. RPA export policies increase the potential for undesirable consequences.

Current U.S. RPA export policies reduce opportunities to build U.S. relationships with other countries, undermine its efforts to expand regional alliances and coalitions, diminish U.S. diplomatic and operational influence, and weaken our nation's industrial base. They likewise benefit China, Russia, and other strategic competitors who use their RPA exports to create additional avenues to expand their influence and gather intelligence. Failing to revamp its RPA export policies means the United States could face a weakening of its relationships and influence in the very regions it seeks to promote stability and core U.S. interests.

Not only should the administration update U.S. RPA export policies, it should also aggressively pursue opportunities to share these capabilities with friends, allies, and partners that are critical to integrated deterrence. This can be done in ways that affirm the U.S. commitment to nonproliferation goals, regional stability, and other international norms.

## Introduction

Although the United States at one time enjoyed a near-monopoly on RPA technologies, its technological lead is rapidly eroding as other countries build and export their own unmanned aircraft. The global development and export of RPA dramatically accelerated over the last decade as countries around the world recognized the asymmetric advantages they could provide to their militaries. RPA capable of persistent intelligence, surveillance, and reconnaissance (ISR); precision strike; and other missions have proven to be effective lower-cost force multipliers for militaries that employ them. As of 2019, over 95 countries operated RPA, and more than three dozen militaries had large armed unmanned aircraft in their inventories.[1]

Despite this global growth in demand, U.S. RPA exports remain constrained, overly restrictive policies. These policies are a mistake; they work against U.S. national security objectives of building the capabilities and capacity of its allies and friends. For instance, the U.S. Government has approved the export of MQ-9 Reaper RPA to the United Kingdom, France, Italy, Spain, Belgium, and the Netherlands. Other requests for the MQ-9 by Jordan, the United Arab Emirates, Iraq, and others have been denied, with predictable consequences. These and other countries have subsequently turned to America's greatest competitor—China—to purchase RPA to meet their security needs. This has helped China emerge as a major global competitor in developing and exporting RPA, including variants capable of carrying guided weapons. In fact, China has exported more armed unmanned aircraft than any other country, filling a void partially created by U.S. State Department export policies.

### RPA Provide Persistent, Real-time ISR & Strike

RPA operations have evolved dramatically since they were first deployed as experimental capabilities during the mid-1990s Balkans conflict. Initial operations of the MQ-1 Predator—precursor to the MQ-9—were plagued by ground fires, engine failures, and airframe icing. Yet, in mid-2000, the persistent and real-time ISR provided by an MQ-1 enabled U.S. intelligence analysts to locate Osama bin Laden at a remote site in Afghanistan. Because the MQ-1 was not armed, U.S. forces were unable to act quickly enough to launch a raid or air strike before bin Laden could slip away. Just over a year later, a Predator fired a Hellfire missile at a vehicle outside a compound in Afghanistan where Taliban leader Mullah Omar and his senior staff were located. While not shot at Omar, it clearly demonstrated how armed RPA could provide real-time, high-fidelity, persistent ISR and strike in dynamic environments.

Why has the United States maintained such a restricted RPA export approach? To a large extent it is driven by unfounded concerns over how some countries might use them and how they could impact regional stability. Some well-meaning U.S. bureaucrats who oppose RPA exports believe their operations would decrease regional stability and could even encourage some regional disputes to turn hot despite evidence to the contrary. Another rationale is based on the unsupported supposition that RPA exports could encourage regional arms races, including the spread of nuclear weapons technologies. Due to these baseless claims, modern RPA continue to be inappropriately included in the Missile Technology Control Regime (MTCR) agreement, which was originally developed to support nuclear weapons nonproliferation efforts. The MTCR is a non-compulsory

international agreement that was established to not share nuclear weapons and other weapons of mass destruction (WMD) missile delivery technologies. This includes unmanned aerial systems that can deliver payloads of 500 kg or greater over ranges of 300 km or more. Modern RPA like the MQ-9 Reaper, with over two decades of use in conventional operations, have been swept up in this regime. Blocking the sale of U.S. RPA is therefore viewed by some as signaling support for nuclear nonproliferation, despite the reality that they are not missiles or nuclear warheads.

However well-intended, these policies have greatly constrained RPA exports to America's allies and friends to the benefit of China and other strategic competitors. This is detrimental to U.S. national security. Specifically, it reduces opportunities to build U.S. relationships with other countries, undermines efforts to build regional coalitions, diminishes U.S. diplomatic and operational influence, and weakens our nation's industrial base. Moreover, it creates additional avenues for China to expand its influence and gather intelligence. China's RPA sales do not come with the same end-use restrictions that accompany U.S. military equipment exports. Since 2014, China has exported more RPA than any other country, and Russia is not far behind in exploiting the growing demand for these capabilities.[2] Simply said, the United States is choosing to forego opportunities to shape the decisions and behaviors of multiple countries in favor of allowing China to gain influence and access. If this trend continues, the United States may well find itself increasingly marginalized in regions of the world where it seeks to wield influence and shape regional dynamics.

Twenty years ago, when the United States alone possessed armed RPA, their proliferation was still a theoretical issue. Today, the era of RPA proliferation is here, whether U.S. policymakers embrace this reality or not. Like other military technologies, U.S. decisions to export RPA should be based on a realistic view of how they can and should contribute to U.S. national security. The fact is that, far from destabilizing regions, the export of armed RPA can provide significant value by building relationships and increasing capacity for U.S. friends, allies, and partners. It enables friendly forces to defend themselves against aggression and contribute to future coalitions to defeat threats to regional stability. Assistance to Ukraine is a recent case in point. U.S. State department export policies on RPA are essentially denying access to these vital tools, which could be an effective counter to the aggression of the Putin regime.

The administration should update its RPA export policies and aggressively pursue opportunities to share these capabilities with allies and partners critical

### Drone or RPA?

The term "drone" is commonly used to refer to remotely piloted aircraft. This term, however, perpetuates misnomers about how RPA are operated. This paper specifically avoids using drone in order to emphasize the robust and active role of humans in managing and controlling these systems. RPA, although uninhabited, require pilots and sensor operators to fly and conduct mission tasks, just as a manned aircraft does. In fact, RPA have more people closely involved in the real-time mission execution than manned strike aircraft. As Lt Gen (Ret.) David Deptula, an early advocate of RPA operations, emphasized, "There is nothing unmanned about RPA operations!"

Source: John Tirpak, "The RPA Boom," *Air Force Magazine*, August 1, 2010.

to integrated deterrence. This can be done in ways that affirm the U.S. commitment to nonproliferation goals, regional stability, and other international norms. Working together, the U.S. State Department and Department of Defense should:

- Define medium and large RPA, including armed RPA, as military aircraft instead of cruise missiles for the purposes of export.
- Engage with other MTCR signatories to affirm the U.S. commitment to nonproliferation while simultaneously removing RPA as MTCR-controlled technologies.
- Work with states that are not yet signatories to adopt the 2016 "Joint Declaration for the Export and Subsequent Use of Armed or Strike-Enabled Unmanned Aerial Vehicles." The United States should encourage reluctant states to agree to this declaration's principles in part, if not in whole, in conjunction with RPA export agreements.
- Convene a working group to enhance monitoring protocols and end-use agreements for armed RPA exports.
- Engage with allies and partners who have pursued opportunities to purchase Chinese RPA and encourage them to revisit U.S. RPA as their system of choice.
- Publicly articulate the strategic benefits of increasing armed RPA exports: building partner capabilities, protecting the U.S. defense industrial base, and gaining greater influence in the global RPA market.

For far too long, the United States has neglected remotely piloted aircraft exports as a key means to promote its diplomatic and national security interests. Instead, it has ceded a large part of the growing international RPA market to China, Russia, Turkey, and others—to our nation's detriment. It is time to recognize RPA, including armed variants, as military aircraft and not cruise missiles for the purpose of determining export policy. As former Defense Security Cooperation Agency Director Heidi Grant said recently, "We have to look at [armed RPA exports] and say, if we're not there, our strategic competition is going to fill the void. Is that riskier than transferring high-end technologies?"[3]

## Not "Killer Bots": Understanding RPA Operations

Popular misconceptions about RPA, how they operate, and the effects they can create in the battlespace have poorly informed U.S. decisions on their export—especially in the case of exports of the MQ-9, the Air Force's only armed RPA. Because these aircraft are uninhabited, many people believe that humans are not fully in control or even involved in RPA kinetic strike operations. Questions often raised during debates over U.S. RPA exports include: Will their use be less discriminatory than manned aircraft operations? Could their use by U.S. allies and partners lead to increased collateral damage and harm to civilians? Will the export of RPA contribute to the violation of human rights and the laws of war?

These concerns do not match the reality of modern RPA operations and favor assumptions on how they might be used. Armed RPA are the most controlled aircraft in the U.S. military. The fact is humans directly "in the loop" provide an incredible degree of control and oversight over RPA operations for the purpose of achieving valid and proportional military objectives in the battlespace while avoiding unnecessary collateral damage and loss of life.

