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Forward Arming and Refueling Points for Fighter Aircraft

Power Projection in an Antiaccess Environment

Lt Col Robert D. Davis, USAF

The United States depends upon effective power projection to advance its national interests abroad. A section of the Department of Defense's strategic guidance for 2012 describes one of the primary missions of the US armed forces as "Project[ing] Power Despite Anti-Access/Area Denial Challenges."[1] The US Air Force plays a central role in power projection by providing air and space superiority; intelligence, surveillance, and reconnaissance (ISR); rapid global mo-

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bility; global strike; and command and control.[2] The US military faces significant challenges to its power projection capabilities, particularly in the Western Pacific theater of operations (WPTO). The People's Republic of China has invested substantial resources in the modernization of its military forces and continues to expand its antiaccess/area-denial (A2/AD) capabilities, largely designed to prevent opposing forces from gaining access to the WPTO.[3] Consequently, as the Air Force attempts to solve today's A2/AD problems, it should first reduce the vulnerabilities of forward-deployed forces to A2 threats, thereby allowing them to project force into a contested theater. The rapid movement and employment of fighter aircraft by means of mobile forward arming and refueling points (FARP) support this priority.

Fighter FARP, an innovative concept, combines sortie-generation capabilities and mobility support to enable more expeditionary and dispersed operations. It uses existing airfields throughout an area of responsibility to increase the range and tempo of fighter operations. Fighter FARP includes rearming, refueling, and swapping pilots without the use of airfield infrastructure—usually in 90 to 120 minutes. Benefits include strategic deterrence, crisis stability, greater range of fighter aircraft, and sustained fighter operations in an A2/AD environment. Currently, this affordable, feasible concept can be executed on a small scale, but the Air Force should develop it into an operational capability for application in a variety of scenarios using current and future aircraft.

Although other nations such as Iran and North Korea have A2/AD capabilities, this article focuses on issues in the WPTO. China's capacity for A2 has increased to the point that it fundamentally confronts one of the basic concepts of US power projection—the massing of forces at forward bases. Thus, the article first describes A2/AD in the WPTO, offers a brief history of FARP in the US military, and examines this concept, including its three critical elements, operational and strategic benefits, and known challenges.

Antiaccess / Area Denial

In an effort to hinder America's ability to project combat power and conduct operations in the WPTO, China has developed a robust A2/AD system that includes both defensive and offensive capabilities. *A2* refers to actions and capabilities intended to deny adversary forces entry to a theater of operations. *AD* denotes actions and capabilities intended to limit an enemy's freedom of action within an operational area.[4] China's A2 strategy calls for deterring US military action in support of its allies by increasing the difficulty and costs associated with projecting power in the WPTO.[5] China plans to attain its A2/AD objectives through the coordinated use of air defenses, antisatellite/cyber weapons, and both ballistic and cruise missiles to target operating bases and maritime forces in the region.[6] Fighter FARP addresses the projection and sustainment of fighter forces in a contested environment.

Threats to US and allied bases include Chinese ballistic and cruise missiles that can strike bases throughout the WPTO. The Department of Defense estimates that China could target approximately 1,100 of its short-range ballistic missiles (SRBM) and 500 ground-launched cruise missiles (GLCM) against bases within the first island chain, which encompasses the East and South China Seas. Additionally, more than 500 medium-range ballistic missiles (MRBM) and air-launched cruise missiles (ALCM) can reach bases as far away as Guam and the second island chain (figs. 1 and 2).[7]

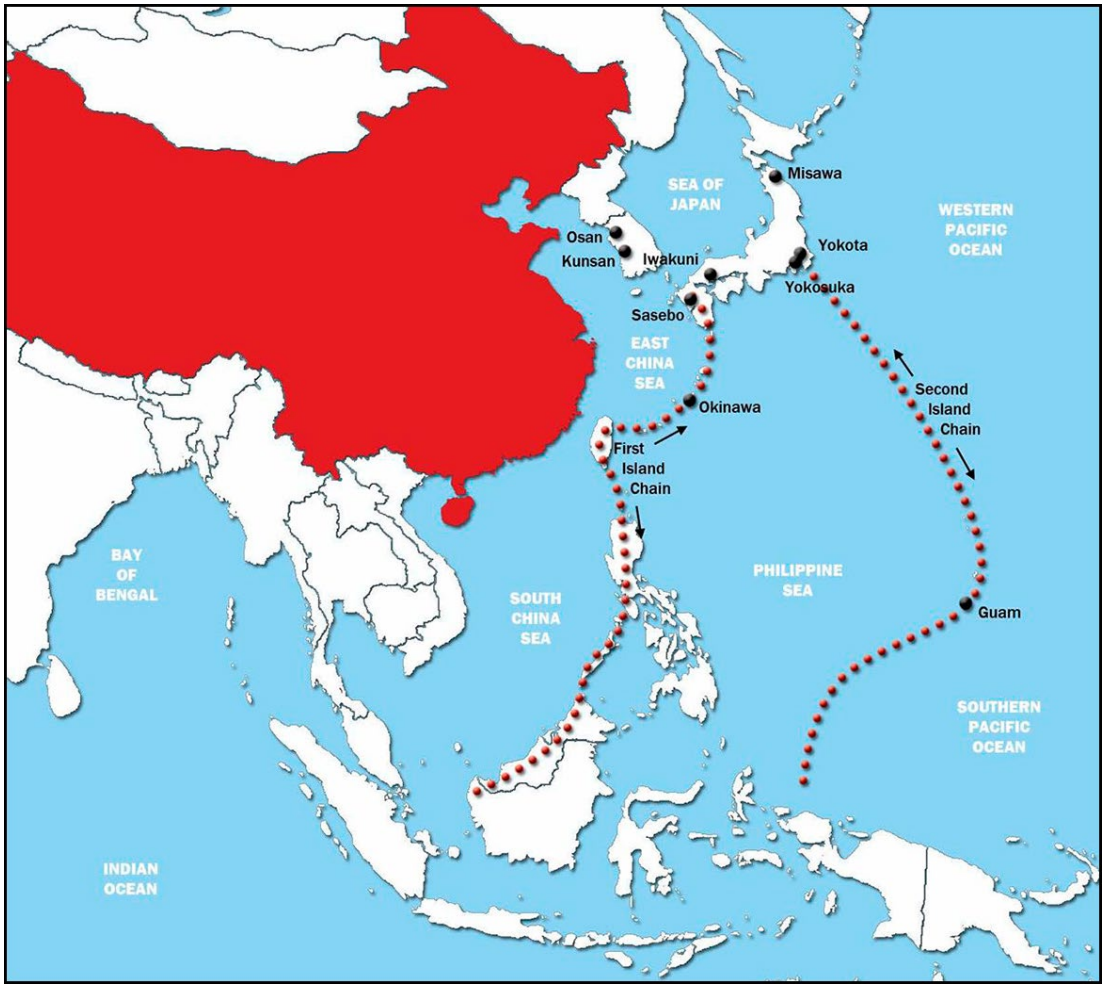

Figure 1. The first and second island chains. (From Jan van Tol et al., *AirSea Battle: A Point-of-Departure Operational Concept* [Washington, DC: Center for Strategic and Budgetary Assessments, 2010], 13, http://www.csbaonline.org/publications/2010/05/airsea-battle-concept/. Reprinted with permission from the Center for Strategic and Budgetary Assessments.)

