



(Associated Press photo)

A camera-equipped Phantom unmanned aerial vehicle (UAV) made by Chinese company Dajiang Innovations (DJI) hovers 10 January 2015 during a test in Shanghai, China. A DJI-manufactured UAV like the one shown crashed on the White House lawn 26 January 2015.

Countering the Unmanned Aircraft Systems Threat

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A key lesson of history is that every war is different. Consequently, to benefit from the insights provided by history, prudent war planners must confront the probability of the unexpected by applying training, doctrine, and equipment aimed at anticipating and addressing a wide variety of future challenges. For example, militaries that are not examining ways to defend against the use of

unmanned aircraft systems (UASs) are not preparing adequately for the next war, or even the emergence of an already clear and present danger to their interests.

Unfortunately, the U.S. military has been among those slow to acknowledge the UAS threat and has only recently started to examine the basic requirements to address the challenges associated with UAS defense. Although the United States—fueled by

technological advances—was a leader in revolutionizing the offensive use of UASs to support land power during its campaigns in Iraq and Afghanistan, it now must show at least as much leadership by allocating resources to defend itself against the growing threat of UASs, or, at some point, the Nation will be unpleasantly and tragically surprised. This article will provide six recommendations for assuming such a leadership role by adopting a joint approach for implementing counter-UAS (C-UAS) operations.

Background and Context

Much of the contemporary attention on UASs in the media and from the public is focused on the commercialization of unmanned capabilities, the legality and impact on the laws of warfare stemming from the use of UASs against terrorists, and calls to stem the proliferation of this growing technological capability in general. Although these are all important discussions, missing from the discourse on UASs is the critical discussion of how to defend against a UAS attack or against a persistent enemy intelligence, surveillance, and reconnaissance threat from this technology.

While the United States has successfully employed UASs to support its strategic objectives basically unchallenged in both Iraq and Afghanistan for more than ten years, many nations and nonstate actors have been acquiring the ability to field their own UASs as a result of the proliferation of new technology in the field. This means many already have the ability to employ them against the United States and its allies. Consequently, the limited U.S. capability to neutralize UASs guided by sophisticated surveillance technology and equipped with weapons that are accurate at a distance—especially at the tactical and operational levels of warfare—is already a serious vulnerability that should be addressed in policy similar to that concerning UAS use in the offensive.¹

Improved technology associated with the application of UASs on the battlefield has already caused changes that will have a long-term impact on the future application of military power. For example, reputedly covert targeted strikes against terrorist targets are now relatively common practice. Such will continue to be the norm on future battlefields. However, the transition of UASs from covert action to more conventional applications by the United States

and its adversaries poses an important question: Are U.S. forces trained, equipped, and organized to successfully defend the Nation against UAS infiltrations and attacks? Currently the answer is no. Consequently, as a matter of prudent policy, it is imperative that the United States develop a credible capability to counter the use of UASs against its forces and its allies.²

Technological improvements support the growth and proliferation of a commercial market that desires to exploit the capabilities of UASs.³ According to the Teal Group's 2014 market study, "the overall UAV [unmanned aerial vehicle] electronics market is the world's fastest-growing aerospace payload market, with spending on UAVs to nearly double over the next decade from current worldwide UAV expenditures of \$6.4 billion annually to \$11.5 billion, totaling almost \$91 billion in the next ten years."⁴ Such investment will add to the existing four thousand different unmanned aircraft platforms in circulation in the global market and to the number of countries (already at seventy-six) known or suspected to have military UASs.⁵

Moreover, sources of demand for UASs are shifting. It is projected that at least one-quarter of that demand will come from outside the United States by 2023.⁶ This rapid global proliferation of UAS capabilities will have a direct impact on U.S. operational accessibility (the ability to project military force into an operational area with sufficient freedom of action to accomplish the mission) in future operations.⁷

Preparing for a Growing Threat

Current service and joint C-UAS capabilities cannot protect U.S. forces. As a result, the United States may have already lost much of its freedom of action to operate and maintain operational dominance over an adversary possessing an unexpectedly sophisticated UAS capability. This lack of C-UAS capabilities also means a greater likelihood for increased casualties and a lower probability for mission success. In other words, if proper steps are not taken to develop robust C-UAS capabilities, the president and Congress may find themselves in the not-too-distant future with significantly less flexibility in their options during a crisis, and thus they may feel unduly hesitant to use ground forces at critical times due to the higher level of risk. More limited options for using force will directly



(Photo courtesy of the U.S. Army)

The AN/MPQ-64 A3 Enhanced Sentinel Radar System is the only 360-degree coverage air defense radar in the Army's inventory. It features a 3-D X-band phased array antenna that provides an instrumented range of seventy-five kilometers.

impact U.S. power projection globally in support of U.S. interests and allies.