Figure 1: An MQ-9 pilot and sensor operator

Credit: U.S. Air Force Photo

## The Human Team Behind RPA Operations

Remotely piloted aircraft are hardly unmanned. In fact, there are more people involved in the real-time mission employment of RPA than for manned strike aircraft. RPA require remote mission crews that include a pilot, sensor operator, a dedicated intelligence team, and the launch support element (LSE) that maintains RPA and is responsible for their takeoff and landing operations. Then there are the numerous intelligence personnel that support the mission pilot and operator in real-time, conducting analysis of the mission collection results. RPA missions are also closely supported and supervised by other personnel, specialists, and commanders in Air Force air operations centers (AOC). Understanding the continuous role these highly trained professionals play in RPA operations—including precision strikes—makes it clear that humans are in control at every step of their employment.

**Walking through a typical RPA strike mission.** This degree of human control can be illustrated by walking through a typical RPA mission. An LSE composed of maintenance personnel and a qualified RPA pilot is physically deployed with RPA to remote theater locations for the purposes of controlling them during their takeoff, recovery, and landing phases of flight. RPA pilots use a low-latency, line-of-sight datalink to command appropriate RPA actions. For example, pilots position the aircraft to enhance its sensor look angles or optimize weapons launch parameters to achieve a mission while minimizing collateral damage. After launch, the pilot is responsible for navigating an RPA to its area of responsibility, maintaining its assigned orbit, responding to taskings, and conducting maneuvers or tactics as needed. RPA pilots literally fly their aircraft, controlling its flight control surfaces and

engine speeds just like a pilot would in a manned aircraft. The only difference is all this is done remotely through satellite datalinks.

A sensor operator sitting next to the pilot controls an RPA's multi-spectral targeting system (MTS-B)—the eyes of the RPA—and works closely with the pilot to maneuver the aircraft.[4] On the MQ-9, this system provides infrared, color, monochrome daylight TV camera, and shortwave infrared camera imaging to the RPA team. Full-motion video from each of the imaging sensors can be viewed as separate live video streams or fused together for enhanced analysis. Sensor options also include synthetic aperture radar (SAR), electronic signals (ELINT) collection, electronic warfare, and other types of ISR equipment.

**Teams of military and civilian professionals located in theater and at remote operating locations provide an unprecedented degree of control over every step of an RPA mission…. They are not "killer bots" that populate science fiction, and they are not launch-and-leave cruise missiles.**

An RPA's dedicated intelligence analysis team is free to rewind, review, or even pause the aircraft's feed to get clarity on images and detect changes or movements on the ground that may not be immediately apparent to the pilot and sensor operator controlling the aircraft. The intelligence analyst team directs the sensor operator's management of the MTS-B and other assets based on mission objectives. "Targeteers," who are professionals skilled in identifying targets, attack planning, collateral damage assessments, and rules of engagement, are also part of the intelligence team. Targeteers and other team members identify valid targets, determine if a strike is needed, what kind of weapons are appropriate, and then forward a recommendation to an air operations center.

The air operations center integrates RPA operations with other joint combat operations. AOCs include an RPA team with additional intelligence analysts, lawyers (or in military parlance, judge advocate generals, a "red teamer" to help commanders assess potential actions, and a target engagement decision authority. When an RPA's intelligence team determines a target meets a commander's rules of engagement (ROE), they nominate the strike to the team at the AOC. This team assesses the context of the strike, the quality of the target assessment, the potential for collateral damage, and the broader legality and ethics of the strike before approving or denying the request. For many armed RPA operations, target engagement decisions reside with commanders in an AOC. For some scenarios, final approval authority may be delegated down to the unit level, or it can reside with the Secretary of Defense or even the President of the United States, depending on the nature of the target. Critical to a go or no-go decision is how the proposed strike will comply with the laws of armed conflict concerning valid military targets, military necessity, and proportionality of the use of force. The red teamer is a key component of this analysis, as this member acts as a devil's advocate, asking "what if" questions and seeking to identify gaps in the logic and evaluation of the strike.

In combination, these teams of military and civilian professionals located in theater and at remote operating locations provide an unprecedented degree of control over every step of an RPA mission. While RPA have unique attributes such as long loiter times that cannot be matched by most manned aircraft, they are not unique in the sense that they have the same or even greater degree of human control and oversight. They are not "killer bots" that populate science fiction, and they are not launch-and-leave cruise missiles. Instead, they are like any other

combat aircraft that depends on human beings to direct and control their operations. RPA export policies based on any assumption otherwise are outdated, making clear that some policymakers may be uninformed as to the true nature of modern RPA operations.

## Digging Deeper into Discriminate Use of Force: Robust RPA Strike Evaluation and Oversight

Veteran Air Force RPA pilot Colonel Johnny Duray, who has conducted armed RPA operations in Iraq, Syria, Afghanistan, Libya, and other parts of the world, observed that "RPA operations are the most controlled aircraft operations conducted by the U.S. There is more oversight than any other platform."[5] This includes the authority to strike targets. The specific process and procedures for determining if a strike is warranted are delineated by the Chairman of the Joint Chiefs of Staff Instruction 3162.02, "Methodology for Combat Assessment." This guidance provides detailed instructions on targeting guidance and intent, combat assessment, collateral damage assessment methodologies including databasing and production standards, munitions effectiveness assessment methodology and modeling, and, finally, comparisons of an actual strike to the collateral damage estimates.[6]

These standards are overlaid with a commander's intent, mission objectives, special instructions, and rules of engagement. At each level of assessment from the RPA intelligence assessment team on up, a "no" vote stops the strike nomination, and a "yes" vote continues the nomination up the chain until it reaches the final target engagement authority.

While a proposed strike is being evaluated, the RPA pilot and sensor operator must work together to maintain positive target custody and maneuver their RPA to maintain an advantageous position for weapon employment with maximum precision and minimal collateral damage. All of these assessments and decisions must be made within fleeting windows of opportunity to strike some targets, especially targets that can quickly relocate. If approval authorities take too long deliberating a strike assessment, the target may disappear, the potential for collateral damage may increase, or other conditions may change that would prohibit a strike.

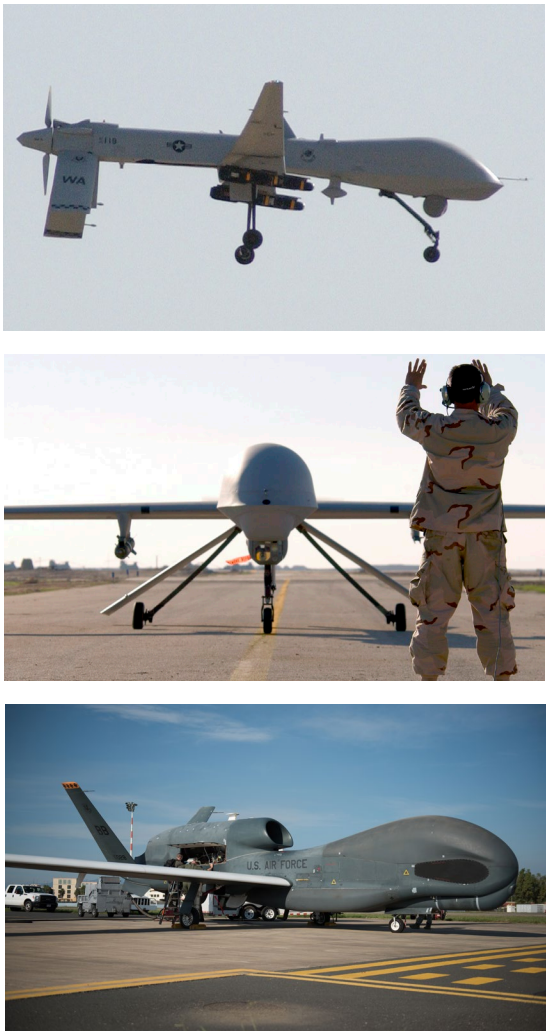

Figure 2: Most U.S. military RPA are not like the small, commercial drones the public are familiar with; they are aircraft that are larger and more complex than commercial drones and require much more training and oversight to operate and successfully execute missions. The photos above illustrate the scale of early U.S. military RPA affected by the MTCR strong presumption of denial.

Top, middile | MQ-1 Predator

Bottom | RQ-4 Global Hawk

Credit: U.S. Air Force Photos | Top | Middle | Bottom

If the target engagement authority approves a strike and it remains valid under approved rules of engagements, air operation watch-standers and staff observe and assess video feeds from the RPA in real-time as it engages the target. If circumstances on the ground change while the RPA's missile or bomb is in flight, the weapon can still be redirected to what is called a "shift cold point," which is an area where the weapon's detonation would avoid collateral damage. Cruise missiles do not have this "shift cold" capability, and even manned strike aircraft are unlikely to command a strike termination in real-time after launch because pilots in cockpits are also scanning for threats, maneuvering their aircraft, and performing other operations.[7]

**The ability of RPA to provide persistent, full-motion video of a specific battlespace—essentially, a bird's-eye view of the operational area—is a distinct combat advantage.**

In summary, RPA are hardly the dystopian killer bots that some imagine them to be. The level of scrutiny and approval that armed RPA operations undergo are exhaustive. Moreover, the long-duration, persistent surveillance that RPA provide allow analysts to build confidence in the validity of targets by assessing patterns of life of high-value targets such as terrorist leaders, their day-to-day behaviors, movements, and other characteristics. This persistence can also increase the precision and effectiveness of attacks because teams can often wait for just the right moment to launch a strike, taking advantage of fleeting windows of opportunity. Finally, RPA real-time video feeds allow greater oversight and higher-level strike approval authorities when appropriate.

The following two examples of real-life RPA operations help illustrate the value of persistent, real-time information that RPA can provide commanders.