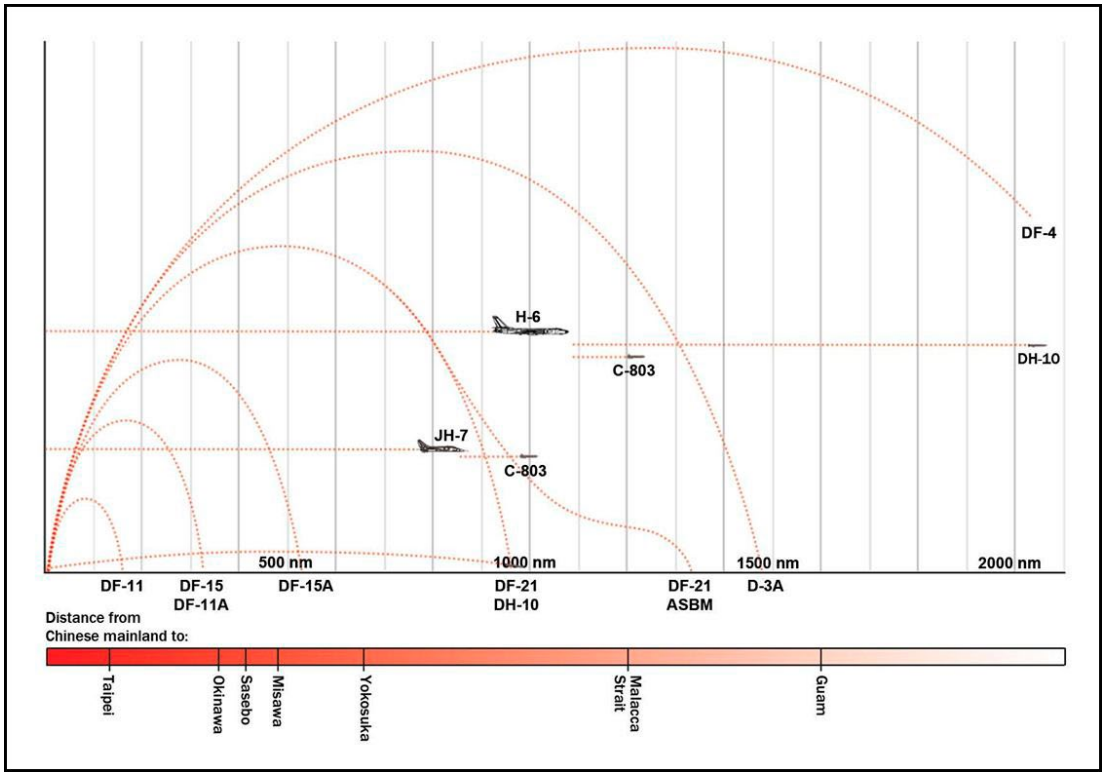

Figure 2. Ranges of Chinese weapon systems. SRBMs include the DF-11, DF-11A, and DF-15A; MRBMs, the DF-21 and D-3A; and cruise missiles, the DH-10 and C-803. (From Jan van Tol et al., *AirSea Battle: A Point-of-Departure Operational Concept* [Washington, DC: Center for Strategic and Budgetary Assessments, 2010], 18, http://www.csbaonline.org/publications/2010/05/airsea-battle-concept/. Reprinted with permission from the Center for Strategic and Budgetary Assessments.)

The inability to operate from bases in the WPTO would threaten US power projection in the region. Over the past 60 years, the "American way of power projection" has included rapidly deploying a large number of forces to a small number of secure forward bases, generating many sorties, and freely initiating combat operations as the United States chooses.[8] If China expects US military intervention, then it is reasonable to assume that Chinese military forces would seize the initiative by executing a campaign to deny US forward basing, thereby

limiting access to the region.[9] In light of China's A2 capabilities, massing forces at main operations bases (MOB) actually projects *vulnerability* rather than *power*.

A Brief History of Dispersed Operations and FARP

The Air Force defines FARP as "fuel's [*sic*] operations used to hot refuel aircraft in areas where fuel is otherwise not available. Fuel is transferred from a source aircraft's (C-130, C-17, or C-5) internal tanks to receiver aircraft."[10] The Army's and Marine Corps's definitions differ slightly, resembling that of Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*: "a temporary facility . . . to provide fuel and ammunition necessary for the employment of aviation maneuver units in combat."[11] This article uses the latter definition since it incorporates the *arming* of aircraft in addition to refueling.

The utilization of FARP and dispersed air operations is not new. Throughout the Cold War, the threat of Soviet attacks on North Atlantic Treaty Organization (NATO) air bases led to different forms of dispersed operations. NATO developed plans to use host-country civilian airfields and large sections of the German autobahn as emergency landing strips.[12] In March 1984, that organization practiced this capability during Exercise "Highway 84," during which NATO aircraft operated for three weeks from a section of the autobahn. Continued concern about the security of forward bases led to the multiweek Salty Demo exercise in 1985 at Spangdahlem Air Base, Germany. Salty Demo showed the effect of sustained attacks against a modern air base and helped guide Air Force investments in Europe through the end of the Cold War.[13]

As the threat to US overseas bases decreased during the two decades following the Cold War, the need to disperse quickly from MOBs also decreased. Nevertheless, FARP remains a reliable method of enhancing flexibility and combat effectiveness. For example, Air Force, Marine, and Army helicopter units regularly execute FARP operations

with pre-positioned fuel supplies. Some Air Force C-17 crews receive training to conduct these operations with aircraft from Air Force Special Operations Command. Rescue units in the Alaska Air National Guard employ HC-130s to extend the range of their HH-60 Pave Hawk helicopters by means of FARP. Numerous military operations since the 1960s, including those in Vietnam, Panama, Iraq, and Afghanistan, have used FARP.[14] Recent advances in Chinese A2 have elevated the threat to US operating bases, leading to development of a new application of FARP.

Rapid Fighter Movements: A New Concept for Dispersed Operations

No "silver bullet" will solve the A2/AD dilemma. An effective strategy will likely include standoff weapons, disabling technologies, and operational resilience. Typical elements of the latter include improved indicators and warning, ballistic missile defense, cruise missile defense, redundancy, selective hardening, rapid infrastructure repair, and distributed basing.[15] This type of basing entails deploying aircraft squadrons to larger numbers of bases with sufficient ramp space, weapons-storage areas, and infrastructure for high-volume fuel delivery. The fighter FARP concept adds to operational resilience by taking distributed basing to an entirely new level.

This concept combines current Air Force capabilities in new ways, resulting in significant strategic, operational, and tactical advantages. It pairs a four-ship of fighters with a transport aircraft, making use of FARP to rearm, refuel, and swap pilots quickly at over 250 possible locations throughout the WPTO. The transport aircraft contains a prioritized parts kit, munitions for rearming, a forward area manifold (FAM) cart to regulate fuel pressure from its internal tanks to the fighters, additional pilots to rotate into the fighter cockpits, and trained personnel to conduct fuel, weapons, and maintenance functions. The fact that the weapons, fuel, equipment, and personnel necessary to conduct

FARP are all contained in the transport aircraft precludes the need for fuel and logistics support at FARP locations. Successful implementation of the fighter FARP concept depends upon three key elements: (1) generation of fighter and transport aircraft from bases outside the A2 environment and projection of that power over long distances in a coordinated fashion; (2) the availability of acceptable runways throughout the joint operations area (JOA) where FARP operations can occur with reduced risk of enemy attack; and (3) successful regeneration of combat sorties using FARP in a time-constrained environment without depending on fuel or logistics support from the dispersed airfield.