The lack of sufficient C-UASs also may have the secondary effect of limiting coalition participation in operations where an adversary fields a capable UAS threat. Levels of coalition involvement usually depend on the degree of importance of a particular mission to the vital interests of the coalition partner. Situations where there are minimal vital interests at stake for a coalition partner and greatly increased risk due to lack of C-UASs could potentially force the United States to spread thin its available resources by sharing what C-UAS capabilities it has, or to take unilateral actions. Fortunately, the nature of the UAS threat has already resonated with many U.S. allies, who are taking steps to improve their C-UAS capabilities. To ensure the cohesiveness of future coalitions, the United States must exercise leadership in developing C-UASs to stress the importance of such measures, as it did with the development of ballistic missile defense capabilities.

Army Has the Lead for C-UASs

The Army has the lead for C-UASs specifically associated with threats to land forces because of the significant impacts an unchecked UAS threat could have on it in the future. The employment of UASs provides a significant area-and-access denial capability,

operating in the seams between the employment of artillery and mortars and the use of fighter aircraft. Consequently, effective C-UASs limit the enemy's ability to impede fires, enabling a key component of the U.S. Army's operating concept, which states, "the ability to deliver fires [both offensive and defensive] to defeat the enemy and preserve freedom of maneuver and action across the range of military operations" is a required capability that the Army must possess to win in a complex world.⁸

Six Recommendations

Six recommendations for improving overall Department of Defense C-UAS capabilities follow.

The Department of Defense should designate a service or an organization as the proponent for all categories of C-UASs. The proliferation of UASs employable in various land, air, and sea domains requires a common direction and joint action to unite future C-UAS efforts and to improve effectiveness. The actions of individual services are important, but a unified joint approach, similar to those taken to address ballistic missile and cruise missile threats, is needed. Applicable to the C-UAS problem, former Chairman of the Joint Chiefs of Staff Gen. Martin E. Dempsey stressed the importance of cooperation among the U.S. armed forces, stating that "improved cooperation hinges on viewing military problems from a comprehensive cross-domain perspective rather than viewing them through an individual service lens."⁹

A joint solution is required to address the challenges of detection and identification in order to improve defeat mechanisms. A common definition of the threat, the establishment of a common threat database, and the establishment of a blue-force positive identification requirement will enhance identification and classification and will help reduce fratricide. In the case of UASs, everything is enemy—until proven friendly. Currently, multiple intelligence organizations are responsible for this mission, and they track fixed-wing and rotary-wing UASs separately. Establishing a common UAS database, with a single intelligence organization responsible for its operation, would provide a considerable advantage for the warfighter.

Timely detection is the critical requirement that leads to identification and classification. The joint force must take advantage of developing

technologies to enhance detection capabilities found in our fielded programs of record such as the AN/MPQ-64 Sentinel radar. Preliminary results from joint tests, as well as observations from exercises, support retired Air Force Col. David M. Neuenswander's conclusion that "effective C-UAS operations require the joint force to fuse air- and ground-based sensors in a real-time common operating picture, enabling the force to detect and engage threat UASs using lethal and nonlethal options."¹⁰

Other materiel solutions for improving detection capability are being examined. More sensors available for detection of the threat, as well as a greater variety of sensor capabilities provided by the joint force, increases overall situational awareness of the warfighter. Lessons learned from the Israeli C-UAS experience illustrate this point:

The UAVs pose several challenges..., one of the most important of which is the process of identification and classification. To deal with this problem, the IAF [Israeli Air Force] uses a larger number of detection and identification systems, both radar-guided and optical.¹¹

Services must modernize their air- and-missile defense capabilities and examine other materiel solutions to address the growing threat. The Department of Defense is taking a proactive approach with the military acquisition Milestone A decision to develop the Army's Indirect Fire Protection Capability (IFPC), Increment 2-Intercept (IFPC Inc 2-I) capability.¹² IFPC Inc-2I is a mobile ground-based weapon system, slated to replace the Avenger system. IFPC is designed to acquire, track, engage, and defeat multiple threats, to include UASs. It can provide 360-degree protection and will simultaneously engage threats arriving from different directions.¹³ Additionally, C-UAS defeat is not just achieved by options on the ground.

Traditional electronic warfare will play a role, along with kinetic alternatives such as proximity fragmented explosive devices carried by systems like Spike or United States Special Operations Command's Switchblade

micromissile. The unhardened nature of smaller UAVs makes the use of electromagnetic pulse tactics possible as well.¹⁴

Other technologies to examine that possibly apply to the C-UAS fight include Extended Area Protection and Survivability, a science and technology program applicable for C-UAS comprised of miniaturized hit-to-kill interceptor technology, high-energy lasers, and the use of defensive swarms.