### Example #1: Armed RPA can be a more deliberate and precise means of providing close air support to ground troops

RPA have a long history of providing directed ISR and strike support to U.S. and friendly forces on the ground. In the U.S. military, a well-trained cadre of joint terminal attack controllers (JTAC) and forward air controllers (FAC) are responsible for coordinating RPA support to friendly forces. A JTAC or FAC is a service member on the ground who directs the actions of combat aircraft providing close air support and other offensive air operations from a forward position. JTACs direct RPA taskings, provide RPA controllers with an orientation on the ground situation, such as where friendly and enemy are located, and coordinate directly with ground units on the kind of support they need. The ability of RPA to provide persistent, full-motion video of a specific battlespace—essentially, a bird's-eye view of the operational area—is a distinct combat advantage to the supported ground troops. As a FAC, retired Marine Lieutenant Colonel James Foley noted that:

> *An RPA has distinct advantages over a manned fighter overhead. First, because of aerodynamic differences, an RPA is flying much slower, and it can literally park itself over the objective area. The targeting pod of an RPA is not masked by the wing or fuselage of the aircraft as is often the case with a fighter as it tries to maneuver to remain over the target area. Secondly, an RPA is able to remain on station for hours, where a fighter at most will have 45 minutes to an hour on station before it has to go off station to refuel, which requires that the FAC must reorient a manned aircraft each time it returns to*

> *station. Third, the weapons carried by an RPA are the same as those carried by manned aircraft, save the unique circumstances when a FAC might need an aircraft to strafe an enemy if engaged in a close firefight.*[8]

Foley also observed differences between coordinating RPA and manned fighter aircraft, emphasizing he preferred to be supported by RPA. In his experience, fighters often arrived on station just in time for the FAC to give them a quick overview of the tactical situation and then conduct strikes—often rushing to execute their missions due to their limited fuel and time on-station. Furthermore, fighters move so fast that their pilots had to constantly maneuver to remain overhead of their target areas, and pilots had to split their attention between interacting with the FAC, managing their sensors, and conducting real-time attack planning and execution—all while flying their aircraft in hostile airspace.

By contrast, the slower speeds of RPA allowed them to provide a better, a higher quality picture of the battlespace to ground troops, and their long loiter allowed RPA teams to spend more time honing their attacks to minimize collateral damage and reduce the likelihood of human error. In short, RPA teams can develop better situational awareness over time and experience less situational stresses than manned aircraft pilots since more people are engaged in assessing real-time mission information. For all these reasons, from Foley's perspective, using RPA for close air support missions is often a more discriminate use of force.

### Example #2: Maintaining positive target custody helps protect innocent civilians

Air Force Colonel Duray reaffirmed Foley's thoughts on the quality of RPA overhead imagery. He noted the slower speeds and better targeting pod depression angles of RPA compared to fast-moving fighters present a more stable video image of potential ground targets to analysts, targeteers, and operators. Moreover, the view from fighter targeting pods that have shallower depression angles compared to RPA can be masked by buildings in urban areas or by terrain features, obscuring potential targets. Duray experienced this limitation during a real-world mission in mountainous terrain. A commander who believed that manned F-15E fighters would be more accurate and effective prohibited MQ-9s from employing weapons against a particular target. The fighters, however, lost target custody due to terrain and then reacquired the wrong target:

> *We had been given guidance that Reapers would not perform the strike, that the strike must be performed by manned aircraft. When all of the engagement criteria were satisfied, two F-15E Strike Eagles were brought into the objective area. They were to strike two vehicles in a row of vehicles that were stationary in a mountainous area. The datalinks between assets weren't working, and it was a difficult pass-off. Also, the fighters avoided flying directly over the vehicles to avoid alerting the enemy that we were overhead. This isn't a concern with Reapers, as they are unable to be detected from their noise. During the engagement, one of the Strike Eagles lost the target when it was masked behind the mountain during one of his turns. When the vehicles came back into their view on the targeting pod, the [F-15E Strike Eagle] pilot and weapons sensor operator thought they had reacquired the correct vehicle, but they hadn't.*[9]

**"RPA not only provide better precision and lessen the chances of human error, they are in many cases a more capable platform to conduct kinetic strikes."**

*-Lieutenant Colonel James Foley, USMC (Ret.)*

Foley continued by saying, "If there is anything that this episode taught us, it's that RPA not only provide better precision and lessen the chances of human error, but that they are in many cases a more capable platform to conduct kinetic strikes."[10]

Despite their best efforts, the F-15E crew in this example lost sight of the target because of their fighter's speed, maneuvering requirements, and need to stand off from the target to avoid detection. Reapers, on the other hand, have a much smaller turn radius and operate at slower speeds than fighters, which allow them to loiter directly overhead a target area. If the F-15E in this example had tried to maintain a closer, overhead orbit like an MQ-9, the target would have likely heard the jet noise and taken evasive actions that could spoil the attack. Plus, RPA are not subject to the "urban canyon" effect and can therefore maintain positive target custody and provide higher quality ISR feeds to analysts, operators, and commanders. The need to maintain a standoff distance also resulted in a mountain blocking the F-15E's view of the target. In this case, a manned fighter was not the right tool for the target—its limitations denied critical information to its crew and resulted in unintended casualties after striking the wrong target.

This does not mean that RPA and manned fighters cannot be exceptionally effective when operating as teammates. A case in point is the successful attack on Abu Musab al-Zarqawi, the leader of al Qaeda in Iraq (AQIZ). Al-Zarqawi had successfully evaded U.S. and coalition efforts to find him for years. Intelligence information revealed that a high-ranking associate name Sheikh al-Rahman met regularly with the AQIZ leader following a very specific security protocol that involved changing cars many times en route to the meetings. However, Rahman had a habit of using a blue car for his final transport. On June 7, 2006, a Predator observed Rahman following this pattern and eventually getting into a blue car that dropped him off at a house in Hibhib, Iraq. The Predator team positively identified the target and provided target cues to two F-16 fighters. Minutes later, the F-16s dropped two 500-pound laser-guided bombs that killed al-Zarqawi and several of his associates. Only an RPA had the ability to provide such persistent and precise tracking of al-Rahman, which finally led to discovering al-Zarqawi's location. In this case, F-16s were the best choice to prosecute al-Zarqawi because of the nature of the target, its environment, and the need for larger weapons effects than a Predator could deliver.

Whether conducting the strikes themselves or cuing other assets, over the last 20 years, RPA have transformed the American public's expectations of warfare. The ability of RPA aircraft to persistently loiter over key targets and follow them has enabled the U.S. military to conduct warfare in a manner that is robustly evaluated, exceedingly precise, and results in minimum collateral damage or harm to civilians. For the types of targets that RPA track and the permissive environment they operate in, this has indeed become the standard for operations. The ability of RPA to limit harm to both U.S. military

personnel and innocent civilians has contributed to a belief that conflict can and should be error-free. When it is not, it is important to understand the contributing factors and why things went awry—and experience has shown mistakes are very rarely the fault of the RPA itself.

### Urgent, high-risk scenarios and imperfect information can sometimes result in unfortunate outcomes

Some RPA export critics continue to cite the potential for their operations to harm civilians, pointing to examples like the MQ-9 strike during the 2021 evacuation of Kabul that killed ten innocent civilians. Although they are right to be concerned with the tragic results of this operation, the fault lies not with the RPA as a weapons system but in the many factors that drove engagement authorities to approve the attack. The same outcome could have occurred if a manned attack helicopter or even a fighter jet had received approval for the strike.

On August 26, 2021, 13 American service members and 170 Afghans were killed, and over 100 were injured by two suicide bombers at a Kabul Airport entry gate where U.S. service members were screening Afghans for evacuation from the county.[11] The American public was horrified and outraged the U.S. military had not been able to prevent the attack. Evacuation operations had to continue, but it was clear that the public expected that the military would protect its service members from further harm. A few days later, a U.S. MQ-9 struck a white sedan believed to belong to ISIS militants. Ten people were killed, and, at first blush, the public was relieved that another attack on U.S. forces and Afghan evacuees had been preempted. Instead, the attack killed Zemari Ahmadi, a longtime worker for a U.S. aid group, along with nine others, including seven children. Public reaction swiftly pivoted from relief to anger, and the U.S. military admitted its mistake.[12]

An MQ-9 intelligence officer familiar with the incident acknowledged the RPA team knew the strike had higher levels of risk than most operations.[13] He also stated that the vehicle type, electronic intelligence, and even the behavior of Zemari on the day of the strike fit the known behavior patterns of suicide car bombers and ISIS-K operatives. Plus, the security situation in Kabul was continuing to devolve, and the U.S. intelligence community had just received a warning another terrorist attack was imminent. Based on this warning and the previous devastating suicide bombing, President Biden directed the DOD to "take every possible measure to prioritize force protection."[14] Given information on hand at the time, engagement authorities made a decision to strike Zemari Ahmadi's car while it was in a courtyard. Instead of killing ISIS-K operatives, ten civilians perished in the tragic attack.

Critics often and incorrectly assert that RPA increase harm to civilians and use examples like the Zemari strike to press their case. The fault in this unfortunate strike lies not with the RPA as a weapons system but in the many factors that drove the engagement authorities to approve the attack. Engagement authorities had to consider the potential consequences of not striking what they assessed to be a likely ISIS-K actor planning another attack on U.S. military personnel and evacuating civilians. Despite their efforts, they made the wrong call, but the tragic outcome was not because the strike platform used in this case was an MQ-9.