Generation and Power Projection of FARP Forces

Fighter FARP relies on effective combat generation of paired fighter and transport aircraft that can project combat power over long distances into an A2 environment, a capability demonstrated and exercised at Joint Base Elmendorf–Richardson (JBER), Alaska.[16] Since 2009 that base's F-22 and C-17 units (fig. 3) have exercised long-range strike and escort (LRS/E) training missions in which they rapidly deploy a formation of F-22s and one C-17 on an eight-hour-plus mission, receive mission updates airborne, generate (or receive) target-quality coordinates, defeat air-to-air adversaries, deliver air-to-ground ordnance in a dense surface-to-air-missile environment, and land at a forward location.[17] These exercises are representative of the long distances involved if combat operations in the WPTO are supported by fighters outside the second island chain; moreover, they show the synergistic effect of combining fifth-generation platforms with a tailored support package on a C-17. Figure 4 indicates the distances from Alaska and Hawaii to the WPTO.

Figure 3. F-22 FARP site layout. Four F-22s and a C-17 line up in preparation of FARP operations during an operational unit evaluation at JBER in August 2013. (Photo courtesy of TSgt Dana Rosso, USAFR, 477th Fighter Group Public Affairs, JBER, Alaska.)

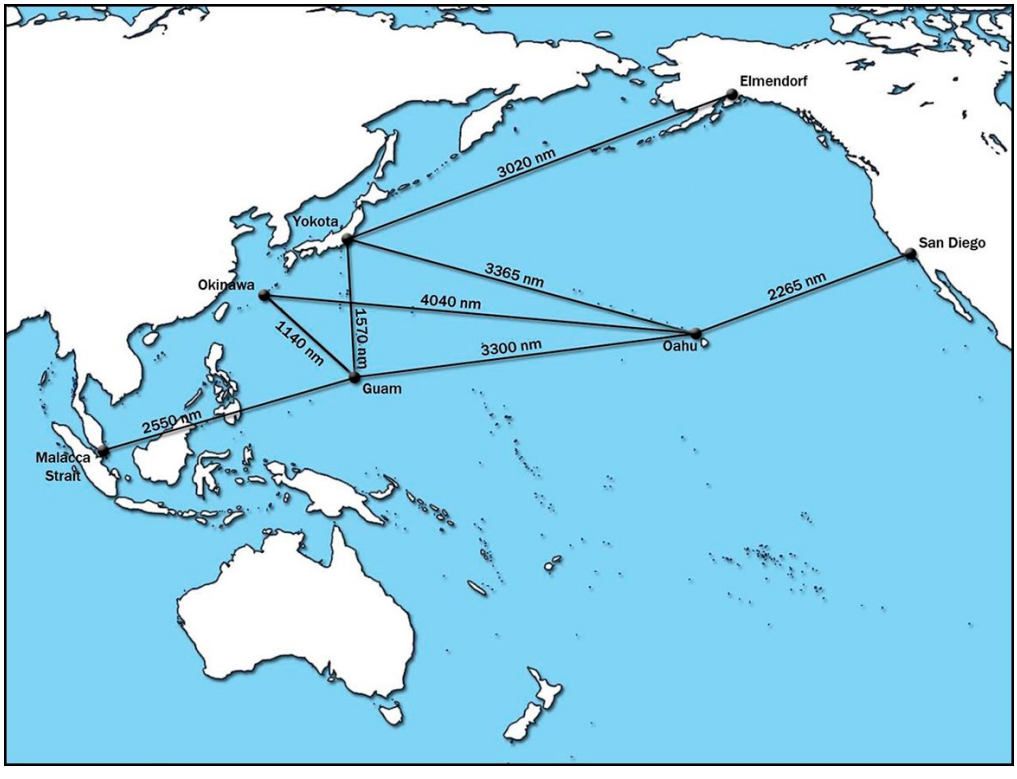

Figure 4. Distances in the Pacific theater. (From Jan van Tol et al., *AirSea Battle: A Point-of-Departure Operational Concept* [Washington, DC: Center for Strategic and Budgetary Assessments, 2010], 12, http://www.csbaonline.org/publications/2010/05/airsea-battle-concept/. Reprinted with permission from the Center for Strategic and Budgetary Assessments.)

Suitable Airfields and Freedom from Enemy Attack

Once the F-22s execute an LRS/E mission into the JOA, they will need a suitable airfield unlikely to be attacked by enemy ballistic or cruise missiles for a useful period of time. Typically, these fighters require runways at least 8,000 feet long and 75 feet wide although operations group commanders can allow shorter ones if the computed takeoff and landing distances do not exceed 80 percent of the available runway.[18] Depending on fuel and weapon loads, an F-22 will likely operate from runways 6,000 feet long, at a minimum. The C-17, which has excellent

short-field takeoff and landing capabilities, can in most situations operate with such a runway. The pavement classification number, an additional consideration for the C-17, represents the weight-bearing capacity of the runway. The WPTO has at least 163 airfields that are 8,000 x 75 feet, and reducing the required length to 6,000 feet increases the total to 258. Table 1 summarizes the possible FARP locations in the WPTO that lie within the second island chain.

Table 1. FARP airfields by runway length and location (in the WPTO)

	8,000 ft. +	7,000–7,999 ft.	6,000–6,999 ft.	Totals
From PRC to First Chain	117	14	43	174
Between Chains Including the Second)	46	14	24	84
Totals	163	28	67	
Grand Total	258			

Source: "Worldwide Airport Database," Airport Nav Finder, accessed 8 February 2014, http://airportnavfinder.com/index.php. For a list of all 258 airfields, see Lt Col Robert D. Davis, "Fighter FARP: An Affordable and Feasible Concept for Power Projection in an A2/AD Environment" (Maxwell AFB, AL: Air War College, 2014). These numbers do not include airfields beyond the second island chain although several in Papua New Guinea and northern Australia are close enough for consideration. All of the runways noted in the table are asphalt, but the pavement classification number did not enter into the equation. Locations demand a certified FARP survey in accordance with Air Force Instruction 11-235, *Forward Area Refueling Point (FARP) Operations*, 15 December 2000, http://static.e-publishing.af.mil/production/1/af_a3_5/publication/afi11-235/afi11-235.pdf.

Maintaining a survivable fighter force is a central feature of the FARP concept since it complicates China's efforts to deny forward bases to US forces. To increase the survivability of FARP forces, the US military should deny the People's Liberation Army's (PLA) real-time *awareness* of the FARP locations currently in use, deny its *ability* to strike these locations in a timely manner, or lower its *willingness* to target a particular airfield.[19] Depending on China's ability to monitor po-

tential FARP locations, FARP operations could probably be conducted during times of reduced awareness. During a major military operation, it is also plausible that US forces will attempt to disrupt or deny PLA ISR through kinetic or nonkinetic means. FARP planners should coordinate closely with intelligence personnel to know when certain locations are available and for how long.

China's ballistic and cruise missiles pose the greatest risk to FARP operations. Given that country's scientific approach to warfare, one can realistically assume that it will dedicate most of those missiles to a small number of high-priority targets such as US and allied MOBs. However, targeting fighter FARP locations will require significantly more missiles as well as Chinese willingness to launch at bases in many nearby countries (including Japan, South Korea, Indonesia, Singapore, Malaysia, Thailand, and Palau). The uncertainty of FARP locations and the tremendous ill will created by targeting its neighbors will likely affect China's willingness to use ballistic or cruise missiles against those sites.[20]

Although choosing a FARP location further from the Chinese coastline may reduce the risk of missile attack, doing so may prove unnecessary because of China's reduced awareness or willingness to target FARP airfields. (It would also lessen the effectiveness of the concept.) Nevertheless, a FARP location greater than 486 nautical miles (nm) from the Chinese coast will lie outside SRBM range, leaving only MRBMs as the primary ballistic missile threat.[21] Choosing a site 540 or 810 nm from the coast will provide 60 or 90 minutes of protection from GLCMs, respectively.[22] In the WPTO, at least 174 potential FARP locations are 540 nm from China, 130 of them beyond 810 nm. To thwart an attack by ALCMs, US forces should prevent Chinese bombers (H-6s and JH-7s) from reaching the maximum launch range of their most likely weapons—323 nm.[23] Air-to-air fighters or other joint counterair capabilities could supply this protection.