Of course, an important issue for any future defeat technology will be the consideration of the cost, as analyst Paul Scharre explains:

It is not enough merely to find a way to destroy an enemy's drone; it must be done in a cost-effective manner. If taking out a \$1,000 enemy drone requires a \$1 million missile, then every drone shot down is a win for the enemy because it imposes tremendous costs on the defender.¹⁵



(Photo by 1st Lt. Lee-Ann Craig, 2nd Battalion, 44th Air Defense Artillery Regiment) Soldiers from Battery A, 2nd Battalion, 44th Air Defense Artillery Regiment, 101st Sustainment Brigade, 101st Airborne Division (Air Assault), load ammunition into a Land-Based Phalanx Weapon System 18 December 2013, Fort Sill, Oklahoma.

Expansion of force structure is also not a course of action that will be pursued in the current fiscal climate, so the emphasis on active measures across the Army and the services is important. Funding at the current level is sufficient to maintain a capability that can be modestly expanded somewhat if the threat grows modestly larger than anticipated. However, if the UAS threat to tactical formations continues to expand exponentially as current trends indicate, the Army must seriously examine bringing a basic capability to brigade combat team formations that will protect them, or otherwise it must accept the losses that will follow.

The services must reexamine joint tactics, techniques, and procedures (TTPs), and training required to defeat UAS capabilities. The emergence of the UAS threat has revealed that the Army does not have sufficient forces at all levels to combat it. Leveraging combined-arms air defense procedures, utilizing friendly armed UASs, and examining Army aviation's role in C-UAS can help to alleviate the problem of insufficient UAS defense assets currently faced by the Army. The examination of current techniques can help maximize the effectiveness of existing air and missile defense systems and improve current organizational capabilities to execute essential tasks.

This reexamination needs to lead to the development of a joint C-UAS concept, a joint C-UAS strategy, and an update of Joint Publication 3-01, *Countering Air and Missile Threats*, to address the evolving threat in greater detail.¹⁶

The development of TTPs to improve interoperability among the services supports the joint integration of mission command. Current cross-domain detection and combat-identification efforts are time consuming, and C-UAS is dynamic. The most likely individual to come into contact with a small-threat UAS in the future will be a soldier on the forward edge of the battlefield. How will he or she know the unknown UAS is a threat? Neuenswander emphasizes the importance of good interoperability across all levels to counter the UAS threat in his 2012 article "Wargaming the Enemy Unmanned Aircraft System Threat":

If the soldier can confirm the UAS is a threat, this is the first step in the UAS defense kill chain. However, [lack of] interoperability can become a great obstacle in the process. Soldiers at the squad level do not have access

to an air picture and no standard service or joint air defense request system currently exists. The development of a Joint Air Defense Request System that would correlate visual detections from ground units and enable follow on engagement is needed.¹⁷

Services must pursue a common command and control capability to exercise control of the complex C-UAS environment. The U.S. Army has taken positive step with its ongoing development of an Integrated Air and Missile Defense Battle Command System (IBCS). The IBCS provides users with a fused, composite air picture for greater situational understanding and awareness, automated battle management tools to aid in engagement decisions, and an integrated planning capability that assists in C-UAS defense design.¹⁸ The planned introduction of IBCS in 2018 will allow Army air and missile defense elements to receive friendly UAS locations from nearby ground stations and to pinpoint aerial position reports from self-reporting UASs. It will also provide the force with a highly accurate and correlated common tactical air picture.

The joint force needs to expand its exercises to address evolving threats. The joint force must refine its doctrine to address engagement authority demonstrated by C-UAS scenarios and match emerging technological developments. It must continue to evaluate its doctrine and TTPs, using exercises that include C-UAS scenarios to practice and refine the application of TTPs.

A proactive approach to address the emerging UAS threat supports the vision of Secretary of Defense Ashton Carter, who said, "the Pentagon must always have a watchful eye on the horizon, anticipating needs and gaps in capabilities before they become dire."¹⁹ As the chief of staff of the Army also outlined in the Army Operating Concept,

One of our most important duties as Army professionals is to think clearly about the problem of future armed conflict. That is because our vision of the future must drive change to ensure that Army forces are prepared to prevent conflict, shape the security environment, and win wars.²⁰

By taking the proactive steps outlined above with regard to C-UASs, the Army and the joint force will be better prepared to prevail against a serious, imminent threat. ■

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Notes

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