In summary, RPA are not instruments that threaten to greatly increase harm to civilians in warfare. Quite the contrary,

studies on the use of RPA have quantitatively demonstrated the opposite is true.[15] RPA capable of assessing potential targets over long periods of time and providing teams of intelligence experts and strike authorities with more real-time information than ever before have, in fact, improved the targeting, decisions, timing, and precision of strikes to decrease harm to non-combatants.

## The Value of Building Partner Capability and Capacity

Exporting key military weapon systems like RPA to allies and partners is a vitally important element of American national defense. These exports do not weaken our own defenses—the exact opposite is true. Sharing advanced military technologies helps allies and friends build the capacity to defend themselves. Sharing and developing these capabilities with friendly nations is a force multiplier for the U.S. military, and one that has economic and industrial benefits for the United States overall. Every U.S. National Security Strategy (NSS) and National Defense Strategy (NDS) published over the last 30 years has emphasized how essential allies and partners are to our nation's security. The U.S. national security community widely recognizes that building allies' defensive capabilities and capacity through military personnel exchange programs, training activities, exercises, and equipment exports are a critical means to create new and strengthen existing relationships.

If anything, technology sharing and military exports have only grown in value since the end of the Cold War. During this strategic pause, the size of the U.S. military shrank even as operational requirements and threats have increased. Simply put, the U.S. military is too small to do all that the nation asks of it, and allies and partners are critical force multipliers that can help fill the gap. Remotely piloted aircraft exports are a key tool that should be part of the larger U.S. effort to build partner capacity, especially for valuable mission areas such as persistent ISR, counterterrorism, counter-maritime operations, and even defense against growing air and missile threats.

**Military exports can help assure and deter.** Sharing military equipment also sends a strong signal of U.S. commitment and intent to defend its allies and friends. This is a key reason why the U.S. decided to approve the sale of 66 F-16Vs to Taiwan. In a joint statement, Congressmen Eliot Engel (NY-D) and Michael McCaul (TX-R) stated, "The sale of F-16s to Taiwan sends a strong message about the U.S. commitment to security and democracy in the Indo-Pacific."[16] Military exports also help deter regional threats and decrease the potential that China, Russia, or other aggressors would choose to use military force against a U.S. ally or partner. Overly restrictive military export policies—including policies for RPA exports—can deny allies and friends extremely cost-effective and precise means to detect and respond to threats to their sovereign territory and airspace. Moreover, allies are left with the alternative of seeking RPA from other countries—including China, Russia, and others with security objectives contrary to those of the United States. This conversely erodes the effectiveness of America's integrated deterrence strategy.

**Military equipment exports can improve coalition operations**. The ability to effectively operate as part of a coalition force is a keystone to integrated deterrence. There is an inherent improvement in the effectiveness of coalition operations that comes with operating common equipment, and this should include RPA. Shared logistics, planning, sustainment, spares, tactics, sensors, datalinks, weapons, and

Figure 3: Examples of Chinese RPA, which they have exported to both friendly nations and adversaries.

Top | The mass-production model of China's unmanned aerial vehicle CH-5, or "Caihong (Rainbow) 5." The CH-5 can conduct reconnaissance, surveillance, patrol, target positioning and strike missions according to its developer.

Bottom | Chinese Wing Loong 1 and Gongji GJ-11 stealth RPA.

Credit: Top | Bai Guolong/Xinhua via Chinese Ministry of Defense | Bottom | Wei Peiquan/Xinhua via China Ministry of Defense

communication equipment all help create a unified coalition force instead of an ill-fitted patchwork of different forces. For example, interoperability across future coalitions is a premise of the F-35 program. Admiral (Ret.) Scott Swift and General (Ret.) Phillip Breedlove emphasized the value of interoperability across nations' military capabilities, stating that "in addition to survivability and lethality, more countries are seeking interoperability with friends and allies, the F-35 delivers this crucially important area."[17] Increased interoperability equates to increased operational integration in real-world battlespaces, decreases the fog and friction of combat, and helps enable coalition forces to synergistically work together.

Coalition members that do not share the same or similar types of RPA weapon systems can struggle with the interoperability challenges, creating operational friction. One U.S. MQ-9 pilot voiced his frustration with the lack of machine-to-machine data exchange when operating with a UK remotely piloted aircraft in the Middle East. Because the UK RPA was unarmed and could not prosecute its own targets, it continued to miss key strike times against high-value targets. The U.S. MQ-9 team was called in to support the UK RPA, but since the UK aircraft did not have a compatible datalink, the aircraft could not share information machine-to-machine. The U.S. RPA pilot noted that his team had to resort to a far less-effective work-around:

> *It was manual coordinates. By that, I mean they would literally pass us coordinates over the phone, which, when you're talking about a dynamic target set, is almost pointless because of the inherent latency of the information. 'Here's the last known location; it's a vehicle heading in this direction, about this approximate miles per hour….' Our ability to find that target was extremely low—your success goes way down. We never found the target. It was just impossible. Compare that to real-time data sharing, where I can pull up on my computer screen his exact sensor, I can double-click it with a mouse, and my internal sensor will slew exactly where they're looking. We*

*can match to compare targets to verify we're on the exact same guy. I mean, with machine-to-machine, I can come on station, build SA [situational awareness] immediately, and I am tracking a vehicle in a city that has a thousand other vehicles that look exactly like it, but I can look at their monitor to see where their crosshairs are, look at my screen and go—real time—yep, that's the exact same car. And they can see my screen and my crosshairs and affirm, yep, you've got the exact same car.*[18]

This kind of interoperability is crucial to the seamless integration of military forces across an international coalition. Countries with militaries that do not share the same or compatible weapon systems are likely to be less interoperable and struggle to achieve the same speed and effects that are possible when operating similar equipment.

**Military exports benefit the U.S. economy.** U.S. arms sales provide significant economic benefits to both the United States and its partners. Foreign military sales (FMS) and direct commercial sales (DCS) totaled $170.1 billion in 2019 and $175.1 billion in 2020.[19] These sales sustained thousands of high-skill American jobs and helped balance capital flows and trade deficits. For example, foreign military sales become a win-win when they lower the total cost of acquisition, ownership, and modernization for all program participants by achieving economies of scale. Cost-sharing, amortization, and economies of scale are all pillars of the F-35 program. Fourteen countries are currently flying or have plans to buy the F-35 Lightning II, including Israel, South Korea, Japan, Finland, and Singapore, as well as seven NATO allies.

Furthermore, defense exports preserve America's technological advantage by helping to sustain its industrial base. The F-15E Strike Eagle is a prime example of how foreign sales can sustain essential production capacity. The United States Air Force concluded its F-15E procurement in 2001 with a total buy of 435 aircraft.[20] Without foreign sales, the F-15 production line would have shut down, and its many skilled engineers, technologists, and laborers likely would have lost their jobs. The reality is that the slow pace of establishing major new U.S. military acquisition programs means that production line closures can also be the end of the line for the human talent needed to create and produce modern weapons systems. In the case of the F-15E, Boeing was fortunate to secure foreign military sales to Israel, South Korea, Saudi Arabia, Singapore, and Qatar. These export sales were the only lifeline for the F-15 production line and the engineering talent and manufacturing skills that relied upon it. Had those sales not been approved, procuring the F-15EX would not be an option for the Air Force today, as the F-15 production line would have closed nearly 20 years ago. The MQ-9 is now at the same juncture point. Without export opportunities, the MQ-9 production line will close—and with it, the engineering talent, technologists, and skilled manufacturing workforce to build the next generation of uninhabited aircraft may be lost in part or in whole.

Nations that procure U.S. military equipment also secure significant economic value. For instance, it can help these nations to avoid the cost of developing and fielding advanced military technologies. Inventing and developing these capabilities is expensive, and nations may not have the intellectual, industrial, or economic base necessary to create these kinds of weapon

Figure 4: U.S. friends and allies have, to some degree, moved forward without the United States to develop and procure their own RPA.

Left | An Israeli Heron TP Eitan ("Steadfast") RPA. This medium-altitude, long endurance RPA is also operated by India, Germany, and Greece.

Right | An Israeli Elbit Systems Hermes 900 Kochav ("Star") RPA. Counting other governments that have made procurement decisions on this system, these RPA are set to be operated in a dozen countries.

Credit: Left | Eran Levi/Israeli Air Force | Right | Celia Garion/Israeli Air Force

systems in isolation. This cost avoidance—and value—isn't simply about gaining access to technology. U.S. defense exports include sustainment and logistics support; technical data; and established tactics, techniques, and procedures in the sale. This means that exporting RPA to allies and partners also exports many of the values and practices that underpin U.S. RPA forces and operations.

Strengthening existing and creating new alliances and partnerships has long been a pillar of U.S. National Security Strategies and National Defense Strategies. Credible partners with strong, interoperable, and complimentary military capabilities are crucial to the successful outcome of U.S. military campaigns. In the 2005 NDS, then-Secretary of Defense Donald Rumsfeld stated an enduring principle of U.S. security: "International partnerships continue to be a principal source of our strength."[21] The 2012 NDS was even more explicit regarding America's interests: "Build[ing] the capacity and competence of U.S., allied, and partner forces or internal and external defense, [will] strengthen alliance cohesion, and increase U.S. influence." In other words, weak partners weaken America's national security, and strong allies and partners strengthen America's national security. Moreover, potential adversaries like China and Russia lack such an integrated network of security partners. The United States should maintain this significant comparative advantage. Military exports are a key means of strengthening allies and partners—and, by extension, the United States. Remotely piloted aircraft are important tools to achieve these strategic objectives, and U.S. RPA export policy must reflect this.