Conducting Fighter FARP

The fighter FARP concept, a natural extension of the LRS/E mission, allows fighters to resume operations quickly after a mission without returning to a base far from the JOA. Besides a suitable runway, other minimum requirements for fighter FARP include certified maintenance, weapons, and fuels personnel; a FARP-certified C-17 crew; a FAM cart; supporting fuels equipment; ammunition; maintenance equipment; beyond line-of-sight (BLOS) communications; additional F-22 and C-17 aircrews with crew-rest quarters; one to two mission planners with a mission-planning computer; and air-refueling (AR) tanker support.[24] The length of time on the ground depends upon the amount of fuel and munitions needed by the fighters. If it needs few munitions, a four-ship of F-22s can be back in the air 60 minutes after landing. In most situations, arming/refueling the fighters takes 60 to 120 minutes (fig. 5).[25]

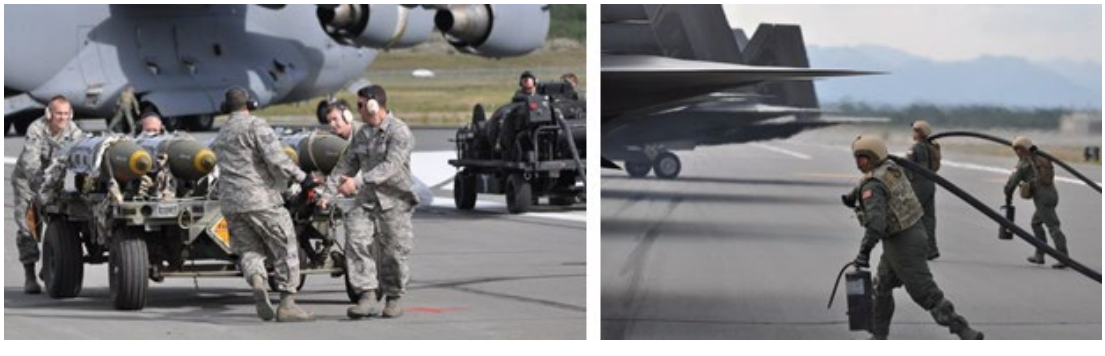

Figure 5. F-22 arming and refueling operations during an F-22 FARP evaluation at JBER, Alaska. (Courtesy of TSgt Dana Rosso, USAFR, 477th Fighter Group Public Affairs, JBER, Alaska.)

Several factors affect the number of days that F-22s can sustain FARP operations away from a base having robust maintenance capability, but the typical number is three days.[26] The C-17s and associated personnel must rotate more frequently because of fatigue and ammunition considerations. Although this concept requires additional analysis

before it can be developed into an operational capability, enough information exists to highlight the most significant benefits and issues associated with fighter FARP operations.

Strategic Benefits

The most significant strategic benefit of the fighter FARP concept is its potential deterrent value. Possession of a credible capability to conduct fighter operations despite an adversary's attempt to deny forward basing would likely have a deterrent effect and might prevent the need for lethal military force. This is particularly true for China, whose military planning is characterized by a scientific approach to warfare. The United States should publicly announce and exercise its ability to conduct fighter FARP. If Chinese military leaders lack confidence that their antiair campaign will achieve its desired aims, then America can likely deter them.

The concept also imposes significant costs on China (or any adversary) if it attempts to deny FARP locations by increasing its number of missiles or ISR capabilities. Given the many possible sites in the WPTO and the likelihood that China would have to target an airfield with multiple missiles, the PLA would need to augment its stockpile of weapons substantially. Additional space-based or airborne ISR platforms are also very expensive. Compared to the low cost of executing fighter FARP, China's outlay for denying such a capability would be extremely high.

Furthermore, the United States would enjoy the benefit of conducting conventional "strategic strike" missions with fifth-generation fighters. By utilizing FARP, F-22s can launch from their home base, fly more than 4,500 miles (with AR tanker support) during one flight duty period, swap pilots, continue to the desired location, and operate in an advanced threat environment while delivering their munitions. After striking multiple targets, the aircraft can return to their home base or other suitable airfields. The employment of F-22s over long distances

also allows them to escort other strategic platforms and/or strike high-value targets on their own, producing strategic effects.

Moreover, fighter FARP offers responsive, flexible, and scalable options for stabilizing a crisis and thus exerts a significant strategic impact. A plausible future crisis might involve a territorial dispute between China and Japan or renewed aggression by North Korea. In such situations, a package of stealth fighters and specifically paired transport aircraft can be generated and deployed on a long-range mission to demonstrate American resolve and reassure US allies in the region. In less than 24 hours, a four-ship of stealth fighters can fly thousands of miles using FARP to extend their range, deliver precision-guided munitions (if needed), and land at a forward base as a stabilizing presence. The aircraft can continue local operations or move to another base in the region, using FARP as necessary. If the situation demands more forces, then the Air Force can generate additional packages and quickly deploy them to the theater. Upon resolution of the crisis, it can redeploy them within hours. Flexible and rapid power projection (especially in an A2 environment) gives US leaders more options for effective crisis stability and helps advance America's interests abroad.

Sortie Generation

The concept offers the significant operational benefit of sustaining fifth-generation airpower operations when MOBs become unusable. The estimated number of sorties that a squadron can generate each day using FARP is an important planning factor and helps in evaluations of the utility of the concept. Even under the best FARP conditions and high availability of platforms, the sortie generation rate will be lower than that of forward bases because of efficiencies gained through consolidated maintenance and supply resources. The operational value of fighter FARP, though, is not its efficiency but its lack of vulnerability to A2 measures. Fighter FARP is more than a good idea—it is a necessity.

For example, an F-22 fighter squadron and aircraft maintenance unit based at JBER with 21 primary aircraft authorized could employ up to three four-ship cells concurrently.[27] If three cells are employed simultaneously, then 12 of the 21 jets (57 percent) will conduct FARP operations while the remaining nine aircraft remain at home station. As the three four-ships rotate back to JBER for maintenance, up to two additional four-ships can replace them. If several aircraft are undergoing long-term maintenance, the fighter squadron might be able to employ a maximum of only two four-ships concurrently.[28]

The number of sorties flown by a four-ship each day depends upon several factors. If the tasked mission is defensive counterair with few air-to-air engagements, it could remain on station for an extended period of time (eight to 10 hours), producing two missions (eight sorties) per day for the four-ship. Other missions such as offensive counterair or air-to-ground strike would likely call for a higher rate of weapons expenditures and an earlier return to a FARP location. In this situation, a four-ship could reasonably fly three or four missions (12 or 16 sorties) in 24 hours. In light of the assumptions above, one F-22 squadron can generate at least 480 sorties over a continuous 30-day flying period (two four-ships, each flying two missions per day). When MOBs are unusable, 480 sorties per month flown by eight fifth-generation, continuously present fighters represent a substantial amount of combat power.

Fighter FARP operations may prove necessary only during the opening weeks or months of a major combat operation. In a hypothetical WPTO scenario, this concept would likely be combined with other distributed basing and resiliency efforts. As the military operation unfolds, the ballistic and cruise missile threat to MOBs is likely to attenuate, and damage to those bases will be repaired. The lesser threat will allow fighter and maintenance units to move forward to MOBs where they can take advantage of consolidated resources. Although it is difficult to predict the time required to reduce such a threat, one can rea-

sonably assume that a squadron tasking to conduct FARP operations would last one to two months.

Other Operational and Tactical Benefits

The affordability of the fighter FARP concept compared to that of other operational resiliency efforts is an important benefit that has operational implications. On the one hand, typical base-dispersal efforts require costly infrastructure investments at multiple bases throughout the region. These construction projects are not only expensive but lengthy. On the other hand, expenses associated with FARP operations are relatively small since investments are limited to the purchase of additional FAM carts, fuel hoses, modified in-transit crew-rest bunks, and additional training to certify FARP personnel. Although other dispersal and resiliency efforts should continue, fighter FARP—a feasible, proven concept—offers affordable dispersion that can be implemented immediately.

Moreover, fighter FARP is transferrable. This article concentrates on the WPTO, but fighter FARP is applicable to any theater with acceptable landing surfaces. Alaska's geographic position permits LRS/E and FARP missions over the North Pole to reach other areas of responsibility quickly. New fifth- and sixth-generation aircraft should be designed with the flexibility to operate from dispersed locations using a FARP concept. Future technologies and capabilities will amplify the utility of FARP by adding improved sensors, weapons, and integrated networks into joint operating concepts that exploit multiple domains (air, space, cyber, surface, and subsurface).

Known Challenges

The rapid generation and movement of fighter airpower will challenge many of the Air Force's established ways of "doing business." Although initial evaluation of the concept has highlighted some issues, none of them are insurmountable. The first set concerns the sustainment of FARP operations through the continuous use of C-17 aircraft (fig. 6).

Fatigue and limitations of the flight duty period prevent a C-17 from supporting these operations for more than about 24 hours. Sustaining a steady supply of fuel, munitions, personnel, and equipment on these platforms presents a logistical problem that demands creative solutions. The added risk of an aircraft malfunction requiring extensive maintenance at a FARP location poses another set of potential obstacles. For the most part, the solutions are affordable and feasible; moreover, they can be implemented immediately with acceptable levels of risk. The list of challenges and solutions in table 2 is not exhaustive, and further analysis of these and others should continue. In the end, the significance of the strategic and operational benefits greatly outweighs the hindrances.

Figure 6. C-17 loaded for F-22 FARP practice. (Courtesy of TSgt Dana Rosso, USAFR, 477th Fighter Group Public Affairs, JBER, Alaska.)

Table 2. Known challenges and possible solutions for fighter FARP

Known Challenges	*Possible Solutions*

Crew fatigue	• Rotate transport aircraft approximately every 24 hours.
	• Augment transport aircrews.
	• Provide in-transit rest for nontransport crews.
	  • Install bunks on the side of cargo bay (current capability).
	  • Modify "Tortoise"—secure debrief modules (currently possessed by fighter squadrons).
	  • Modify Senior Leader in-Transit Conference Capsule.

Munitions requirements	• Anticipate munitions based on air tasking order. • Position munitions at airfields with munitions-storage capabilities. • Swap transport aircraft more frequently.
High C-17 demand	• Increase the types of FARP transport aircraft (C-130, C-5, etc.). • Lower the demand to move units to MOBs until threat levels decrease. • Establish priorities between supported/supporting commanders.
Fuel requirements	• Coordinate tankers for both fighter and transport AR.
Aircraft malfunctions	• Carry spare parts kit on transport aircraft. • Fly non-mission-capable aircraft if safe to do so. • Leave grounded aircraft and fly remaining platforms (degraded mission with two- or three-ship). • Launch additional transport with parts and personnel to fix aircraft.
Long-term fleet health	• Take advantage of higher-quality low observable maintenance facilities at established stealth fighter bases (Alaska and Hawaii).
Command and control	• Establish a dedicated mission planner with communication link to air and space operations center. • Develop robust lost-communication contingency plans. • Use current BLOS communications on transport aircraft. • Invest in future BLOS communications for fighter aircraft.

Fifth-Generation Doolittle Raid

> *If we should have to fight, we should be prepared to do so from the neck up instead of from the neck down.*
>
> —Gen Jimmy Doolittle

The famous Doolittle Raid during World War II offers a superb example of how an innovative concept can lead to strategic effects. On 18 April 1942, just four months after the Japanese attack on Pearl Harbor, Lt Col Jimmy Doolittle led 16 aircraft and 80 men on a bombing raid over Tokyo. The Japanese believed that the "tyranny of distance" in the Pacific and their defensive capabilities would prevent American forces from reaching the homeland.[29] However, the Doolittle Raid increased the operational reach of airpower by placing B-25 bombers on the US aircraft carrier *Hornet*. Doolittle's unorthodox concept had the support of Lt Gen Henry H. "Hap" Arnold, chief of the Army Air Forces. Launching B-25s off a Navy carrier required special modifications to the bombers and a robust training program for the aircrews.

The raid over Tokyo achieved nearly complete surprise and bolstered US public support for the war enormously. Although the physical destruction was relatively small, the fact that American military power had penetrated the Japanese "A2" perimeter caused devastating psychological damage.[30] Consequently Japan's leaders changed their strategy, leading to ruinous defeat at the Battle of Midway.[31]

The fighter FARP concept has several parallels to the Doolittle Raid. Both deal with the tyranny of distance and the A2 environment in the Western Pacific. Further, like the raid, fighter FARP extends the operational reach of airpower. Most importantly, it too can have a demoralizing effect on an adversary, causing him to question his strategy, and can create both operational and strategic effects that advance US objectives.

Conclusion

Projection of power around the world is an important military capability that contributes to America's national security strategy. China's A2/AD strategy seeks to challenge US force projection in the WPTO and deter American involvement in the event of China's military action against its neighbors. To project and sustain airpower in an A2 environment, the Air Force must overcome the threat to its forward operating locations from enemy ballistic and cruise missiles. The Fighter FARP concept addresses this issue by providing flexible and dispersed sortie generation that does not depend upon the use of MOBs.

Rarely does a single concept address strategic, operational, and tactical operations simultaneously. The generation of fighter FARP sorties provides increased deterrence, rapid stabilization of a crisis, long-range power projection into contested environments to conduct counterair or strike missions, and the production of strategic effects via surprise raids or extended combat operations. By these means, the United States can impose costs on the adversary, offer options to national leaders for the effective projection of airpower in a supposedly denied environment, and do so quickly at relatively low expense and with existing forces. This collection of strategic, operational, and tactical advantages makes the associated risk acceptable. Demonstration and exercise of this capability, regardless of whether or not America actually uses it, greatly complicate the adversary's planning process and cost. Under these circumstances, the Air Force cannot ignore the concept of fighter FARP in the WPTO and should invest in it now. ✪

Notes

1. US Department of Defense, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: Office of the Secretary of Defense, January 2012), 4, http://www.defense.gov/news/defense_strategic_guidance.pdf.

2. Department of the Air Force, *Global Vigilance, Global Reach, Global Power for America: The World's Greatest Air Force—Powered by Airmen, Fueled by Innovation* (Washington, DC:

Department of the Air Force, January 2013), 4–9, http://www.af.mil/Portals/1/images/airpower/GV_GR_GP_300DPI.pdf.

3. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China, 2013* (Washington, DC: Office of the Secretary of Defense, 2013), i, http://www.defense.gov/pubs/2013_china_report_final.pdf.

4. Department of Defense, *Joint Operational Access Concept (JOAC)*, version 1.0 (Washington, DC: Department of Defense, 17 January 2012), 6, http://www.defense.gov/pubs/pdfs/joac_jan%202012_signed.pdf.