## The Mechanics of Foreign Military Sales

Like any U.S. defense export, foreign RPA sales must follow deliberate bureaucratic request, review, coordination, and oversight processes. These processes are in place to ensure that defense exports are aligned with the administration's foreign policy goals, do not weaken America's security posture, and ensure Congressional oversight. RPA exports are a valuable tool for promoting security and effective diplomacy, and, in understanding the considerations that govern defense export decision processes, there is a compelling case for redefining restrictive RPA export policy.

## Processes

U.S. defense exports are governed under two major processes—foreign military sales (FMS), also known as government-to-government transfers, and direct commercial sales (DCS). Under the FMS program, the U.S. government interacts with purchaser countries as a broker for U.S. manufacturers to sell to foreign countries and organizations. Under the DCS program, the U.S. government does not act as a broker but must still license such transactions. Since the Department of State is ultimately responsible for the export of military articles, technologies, and services through both processes, it must notify Congress with the Letter of Request (LOR) and a Letter of Offer and Acceptance (LOA) 15 to 30 days prior to a final decision for sales that exceed certain dollar threshold. Congress can hold or restrict such sales via a joint resolution.[22]

**RPA exports are especially important for strengthening alliances and partnerships in regions of the world like the Middle East, where the United States is no longer maintaining a robust military presence.**

When a country indicates an interest in a defense system, the U.S. embassy in country conducts a U.S. Country Team Assessment and develops a coordinated position on the sale with the Defense Security Cooperation Agency (DSCA), the lead military service's security assistance organization, and the Bureau of Political Military Affairs at the Department of State. The large number of stakeholders involved in this evaluation and approval process reflects the serious and sensitive nature of defense exports and ensures that these decisions support U.S. national interests and values.

Additionally, all FMS and DCS arms exports and sales are governed by the Arms Export Control Act (AECA), the International Traffic in Arms Regulations (ITAR), and the Conventional Arms Transfer Policy.

The Arms Export Control Act is the legal statute that provides the authorities and "general rules for the conduct of foreign military sales and commercial sales of defense articles, defense services, and training."[23] AECA requires the U.S. government to conduct end-use monitoring (EUM), both for government-to-government transfers or for DCS. This includes scheduled inspections, physical inventories, general inquiries, and reviews of accountability records by U.S. government representatives. Moreover, the end-use of U.S. defense articles must comply with international law.

The International Traffic in Arms Regulations provides for the specific enactment of the AECA, including authorized officials; the registration of manufacturers and exporters; how defense technical data should be handled; prohibited exports and prohibited nations; violations and penalties; and administrative procedures.[24]

Finally, the Conventional Arms Transfer Policy codifies the criteria that must be considered in any defense export decision. These criteria address five major concerns that guide all defense transfers: U.S. national security, U.S. economic security and innovation, relationships with U.S. allies and partners, human rights, and nonproliferation.[25]

**1. U.S. national security.** Defense exports should support the strategic, foreign policy, and defense interests of the United States. The State Department explicitly identifies supporting regional security; protecting the technological advantage of the United States; and contributing to counterterrorism, drug trafficking, and similar threats to national security as key interests that exports should support.

RPA exports are especially important for strengthening alliances and partnerships in regions of the world like the Middle East, where the United States is no longer

maintaining a robust military presence. As the United States pivots to focus on peer conflict and high-end warfare, RPA will be important tools for allies and partners to conduct counterterrorism operations, provide persistent ISR to the receiving nation and the United States, and reassure allies and partners in regions of the world where China or Russia may seek to displace U.S. influence.

**2. U.S. economic security and innovation.** Defense export decisions must account for the potential "financial or economic effect on United States industry and its effect on the defense industrial base, including contributions to United States manufacturing and innovation."[26] The requesting nation's ability to procure similar systems from other states—and potentially adversarial states—should also be considered.

A robust RPA export program is crucial to sustaining and growing America's uninhabited aircraft industry. Where the United States has delayed or denied an RPA export request, China has aggressively moved to export its own RPA to those nations. This revenue—a lost opportunity for U.S. firms—funds Chinese defense innovation.

**3. Relationships with allies and partners.** Assessments of potential defense technology transfers must include the degree to which they can build the security of the receiving nations and increase the access and influence of the United States while also avoiding adverse economic, political, or social effects within the receiving nation.

Some critics believe that armed RPA can increase regional instability because it is easier to use them to carry weapons than manned aircraft. This neglects the potential for RPA to decrease the probability of conflict escalation because they do not carry pilots. The loss of an RPA due to an enemy's actions can reduce the potential of reprisal on the scale that might be expected if a pilot or even a crew was lost during the shootdown.

**4. Human rights and international humanitarian law.** Defense exports should not facilitate the abuse of human rights or violations of international humanitarian law.

Some critics object to the export of U.S. RPA because they worry that these aircraft will be used to conduct illegitimate strikes against non-combatants. Yet RPA are not any more likely to be used to violate international humanitarian law than any other weapon system simply because it is unmanned. Furthermore, RPA video feeds and datalinks provide the opportunity for more robust monitoring and tracking than other weapons systems.

**5. Nonproliferation.** The defense transfer should not "undermine the integrity of international nonproliferation agreements that prevent proliferators, programs, or entities of concern from acquiring missile technologies … to deliver weapons of mass destruction."[27]

Nonproliferation is a major concern for many in the U.S. State Department who mistakenly view remotely piloted aircraft as cruise missiles and, therefore, potential delivery vehicles for weapons of mass destruction (WMD). This is an outdated mindset that is not informed by current RPA capabilities and operations. Remotely piloted aircraft are just that—aircraft—and should be treated as such in export considerations.

The State Department further articulates its five primary objectives with respect to RPA export decisions that are not dissimilar to the existing Conventional Arms Transfer Policy criteria: 1) to increase trade opportunities for U.S. companies; 2) to build partner security and counterterrorism capabilities; 3) to strengthen bilateral relationships; 4) to preserve U.S. military advantage; and 5) to prevent the proliferation of weapons of mass destruction (WMD) delivery systems.[28] Unlike the CATP criteria, these are objectives, not considerations. Another way to look at them is to ask

Figure 5: The Turkish Air Force Anka family of RPA have been operating since December of 2010 and have accumulated more than 90,000 flight hours as of March 2021 according to its developer, Turkish Aerospace.

Credit: Mustafa Karabas/TUSAS (Turkish Aerospace Industries)

whether a denial of export would obstruct the accomplishment of these objectives. For example, would denying the export of an RPA decrease the trade opportunity for a U.S. company and weaken a partner's security or a bilateral relationship? Would denial of an RPA export request diminish America's military advantage or potentially contribute to the proliferation of WMD delivery? For most of these questions, not exporting RPA to an ally or partner is contrary to the objectives of the CTAP. These objectives are more than simply nice-to-haves—these are outcomes the U.S is actively seeking to achieve.

Finally, U.S. defense exports are proactively managed by the United States through the end of their use by the receiving country. The Arms Export Control Act (AECA) mandates that ongoing review and end-use monitoring are integral components of any defense transfer program. When the United States decides to export a defense system to an ally or partner, constraints on the article's use and disposal are often part of the contract. These activities include ongoing monitoring, inspections, and authorization for the country's divestiture plan.

## End-Use Assurances, End-Use Monitoring, and "Principles for Proper Use"

Those who object to RPA exports often cite concerns over how these aircraft will be employed by receiving countries, but the United States does not haphazardly export arms without consideration for how these weapon systems may be used. Recipient countries must agree to not retransfer equipment to third parties without written consent from the U.S. Government and not use the equipment for purposes other than for what they were furnished. They must also maintain security of the items.[29] Two U.S. programs—"Blue Lantern" for direct commercial sales and "Golden Sentry" for FMS transfers—support, monitor, and manage exported defense articles throughout their lifespan. The State Department's Directorate of Defense Trade Controls operates Blue Lantern, and DOD's Security Cooperation Organization (SCO) implements Golden Sentry. Both programs provide "reasonable assurance that: 1) the recipient is complying with the requirements imposed by the U.S. government with respect to use, transfers, and security of defense articles and defense services; and 2) such articles and services are being used for the purposes for which they were provided."[30]

This end-use monitoring involves regular on-site and surprise inspections of partner national security installations and exported defense articles. Inspectors verify serial numbers, account for paperwork and other technical data, and interview operators, maintainers, and others involved in the program. End-use monitoring also provides for U.S. approval and authorization for how a country will divest the weapon system.

**RPA have end-use monitoring advantages.** RPA offer the opportunity for enhanced end-use monitoring due to its technologies and how they are operated. Traditionally, the United States does not spy

on or interfere in the sovereignty of how allies and partners use exported systems. If negotiated in the export agreement, contractual compliance can be monitored and enforced more robustly through an RPA's sensor and command and control datalinks. It is entirely possible to automate monitoring the feeds of these systems to alert both users and the United States of potential agreement violations. And, if warranted, it might even be possible for U.S. enforcers to cut the datalink real-time to prevent egregious acts.

Contractor support is another potential check and balance for RPA operations. Contracts for RPA exports can be written with caveats that any violation of user agreements would result in the immediate withdrawal of contractor support and activities. This would have a significant impact on country operations. Any country that purchases U.S. manufactured armed RPA will require the support of U.S. contractors, who can stop work and be withdrawn on a moment's notice for cause.

Like with all arms exports, the United States has a key strategic interest in the monitoring protocols and end-use agreements for armed RPA exports. Unlike other arms exports, RPA offer the United States the enhanced means to conduct use monitoring and more robust responses in the case of violations.

### The Missile Technology Control Regime

Exporting RPA should be an important means for the United States to strengthen alliances and partnerships—and, by extension, the U.S. defense industrial base, which is critical to the U.S. military's current and future readiness. Instead, continuing to include all RPA as capabilities that are covered by the MTCR's guidelines works against these priorities.

Established in 1987, the MTCR is an informal and voluntary association of countries (a "regime") that seeks to limit the proliferation of WMD delivery technologies.[31] By restricting access to the highly sophisticated technologies necessary for ballistic missiles, participants sought to erect further barriers to acquiring and developing practical nuclear weapons and WMD delivery systems. In the early 1990s, members added "drones" to the regime due to their superficial similarity to cruise missiles and have since applied the regime to remotely piloted aircraft.

The MTCR classifies drones based on their payload and range. Drones that can carry a payload of at least 500 kg to a range of at least 300 km are classified as "Category 1" and are subject to the most restrictive guidelines in the regime: Category 1 system exports are subject to "an unconditional **strong presumption of denial** regardless of the purpose of the export and are licensed for export only on rare occasions."[32] As Category 1, larger RPA are treated the same as complete ballistic missile systems, space launch vehicles, re-entry vehicles, rocket engines, guidance systems, and warhead mechanisms.[33] Category 2 technologies—which include RPA that are limited to a 300 km range regardless of payloads—are considered less sensitive or less complete, and are subject to fewer restrictions.

The entire premise of the MTCR is that these technologies are exceedingly difficult and expensive to develop. There is a logic to this approach; even if a state were able to develop a nuclear weapon or a WMD, it would not be pragmatically useful without the associated delivery mechanism. By restricting the export of delivery technologies, member nations can frustrate the aspirations of states seeking to field nuclear weapons or WMD.

Figure 6: The U.S. MQ-9 Reaper is still the global gold standard in terms of highly capable and reliable military RPA. However, this is not down to technology alone, but in part due to U.S. forces', and operators' specifically, deep experience. Choosing to share these capabilities with friends and allies would only stengthen American dominance of these cpabilties and solidify its position as the leader of RPA operational art. If that position is left open, it will not be long until another nation may assume that mantle and set norms of behavior that are worse than disadvanageous, but dangerous.

Credit: U.S. Air Force photo

The efficacy of the MTCR in limiting proliferation or access to covered technologies hinges on whether adherents hold a near-monopoly on these systems. In the case of RPA, this "near-monopoly" is an artifact of the past. The fact is, the United States is no longer the sole or even dominant manufacturer of large RPA. China has exported its RPA widely, even establishing multiple manufacturing facilities in different regions. RPA expert and University of Pennsylvania professor Michael Horowitz reinforced how this market dynamic has adversely impacted U.S. competitiveness, stating that "treating uninhabited aircraft as missiles for export policy purposes doesn't work. It has allowed China to capture a significant chunk of the unmanned aircraft export market, including with U.S. allies and partners."[34] In other words, the U.S. adherence to the MTCR's strong presumption of export denial has instead offered China the opportunity to export RPA to U.S. allies and partners—and could therefore weaken critical U.S. bilateral relationships. If allowed to continue, this will erode America's global security interests.

The "strong presumption of denial" applied to large RPA exports has also had a negative impact on the U.S. defense industrial base.[35] These consequences go beyond straining the ability of U.S. companies to maintain production lines and their skilled workforces. Without the opportunity to export RPA, U.S. defense companies do not have access to revenue that can be reinvested in next-generation capabilities needed to maintain the U.S. military's competitive edge. Other nations are not idly standing by. In addition to a robust Chinese RPA industry, the Czech Republic, France, Spain, Germany, Italy, Turkey, and the United Arab Emirates are all beginning to develop, produce, and export Category 1 RPA.[36] The good news

is the Trump administration announced a change in policy in July 2020, adding a maximum true airspeed threshold of 800 km per hour to the definition of Category 1 RPA. RPA that would have previously been classified as Category 1 are now defined as Category 2 so long as they do not exceed 800 km per hour. Consequently, aircraft such as the MQ-9, RQ-4, and future U.S. RPA should no longer be subjected to a strong presumption of denial.[37] While modifying the Category 1 definition was an appropriate response to the realities of the RPA market, technologies, and capabilities, it was also a strong indicator that using the MCTR to control RPA exports is simply outdated.

This does not mean the United States should completely walk away from the voluntary MTCR, which remains an important regime for controlling and limiting access to the highly sophisticated and difficult technologies associated with missiles. However, it is no longer appropriate or even effective when applied to remotely piloted aircraft systems. Continuing to cover RPA under the MTCR guidelines threatens to distort the global RPA market in favor of U.S. competitors, encourage the expansion of RPA production capabilities abroad while constraining U.S. innovation, and even weaken the efficacy of the MTCR Regime itself.

## Expanding on the Increasingly Competitive International RPA Market

The military RPA market is far more competitive and dynamic than many in the U.S. export policy community understand and appreciate. Despite significant growth in global RPA sales, the United States has lost the opportunity to gain a dominant position in—and, therefore, shape and manage—the RPA market. In 2010, 60 countries operated military RPA. The number increased to 95 counties by 2019, and it continues to grow.[38] Nearly 40 countries currently operate, or intend to acquire, medium-altitude, long-endurance (MALE) or high-altitude long-endurance (HALE) aircraft that can sustain a mission duration of over 24 hours and carry meaningful payloads of weapons or sensors. At least 18 companies in seven nations produce these larger military RPA.[39]

The U.S. bias against exporting RPA also impacts its ability to compete with China on a strategic level. China is aggressively selling RPA to whoever is interested.[40] Between 2011 and 2019, dozens of countries acquired armed RPA, 11 of which bought them from China. Over the same period of time, the United States only sold armed RPA to one country—France.[41]

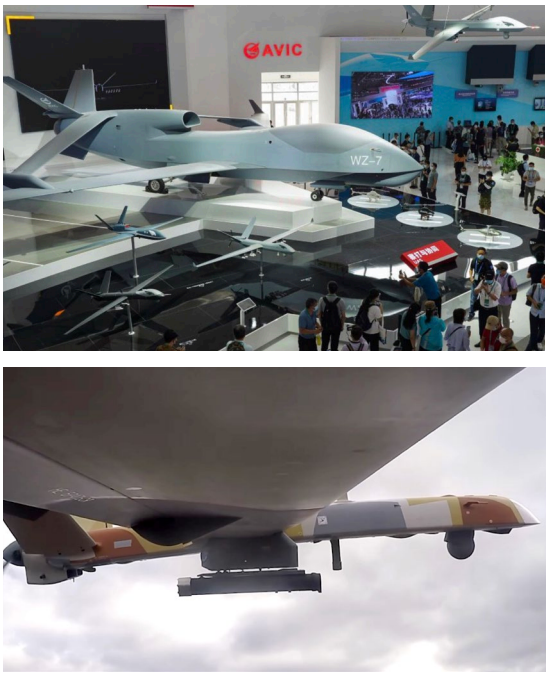


Figure 7: Top | The Chinese WZ-7 Soar Dragon High-Altitude Long Endurance RPA has been compared to a U.S. RQ-4 Global Hawk in terms of its mission capability.

Bottom | Russian social media claimed this Kronshtadt Orion Inokhodets ("Amble") RPA was used to strike Donetsk. A larger variant with greater payload is speculated to enter service in 2023. Other variants are already on contract for export according to Russian media.

Credit: Top | Liu Dawei/Xinhua via China Ministry of Defense | Bottom | Russia Ministry of Defense

Nations are increasingly turning to China to meet their RPA requirements, in part because it is so difficult to buy them from the United States.[42] Jordan, for example, became frustrated with U.S. delays over their request to buy the Predator XP, an unarmed version of the MQ-1, and turned to China instead.[43] In this case, the U.S. FMS process was simply "too slow and laborious."[44] Indonesia may even look to China, as they submitted a letter of request over two years ago to purchase the American-made MQ-1 Gray Eagle, which has yet to be approved.[45] It is not unreasonable to suspect that the MTCR's "strong presumption of denial," coupled with concerns over end-use, are major contributors to delays in the FMS or even DCS process for RPA exports.