5. Ye Zicheng, *Inside China's Grand Strategy: The Perspective from the People's Republic*, ed. and trans. Steven I. Levine and Guoli Liu (Lexington: University Press of Kentucky, 2011), 3. See also John A. Shaud, *Air Force Strategy Study, 2020–2030* (Maxwell AFB, AL: Air University Press, Air Force Research Institute, January 2011), 130, http://www.dtic.mil/dtic/tr/fulltext/u2/a540345.pdf. Although China does not seek a large-scale military conflict with the United States, its leaders expect America to intervene if China acts aggressively in a regional dispute.

6. Andrew F. Krepinevich, *Why AirSea Battle?* (Washington, DC: Center for Strategic and Budgetary Assessments, 2010), 13–24, http://www.csbaonline.org/wp-content/uploads/2010/02/2010.02.19-Why-AirSea-Battle.pdf. See also Department of Defense, *Annual Report to Congress*, 5–11; and Jan van Tol et al., *AirSea Battle: A Point-of-Departure Operational Concept* (Washington, DC: Center for Strategic and Budgetary Assessments, 2010), 18–20, http://www.csbaonline.org/publications/2010/05/airsea-battle-concept/.

7. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China, 2012* (Washington, DC: Office of the Secretary of Defense, May 2012), 29, http://www.defense.gov/pubs/pdfs/2012_CMPR_Final.pdf. Furthermore, China has approximately 500 combat aircraft within unrefueled distance of Taiwan and the ability to deploy substantially more (a total of 2,300 combat aircraft), many of which can employ ALCMs. Future capabilities of the People's Liberation Army will include larger numbers of missiles with increased range, advanced stealth fighters such as the J-20 and J-31, and new air defense systems. See Krepinevich, *Why AirSea Battle?*, 32, 35.

8. Van Tol et al., *AirSea Battle*, 23.

9. Ibid., 51.

10. Air Force Instruction (AFI) 23-201, *Fuels Management*, 23 January 2012, 71, http://static.e-publishing.af.mil/production/1/af_a4_7/publication/afi23-201/afi23-201.pdf. For additional Air Force FARP guidance, see AFI 11-235, *Forward Area Refueling Point (FARP) Operations*, 15 December 2000, http://static.e-publishing.af.mil/production/1/af_a3_5/publication/afi11-235/afi11-235.pdf.

11. Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 8 November 2010 (as amended through 15 March 2014), 104, http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf. See also Army Techniques Publication 3-04.94 (FM 3-04.104), *Army Techniques Publication for Forward Arming and Refueling Points*, January 2012, 1-1, http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/atp3_04x94.pdf.

12. Donald E. Lewis et al., *A Perspective on the USAFE Collocated Operating Base System*, RAND Note N-2366-AF (Santa Monica, CA: RAND Corporation, July 1986), 3, http://www.rand.org/content/dam/rand/pubs/notes/2007/N2366.pdf.

13. Christopher J. Bowie, "The Lessons of Salty Demo," *Air Force Magazine* 92, no. 3 (March 2009): 54, http://www.airforcemag.com/MagazineArchive/Documents/2009/March%202009/0309salty.pdf.

14. Capt Jeremy R. Lewis, "Performance Evaluation of a Forward Arming and Refueling Point (FARP) Using Discrete Event Simulation," Graduate Research Project AFIT/MLM/ENS/05-08 (Wright-Patterson AFB, OH: Air Force Institute of Technology, 2005), 8–9, http://www.dtic.mil/dtic/tr/fulltext/u2/a442595.pdf.

15. Roger Cliff et al., *Shaking the Heavens and Splitting the Earth: Chinese Air Force Employment Concepts in the 21st Century* (Santa Monica, CA: RAND Corporation, 2011), 239.

16. The fighter FARP concept can be applied to any fighter and transport combination capable of conducting FARP. So far, it has been applied only to F-22s and C-17s at JBER, AK. Application to other transport aircraft and future fighters will increase the concept's utility.

17. Lt Col Robert D. Davis, commander, 525th Fighter Squadron, to commander, 3rd Wing, and commander, 477th Fighter Group, trip report memorandum, 21 December 2012. See also Capt Ashley Conner, "Innovation Advances F-22 as Strategic Force in the Pacific," 477th Fighter Group Public Affairs, 9 October 2013, http://www.477fg.afrc.af.mil/news/story.asp?id=123366570.

18. AFI 11-2F-22A, vol. 3, *F-22A—Operations Procedures*, 8 December 2009, 11, http://static.e-publishing.af.mil/production/1/af_a3_5/publication/afi11-2f-22av3/afi11-2f-22av3.pdf. If poor weather is expected, the airfield will also require an approved instrument approach and departure procedure.

19. Additional threats to air operations include enemy surface-to-air-missile systems and air-to-air fighters that might disrupt US attempts to move freely within the JOA.

20. FARP operations can be conducted at MOBs and civilian/military airfields with robust infrastructure, but choosing a location without such infrastructure may lower the risk of a missile attack because of its (perceived) lack of military utility.

21. Duncan S. Lennox, ed., *Jane's Strategic Weapon Systems*, issue 55 (Alexandria, VA: Jane's Information Group, 2011), 24. The DF-15A, the longest-range SRBM, has a range of 486 nm. Other SRBMs include the DF-11 (151 nm), DF-11A (189 nm), and DF-15 (324 nm). China's MRBMs include the DF-21, which has a range between 945 and 1,350 nm, depending upon the variant; the D-3A, with a range of 1,512 nm; and the DF-4, with a range of 2,565 nm (beyond Guam).

22. Ibid., 9. This assumes that GLCMs are launched when the first aircraft lands. China's most capable GLCM, the C-602/H-3, is also known as the DH-10. This cruise missile has a maximum range of 1,620 nm, flies at a speed of Mach 0.9, and can be launched from multiple locations along the Chinese coast.

23. Ibid., 8. See also Noam Eshel, "Chinese Air Force Gets More H-6K Strategic Bombers," *Defense Update*, 25 June 2013, http://defense-update.com/20130625_h-6k-bombers-delivered-to-pla-air-force.html. China probably will use its most capable ALCM, the DH-10, only for high-value targets. The C-602/HN-1 has a maximum range of 323 nm, flies at a speed of Mach 0.8, and can be launched only from the H-6 aircraft. Other operational ALCMs include the YJ-63 (108 nm / Mach 0.7) and the C-803 (135 nm / Mach 1.3–1.5).

24. Lt Col Kevin Sutterfield, FARP OUE test director, 477th Fighter Group, JBER, AK, to the author, e-mail, 27 January 2014. The 3rd Wing and 477th Fighter Group at JBER continue to develop and exercise the fighter FARP concept. F-22 and C-17 units performed the

first operational unit evaluation of the concept in August 2013 during which FARP operations were successfully conducted on a JBER runway with four F-22s and one C-17.

25. Ibid. See also Marc V. Schanz, "The Pacific Abhors a Vacuum," *Air Force Magazine* 97, no. 1 (January 2014): 23, http://www.airforcemag.com/MagazineArchive/Documents/2014/January%202014/0114pacific.pdf; and Schanz, "Rapid Raptors: A New PACAF Concept Gets F-22s to the Fight Fast," *Air Force Magazine* 96, no. 11 (November 2013): 57, http://www.airforcemag.com/MagazineArchive/Documents/2013/November%202013/1113raptors.pdf.

26. Some of the determining factors include maintenance inspection requirements, number of weapons expended and available, crew fatigue, and unforeseen F-22 and/or C-17 maintenance problems.

27. Both of the two F-22 squadrons at JBER, AK, have 21 primary aircraft authorized (PAA). There is also one permanently assigned F-22 squadron at Joint Base Pearl Harbor–Hickam (JBPHH), HI, with 18 PAAs. Three other combat-coded F-22 squadrons, all with 21 PAAs, are assigned to bases in the continental United States (CONUS).