Beijing has exploited the reticence of the United States to sell RPA. The United Arab Emirates has purchased Chinese-produced Wing Loong I RPA and was the first export customer for China's more sophisticated Wing Loong II armed RPA.[46] Saudi Arabia purchased a handful of Chinese CH-4 RPA in 2014, has since acquired more than a dozen Loong II armed RPA, and it has expressed an interest in buying 285 more. Pakistan deployed its first operational indigenous RPA in 2015 and increased its RPA force size by procuring Chinese CH-4s. Nigeria also designed its own RPA in 2014 and 2015 but decided to buy the Chinese CH-3A Rainbow RPA instead. It has since placed even more orders for CH-4s and the Wing Loong IIs. Iraq also procured the Chinese CH-4B.[47] Chinese companies further penetrated the global RPA marketplace by establishing production lines in Saudi Arabia, Pakistan, Myanmar, and other countries.[48] Then-Assistant Secretary of Defense for Indo-Pacific Affairs Randall Schriver succinctly captured China's motivation for aggressively pursuing RPA exports, calling them "a tool for them to develop closer defense and military ties, particularly for future access."[49] Schriver continued by noting, "China is less disciplined, and so there's a proliferation risk as well to regimes that we would regard as not necessarily responsible."[50]

There is still an opportunity for the United States to reverse these trends. China has achieved success through a combination of aggressive marketing, conditions-free or constraint-free transfers, and offers to share RPA production jobs with customers. Chinese RPA also can cost less—up to one-fourth of the price—of some American RPA.[51] Yet Chinese RPA are not yet as capable as an American-built RPA, nor are they as reliable. Jordan experienced buyer's remorse after they purchased several CH-4B "Rainbow" RPA in 2016.[52] Only two years later, Jordan sought to sell the CH-4Bs at auction, noting their dissatisfaction with their performance.[53]

The Jordan example offers clear insight regarding the opportunity the United States now has to replace China and build relationships by becoming the RPA provider of choice. U.S. RPA are more capable, more reliable, better quality, and have a deeper support infrastructure compared to what China can offer. But the window of opportunity is short. If the United States does not quickly act to reverse China's market expansion and proliferation of RPA, it may lose the chance to regain its global leadership in RPA systems and the ability to shape the employment norms that leadership confers.

## The Consequences and Opportunities of RPA Proliferation

Many individuals in the U.S. State Department who are responsible for RPA export decisions harbor concerns that are not borne out by any evidence over what they imagine are potentially destabilizing consequences of RPA export. Although these concerns may be well-intentioned, they result in delay or denial of export requests by allies and partners for large or armed remotely piloted aircraft. These concerns

are often rooted in the mistaken belief that the unmanned nature of remotely piloted aircraft will destabilize regional dynamics, lead to increased escalation of tensions or conflict, and result in the increase of violations of human rights and international humanitarian laws. Yet their hesitation in transferring RPA technologies that are accompanied by comprehensive U.S. end-use policies and monitoring regimes are now facilitating the very outcomes they fear. Given that China is far less discriminating than the United States in how RPA they export are used, U.S. policymakers should ask what policies would best advance U.S. strategic interests. Instead of denying the export of RPA, the United States should take advantage of RPA exports to support its allies and partners, build their capacity to defend themselves, and shape the norms by which these aircraft are employed.

**Instead of denying the export of RPA, the United States should take advantage of RPA exports to support its allies and partners, build their capacity to defend themselves, and shape the norms by which these aircraft are employed.**

Remotely piloted aircraft actually facilitate more stable regional dynamics because they increase regional and local situational awareness. Transparency and monitoring programs have long been a feature embraced by the international community to stabilize high-stakes competitions between rivals. The Open Skies Treaty was one such example, where each state-party was allowed to "conduct short-notice, unarmed, reconnaissance flights over the others' entire territories to collect data on military forces and activities."[54] This demonstrates the strong case for different states to observe each other and build trust, foster transparency, and communicate more openly about military activities. At the very least, increased situational awareness can diminish the chances that regional actors will make a strategic miscalculation and stumble into a crisis or conflict.

One such example that could increase trust and diminish the potential for unintentional hostilities is the pending export of the RQ-4B Global Hawk long-range ISR RPA to Japan. Japan will be able to use its RQ-4Bs to conduct persistent maritime surveillance and gain greater situational awareness of the activities of China's People's Liberation Army Navy and the North Korean military in the maritime approaches to its island nation. This capability will increase regional stability because Japan will be able to establish patterns of behavior, track and sort sea traffic, and alert Japan to any unusual activity. Not only will this help improve Japan's knowledge of Beijing's actions, but it will also act as a deterrent by detection. Indeed, this kind of detection capability can act as a deterrent to other potential aggressors to allies in other regions. Given the many maritime disputes in the western Pacific, such systems will provide a new confidence-building measure.[55]

Moreover, because RPA are unmanned, there is less likely a reason that the loss of an RPA during operations—even if shot down—will cause tensions to escalate into a larger military conflict. The loss of human pilots or their capture and detainment can be the source of crises between states. For example, tensions with the Soviet Union escalated rapidly after the shootdown of Francis Gary Powers' U-2 aircraft in May 1960. In contrast, there is an emerging norm that a shootdown of an RPA is not a cause for a rapid escalation of a crisis. when Iran hacked into the datalinks and stole a U.S. RQ-170 in 2011—which arguably placed the United States in an extremely vulnerable position—the incident was quickly smoothed over.[56] Similarly, when Iran shot down a U.S. RQ-4 Global Hawk in June 2019, tensions escalated but were far less than the crisis that occurred after the Powers shootdown.[57]

Remotely piloted aircraft are tools of the governments that use them fundamentally. Concerns that a government will use RPA to violate human rights or international humanitarian law are—and should be—part of every U.S. RPA export decision. As part of this, decision-makers should additionally consider the opportunity of a potential export to shape employment norms, educate RPA operational teams, and monitor how RPA will be used. Simply denying export requests will not deny states from accessing RPA technologies if they can go to China or other sources for them. Instead, transfer decisions that take into consideration the opportunity to influence receiving governments' behavior could potentially prevent violations. Instead of relying on the MTCR, instruments like the 2016 "Joint Declaration for the Export and Subsequent Use of Armed or Strike-Enabled Unmanned Aerial Vehicles" signed by the United States and 53 other nations can further "principles for proper use" of RPA.[58] This declaration established a broad consensus on armed RPA exports, including the following principles:

1. That international law applies to the export of armed RPA.
2. That nations should engage in the responsible export of RPA in line with existing relevant international arms control and disarmament norms.
3. That armed RPA exports should be executed consistent with the principles of existing multilateral export control and nonproliferation regimes.
4. That maintaining appropriate voluntary transparency measures is important.
5. That in light of the rapid development of RPA technology and the benefit of setting international standards for the export and subsequent use, nations should continue discussions on how these capabilities are transferred and used responsibly.[59]

By engaging and incentivizing nation-states that are not currently adherents to the 2016 Joint Declaration with the potential to access U.S. RPA, the United States can increase the community of nations that share norms around the employment and export of RPA, to include norms about human rights. There are natural and healthy tensions between those serving in nonproliferation roles, humanitarian workers, and those who aim to strengthen allies and partnerships. Letting RPA transfer requests languish in the U.S. defense export system or denying them outright does little to advance international standards and norms in RPA employment or end-use, much less U.S. interests. RPA provide persistent ISR, precision strike, and significantly decreased collateral damage—but their presence or lack of a human in the cockpit does not imply, nor has it been proven, that such capabilities increase regional instability or human rights abuses.[60] The United States should actively engage with nations who seek U.S. RPA capabilities to build partnerships, pursue U.S. national security objectives, and ensure the adherence to international laws and norms.

## Conclusions and Recommendations

The era of RPA proliferation is here, and the United States is falling behind its global competitors in strategic relevance in part due to its reticence to export these capabilities to support its allies and build partnerships critical to integrated deterrence. Overly restrictive U.S. RPA export policies persist because of unproven concerns over how these aircraft could be used, how they might impact regional stability, and the potential for them to contribute to regional arms races. The fact is that RPA technologies are no longer at risk of proliferating; *they have already proliferated*. Multiple countries are fielding their own RPA and exporting variants that can carry sensors, weapons, and other payloads. Another real fact is that RPA

exports by adversaries like China, Russia, and Iran are not governed by the same kind of end-use restrictions and oversight policies that accompany U.S. military exports. U.S. end-use regimes are designed to support the same objectives often voiced by RPA export opponents, such as minimizing the potential for civilian casualties. In other words, overly restrictive U.S. RPA export policies increase the potential for these undesirable consequences. Stranger still is the illogical U.S. practice of classifying RPA as systems that fall under the Missile Technology Control Regime, which was developed to control the proliferation of nuclear weapons and WMD missile delivery technologies. RPA are aircraft, not cruise missiles, and they are certainly not nuclear weapons.

**It is time to recognize that RPA are aircraft for the purpose of exports to trusted allies and partners that support America's national security interests.**

Perhaps most importantly, overly restrictive RPA export policies reduce opportunities to build new U.S. relationships with other countries, undermine U.S. efforts to expand existing regional alliances and coalitions, diminish U.S. diplomatic and operational influence, and weaken our nation's industrial base. U.S. RPA export policies also continue to benefit China and other strategic competitors, who can use their respective RPA exports to expand their influence and gather intelligence. Since 2014, China has exported more RPA than any other country, and Russia is not far behind.[61] If this trend continues, the United States may find itself further marginalized in regions of the world where it seeks to wield influence and deter conflict.

The fix is simple—the administration can reform its RPA export policies and do so in a way that affirms America's commitment to upholding international norms and furthering its nonproliferation priorities. Working together, the U.S. State Department and Department of Defense should:

- Define medium and large RPA, including armed RPA, as military aircraft instead of cruise missiles for the purposes of export.
- Engage with other MTCR signatories to affirm the U.S. commitment to nonproliferation while simultaneously removing RPA as MTCR-controlled technologies.
- Work with states that are not yet signatories to adopt the 2016 "Joint Declaration for the Export and Subsequent Use of Armed or Strike-Enabled Unmanned Aerial Vehicles." The United States should encourage reluctant states to agree to this declaration's principles in part, if not in whole, in conjunction with RPA export agreements.
- Convene a working group to enhance monitoring protocols and end-use agreements for armed RPA exports.
- Engage with allies and partners who have pursued opportunities to purchase Chinese RPA and encourage them to revisit U.S. RPA as their system of choice.
- Publicly articulate the strategic benefits of increasing armed RPA exports, to include building partner capabilities, protecting the U.S. defense industrial base, and gaining greater influence in the global RPA market.