28. For a large military operation in the Pacific area of responsibility, the Air Force may choose to add additional CONUS-based F-22 units to the two F-22 squadrons at JBER and the one F-22 squadron at JBPHH.

29. Winston Groom, *The Aviators: Eddie Rickenbacker, Jimmy Doolittle, Charles Lindbergh, and the Epic Age of Flight* (Washington, DC: National Geographic Society, 2013), 325.

30. Ibid., 324.

31. Ibid., 339.

Lt Col Robert D. Davis, USAF

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Remotely Piloted Aircraft and War in the Public Relations Domain

Capt Joseph O. Chapa, USAF

The well-intentioned author of the article "The Killing Machines," which appeared in the *Atlantic* last year, offers a lengthy description of a Hellfire missile strike by a remotely piloted aircraft (RPA). The story's protagonist, a "19-year-old American soldier" who entered Air Force basic military training straight out of high school, became an MQ-1 Predator crew member upon graduation. Reportedly, on his very first mission at the controls, the "young pilot"

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observed a troops-in-contact situation on the ground. The "colonel, watching over his shoulder, said, 'They're pinned down pretty good. They're gonna be screwed if you don't do something.'"[1] The narrative goes on to describe the Hellfire missile strike and the psychological effect it had on the Airman.

To a sophisticated military audience, the factual inconsistencies in this account are apparent. Air Force RPAs are crewed by Airmen, not Soldiers. The 19-year-old Airman (an enlisted rank) cannot be an Air Force pilot (an officer rating). The article claims that during his first time at the controls, this Airman finds himself on a combat mission in-theater. In reality, he would have become familiar with the controls at initial qualification training, prior to arriving at his first combat squadron. Furthermore, when colonels speak to Airmen about life-and-death combat decisions, they tend to do so in terms of direct orders rather than leading suggestions. How can Mark Bowden, notable historian and author of such well-received books as *Black Hawk Down*, commit such factual errors? The answer is simple. Information about Air Force RPA operations is rarely available—and when it is, it usually proves unreliable. This article contends that because an information vacuum exists with respect to US RPA operations, well-meaning people cannot gain adequate knowledge to develop and share an informed opinion on the most important RPA questions. It calls this dearth of information "the epistemic problem."

To disprove a deductive argument, one must (a) disprove one or more premises, (b) identify an ambiguous definition, or (c) demonstrate a logical fallacy in the argument.[2] Many of the RPA articles, opinions, and interviews produced over the last decade are either based on false premises (option a) or employ a logical fallacy of analogy (option c); therefore, many of their conclusions are invalid. This article does not attempt to show that most of the writing on RPAs over the last decade contains fallacies of some kind. Rather, it recognizes the ease with which sincere people can commit such errors as a result of the epistemic problem inherent in any discussion of RPA operations.

The argument, then, begins by asserting that such a problem exists and suggesting that it has three causes. First, enemy forces (here referring specifically to al-Qaeda and the Taliban) have an effective public relations (PR) campaign against RPAs. Second, the United States conducts an ineffective PR campaign in support of RPAs. Third, RPA operations are necessarily concealed by security classifications and national security precautions. The article expounds upon the significance of these causes and provides evidence for them—evidence that will demonstrate not only the three causes but also the reality of the epistemic problem. Its conclusion offers two ways that individuals can mitigate the dilemma and one means by which the US government can rectify it.

Enemy Forces and Public Relations

The term *propaganda* is omitted here because it is controversial and because, even assuming a universally agreed-upon definition, identifying its individual instantiations would prove difficult. For example, one definition holds that "propaganda is biased information designed to shape public opinion and behavior."[3] Another tries to circumvent a negative connotation by distinguishing weak from strong propaganda, describing the former as "persuasion in the interests of the message sender, based on selected facts and emotions."[4] Even if information meets the criteria established by these definitions, it does not necessarily warrant the negative connotation often intended by the term *propaganda*. Although governments and terrorist organizations may engage in it, the term remains unhelpful. The fact that information is biased does not make it false, and the fact that information intends to shape public opinion and action does not make it underhanded or deceitful. This article concerns itself with the genus of information, within which propaganda is a species, and therefore addresses all information—biased and unbiased, true and false—designed to shape public opinion and action.

PR, then, is a better term because it sidesteps the potentially pejorative connotation of the other term and associates a particular set of information with a particular organization. Such an entity with a PR arm, committee, or campaign carefully crafts its message to achieve certain aims. Although some information publicized by al-Qaeda and by an American news network may overlap (regarding a specific RPA strike, for example), that news network is not *participating* in al-Qaeda's PR campaign. (Indeed, if it relies upon information published by that militant group, then the news agency may be a *victim* of the campaign instead of a participant.)

The effects of al-Qaeda's and the Taliban's PR efforts are noticeable and far reaching. In an independent international poll conducted in 2012, the vast majority of respondents were strongly opposed to the US RPA campaign.[5] In his article "A Progressive Defense of Drones," Yale Human Rights Fellow Kiel Brennan-Marquez notes that "as a liberal, I'm against drones essentially by reflex. . . . Unlike traditional warfare, when the loss of life on the other side is presumptively *acceptable*, . . . in the case of drone strikes, the loss of lives on the other side is presumptively *unacceptable*"[6] (emphasis in original). Why these presumptions? Why does the world seem preconditioned against RPAs? What is it about their operations that makes them seem inherently antiliberal or presumptively unacceptable? Some of these seemingly intuitive responses may actually be conditioned, based upon the public's exposures to RPA operations. Such exposure is controlled—or at least influenced—by intentional PR campaigns. The following discussion presents three different models that explain the level of influence and intentionality of anti-RPA PR campaigns, ordering them from the most benign (which assigns a passive role to the PR campaign) to the most severe (which assigns an active role to an enemy PR campaign).

In their ethical assessment of targeted killing, Eric Patterson and Teresa Casale contend that "while contemporary targeted killing is useful for striking terrorists in dangerous places, it will be covered by foreign media like al Jazeera in ways unflattering to the U.S."[7] In this view, re-

porting biases are based on inherent cultural relationships between the news agencies involved and the victims or proponents of RPA strikes. Therefore this "cultural relationship" perspective assigns no PR intentionality to the news agency. That is, these authors do not suggest that al Jazeera is participating in the enemy's PR campaign, or any other, against RPAs. Any biased reporting is simply based upon the nature of things as they are. So American news agencies are just as likely to be slanted toward US interests. Thus, such agencies will necessarily produce biased information without intentionally engaging in a PR campaign.

Other individuals, though, take a stronger view. Regarding many civilian casualty reports, Georgetown professor Daniel Byman claims that "their numbers are frequently doctored by the Pakistani government or by militant groups. After a strike in Pakistan, militants often cordon off the area, remove their dead, and admit only local reporters sympathetic to their cause or decide on a body count themselves. The U.S. media often then draw on such faulty reporting to give the illusion of having used multiple sources."[8] This "controlled information" view is stronger than that of the "cultural relationship" insofar as it does suggest that some groups have a PR agenda. These groups, however, are purportedly not enemy forces but third-party, anti–United States groups—in this case, non-US governments and militant groups.

Prof. Audrey Kurth Cronin of Oxford University and George Mason University takes the strongest position: "Al Qaeda uses the strikes that result in civilian deaths, and even those that don't, to frame Americans as immoral bullies who care less about ordinary people than al Qaeda does." (She notes that this PR strategy is effective in spite of the fact that US RPA strikes avoid civilians about 86 percent of the time and that al-Qaeda purposefully targets them.)[9] This is the "enemy PR campaign" view—the most plausible of the three—which asserts that intelligent people within the enemy's organizational structure intentionally affect information streams so that passive recipients (global populations) will condemn the United States' use of RPAs.