RPA exports are an important tool that can be used to support America's national interests, promote regional stability, and increase global security. Today, this tool is grossly underused. Worse still, continuing to adhere to outdated RPA export policies is ceding the global RPA market to China and other adversaries. It is time to recognize that RPA are *aircraft* for the purpose of exports to trusted allies and partners that support America's national security interests. At a time when the U.S. defense establishment is facing an unprecedented array of threats, it can no longer afford to neglect such a valuable strategic advantage. ✪

## Endnotes

1 Dan Gettinger, *The Drone Databook* (Annandale-on-Hudson, NY: Center for the Study of the Drone at Bard College, 2019).
2 Peter Bergen, Melissa Salyk-Virk, and David Sterman, "World of Drones: Who Has What: Countries with Armed Drones," New America, updated July 30, 2020.
3 Joe Gould, "Pentagon's arms sales chief retires as Biden administration faces decisions on transfer policy," *Defense News*, October 13, 2021.
4 The MTS-B is so named because it was developed for the Predator B RPA.
5 Author interview, Colonel Johnny Duray, November 30, 2021.
6 Chairman of the Joint Chiefs of Staff Instruction 3162.02, "Methodology for combat Assessment," March 8, 2019.
7 Author interview, James Foley, November 18, 2021.
8 Ibid.
9 Ibid.
10 Ibid. Emphasis added.
11 Sandi Sidhu et al., "They wanted a new life in America. Instead they were killed by the US military," *CNN*, September 15, 2021.
12 "Pentagon Says 10 Civilians Were Killed In Kabul Drone Strike," *Capitol Hill News*, September 17, 2021; "Times Investigation: In U.S. Drone Strike, Evidence Suggests No ISIS Bomb," *New York Times*, September 10, 2021.
13 Interview with an anonymous intelligence officer, January 2, 2022.
14 Sidhu et al., "They wanted a new life in America."
15 "Civilian Casualties & Collateral Damage," *Lawfare* blog, July 22, 2013; Robert Hunter Ward, "RPA Ethics: A Focused Assessment," *Small Wars Journal*, April 17, 2019.
16 Brad Lendon, "US finalizes sale of 66 F-16 fighters to Taiwan as China tensions escalate," *CNN*, August 17, 2020.
17 Scott Swift and Philip Breedlove, "The F-35's interoperability tech strengthens US alliances," *Defense News*, December 16, 2020.
18 Interview with John Duray, January 10, 2020.
19 Bureau of Political-Military Affairs, "U.S. Arms Transfers Increased by 2.8 Percent in FY 2020 to $175.08 Billion," U.S. Department of State (DOS) Fact Sheet, January 20, 2021.
20 Congressional Research Service (CRS), "Air Force F-15EX Fighter Program," *In Focus*, September 2, 2020.
21 DOD, *The National Defense Strategy of the United States of America* (Washington, DC: DOD, March 2005), p. 4.
22 CRS, *Transfer of Defense Articles: Sale and Export of U.S.-Made Arms to Foreign Entities* (Washington, DC: CRS, April 30, 2020).
23 22 U.S.C. 2551.
24 DOS, "The International Traffic in Arms Regulations (ITAR)."
25 Bureau of Political-Military Affairs, "Conventional Arms Transfer Policy," DOS, December 17, 2018.
26 Ibid.
27 Ibid.
28 Office of the Spokesperson, "U.S. Policy on the Export of Unmanned Aerial Systems," DOS Fact Sheet, May 21, 2019.
29 Bureau of Political-Military Affairs, "U.S. Arms Sales and Defense Trade," DOS Fact Sheet, January 20, 2021.
30 Ibid.
31 CRS, Transfer of Defense Articles.
32 Bureau of International Security and Nonproliferation, "Missile Technology Control Regime (MTCR) Frequently Asked Questions," DOS Fact Sheet. Emphasis in original.
33 U.S. Government, *Missile Technology Control Regime (MTCR) Annex Handbook 2017* (MTCR as of October 2016), p. iii.
34 Aaron Mehta and Valerie Insinna, "Trump admin official makes it easier to export military drones," *DefenseNews*, July 24, 2020.
35 The "strong presumption of denial" for Category 1 systems is not limited to defense articles only. The MTCR applies to any covered technology, including those developed specifically for commercial purposes. Thus, the MTCR discourages companies that might otherwise invest in large RPA for agricultural, geospatial, environmental, or other important sectors.
36 Gettinger, The Drone Databook, p. XV.
37 Mehta and Insinna, "Trump admin official makes it easier to export military drones."
38 Gettinger, The Drone Databook, p. VIII.
39 Gettinger, The Drone Databook, p. IX.
40 Bergen, Salyk-Virk, and Sterman, "World of Drones: Who Has What."
41 Michael Horowitz, Joshua A. Schwartz, and Matthew Fuhrmann, "China Has Made Drone Warfare Global," *Foreign Affairs*, November 20, 2020.
42 Ian Armstrong, "What's Behind China's Big New Drone Deal?" *The Diplomat*, April 20, 2017.
43 Kate Brannen, "U.S. Firm Denied Request to Market Drones to Jordan," *Foreign Policy*, February 15, 2015.
44 Patrick Tucker and Marcus Weisgerber, "China May Be Selling Armed Drones to Jordan," *DefenseOne*, May 15, 2015.
45 Maureen Santos, "US Mulls Over Indonesia's Military Drones Purchase," *Asean Economist*, November 12, 2021.
46 Bradley Bowman, Maj Jared Thompson, and Ryan Brobst, "China's surprising drone sales in the Middle East," *DefenseNews*, April 23, 2021.
47 Sarah Kreps, "China Swooping in on Military Drone Market," *CNN*, April 1, 2016.
48 George Nacouzi et al., *Assessment of the Proliferation of Certain Remotely Piloted Aircraft Systems* (Santa Monica, CA: RAND Corporation, 2018); and Garuda Militer, "Saudi Arabia Imports UCAV Production Line from China," March 28, 2017.
49 David Axe, "Chinese Drones Are Falling Out of Favor," *The Reboot* blog, *National Interest*, September 3, 2021.

50 Ibid.
51 Jurica Dujmovic, "Chinese Military drones rival the best of the U.S.," *MarketWatch*, December 1, 2016.
52 Kate Brannen, "U.S. Firm Denied Request to Market Drones to Jordan," *Foreign Policy*, February 15, 2015.
53 Kyle Mizokami, "Turns Out Buying a Chinese Knock-Off Predator Drones Is a Bad Idea," *Popular Mechanics*, June 12, 2019.
54 Daryl Kimball, "The Open Skies Treaty at a Glance," Arms Control Association fact sheet, December 2021.
55 Ibid.
56 John Keller, "Iran–U.S. RQ-170 incident has defense industry saying 'never again' to unmanned vehicle hacking," *Military Aerospace*, May 3, 2016.
57 Tara Law, "Iran Shot Down a $176 Million U.S. Drone. Here's What to Know About the RQ-4 Global Hawk," *Time*, June 21, 2019.
58 Office of the Spokesperson, "U.S. Export Policy for Military Unmanned Aerial Systems," DOS Fact Sheet, February 17, 2015.
59 Office of the Spokesperson, "Joint Declaration for the Export and Subsequent Use of Armed or Strike-Enabled Unmanned Aerial Vehicles (UAVs)," DOS Fact Sheet, October 5, 2016, .
60 Michael C. Horowitz, Sarah E. Kreps, and Matthew Fuhrmann, "Separating Fact from Fiction in the Debate over Drone Proliferation," *International Security* 41, No. 2, Fall 2016.
61 Bergen, Salyk-Virk, and Sterman, "World of Drones: Who Has What."

## About The Mitchell Institute

The Mitchell Institute educates broad audiences about aerospace power's contribution to America's global interests, informs policy and budget deliberations, and cultivates the next generation of thought leaders to exploit the advantages of operating in air, space, and cyberspace.

## About the Series

The Mitchell Institute Policy Papers present new thinking and policy proposals to respond to the emerging security and aerospace power challenges of the 21st century. These papers are written for lawmakers and their staffs, policy professionals, business and industry, academics, journalists, and the informed public. The series aims to provide in-depth policy insights and perspectives based on the experiences of the authors, along with studious supporting research.

For media inquiries, email our publications team at publications.mitchellaerospacepower@afa.org

Copies of Policy Papers can be downloaded under the publications tab on the Mitchell Institute website at https://www.mitchellaerospacepower.org

## About the Author

**Heather R. Penney** is a senior resident fellow at the Mitchell Institute, where she conducts research and analysis on defense policy, focusing on the critical advantage of aerospace power. Prior to joining Mitchell Institute, Penney worked in the aerospace and defense industry, leading budget analysis activities, program execution, and campaign management. An Air Force veteran and pilot, Penney served in the Washington, DC Air National Guard flying F-16s and G-100s and has also served in the Air Force Reserve in the National Military Command Center.