Some people may be tempted to doubt an active al-Qaeda or Taliban PR campaign on the grounds that such a decentralized organization or set of terrorist cells probably does not have the strategic capability to affect information to the degree required to sway global opinion. In the face of such doubt, though, one must recall that international terrorism is by its nature a PR endeavor. US Army Field Manual 7-98, *Operations in a Low Intensity Conflict*, cautions that a terrorist organization's acts of violence "draw the attention of the people, the government, and the world to . . . [its] cause" and that "the media plays a crucial part in this strategy."[10] Megan Smith and James Igoe Walsh note that al-Qaeda is among those terrorist groups that "calculate the consequences of their actions not only in the number of lives lost or the economic and social damage inflicted, but in the amount of media attention they are able to garner."[11] In what has been called "mass-mediated terrorism," organizations such as al-Qaeda not only spin media-produced coverage of their activities but also produce their own coverage.[12] In this way, al-Qaeda can generate a message and shape, control, and distribute it to maximum effect. In fact, it is so sophisticated in this domain that it has a designated PR branch called as-Sahab ("the Cloud") Media.[13]

RPA operations are vulnerable to as-Sahab's PR machine in two ways. First, RPA strikes "provide as-Sahab with incidences of United States behavior that can be painted as cruel, brutal, and capricious to a mass audience, further legitimizing the political stances of al Qaeda."[14] Second, as-Sahab can attack the nature of RPA warfare without reference to particular strikes. Indeed, it has released "numerous public statements asserting that the United States exploits its unfair advantage in technology and that the use of unarmed drones is cowardly."[15]

Like as-Sahab, the Taliban can affect public opinion regarding the use of remote weapons, though perhaps not with the same level of sophistication. Target audiences particularly vulnerable to such influence include the local populations of Afghanistan and northwest Pakistan. In the past, in the absence of US government commentary on

reported RPA strikes, the Taliban have taken full advantage of the silence, convincing the local populace that insurgent effects were actually caused by the coalition. They have been so convincing that in 2009, the Taliban successfully convinced Kandahar City residents that an explosion caused by a Taliban bomb years earlier was actually the result of a US air strike.[16]

In addition to the enemy's top-down PR directives, digital interconnectivity and social media have allowed for PR efforts orchestrated at the middle-management level. Zachary Adam Chesser, a 20-year-old American, earned notoriety among jihadists when he e-published an insider's guide to defeating the United States in the PR domain. He urged his adherents to "publish statistics of how many Muslim civilians have been killed by the Americans, using the highest credible estimates. . . . Anytime an American does something wrong, emphasize it . . . [and] anytime the United States does anything that can be perceived as a success in its war against al Qaeda, bury it."[17] Al-Qaeda and the Taliban have recognized and exploited the PR domain for a kind of information superiority and have subsequently poisoned many people against RPA operations—both within the United States and abroad. Thus far, we have learned that the enemy conducts an active PR campaign and that one of its highest priorities is tarnishing the world's opinion of RPAs—perhaps the most capable weapons against that adversary.[18]

The United States' Response

America has met the enemy's PR effectiveness with its own PR failures. Misconceptions about RPA operations have been widespread and continue to proliferate. Take for example the "video game problem." Bowden says that killing from 3,000 miles away is "like a video game; it's like Call of Duty."[19] Professor Brennan-Marquez claims that the "numbness that results from using machines rather than soldiers to carry out our dirty work" produces "the nightmarish image of an 18-year-old drone operator basically playing video games from the de-

tached safety of a Nevada bunker."[20] Moreover, the subtitle of an article by Michael Brooks, a science journalist and holder of a PhD in quantum physics, in the *New Statesman* reads, "Can You Play a Video Game? Then You Can Fly a Drone."[21]

This video game argument employs a logical fallacy called "a failure to recognize distinctions" by D. A. Carson and a "faulty analogy" by Norman Geisler and Ronald Brooks.[22] This method of refuting an argument reflects option C (above), demonstrating that the conclusion does not follow from the premises. Such a faulty analogy occurs by assuming that when two things are similar in one way they will be similar in another way.[23] Proponents of the video game hypothesis claim that flying an RPA is *like* playing a video game—and they may be quite right. But the fact that the two are alike in one way does not mean that they are alike in all ways.

The video game pejorative is rhetorical in nature, and its negative connotation is apparent: RPA pilots must see as little correspondence between their activities and reality as do the video gamers. The pilots must not take their job seriously, just as people who play a video game are not serious, and they look at killing real people in the same way that the video gamers perceive killing computer-generated people. In this way, there exists a necessarily cognitive and emotional distance, as well as a disinterested detachment, from the death that the pilots administer—or so the claimants would have us believe.

Expressed in these terms, the video game hypothesis obviously becomes inadequate—and so it is. Nevertheless, it is pervasive enough to deserve attention. First, one must discover similar elements between the video game and the RPA. Although proponents of the hypothesis should do this themselves, let us consider one possibility. The RPA pilot, like the video gamer, sits in a dark, air-conditioned room with multiple video monitors, a headset, and a microphone, having no exposure to the physiological pressures of manned flight. If these are, in fact, the elements shared by the two activities, then two responses to the video game hypothesis emerge. The first entails identifying the fallacy

and asserting the fact that the existence of similar elements does not imply the similarity of all elements. This might prove a weak response, however, in that even though it demonstrates that the important elements (dissociation with reality, etc.) are not *necessarily* similar, it does not demonstrate that they are *dissimilar*.

A second, stronger response involves identifying another activity that resembles the video game in the same way that the RPA resembles it but that at the same time is dissimilar with respect to the important issues (dissociation with reality, etc.). Two obvious examples come to mind. The first is a radar-approach controller at a busy airport, such as Boston's Logan International. This individual sits in a dark room, looks at several video monitors, and wears a headset and a microphone, having no exposure to the physiological pressures of flight. He or she, though, may control multiple airliners, each carrying hundreds of people in instrument meteorological conditions (i.e., the aircraft are in the weather and rely upon instruments, navigational aids, and the controller's instructions). In this case, the mechanism and aesthetics of the controller's job are strikingly similar to those of the video gamer and RPA pilot, yet the controller appears to face no "video game" critique in the popular press or scholarly literature. Furthermore, one could argue that if the controller were to dissociate his or her activity from reality, the results would prove even more catastrophic than those that would follow if the RPA pilot were to do the same. On the one hand, the MQ-1's two 100-pound Hellfire missiles give the pilot only limited destructive power.[24] On the other hand, if the controller runs two Boeing 737s together (a relatively small airplane at Boston Logan), then more than 250 people face a high probability of death. No RPA strike has generated that many casualties.

The combined force air component commander (CFACC), who has operational control of RPA missions in the area of responsibility, offers an additional counterexample.[25] That general officer also sits in a dark, air-conditioned room with a number of video monitors. Again, demonstrating greater destructive capability than the RPA pilot, this officer is

responsible for numerous missions, objectives, and air assets. Are the proponents of the video game hypothesis prepared to accuse the CFACC of dissociating his activity from reality? If so, there should be as many articles published about the dangers of the Defense Department's entire command and control architecture as there are warnings against video-game-like weapons systems.

The video game problem offers the best example of a PR failure that the US government could rectify with a better PR campaign. People think that flying an RPA is like playing a video game, in part, because of their limited exposure to the operations of that platform. After all, they see only the video-game-like apparatus of a dark room, video monitors, a headset, and a microphone—but no flight physiology (see the Air Force's own television advertisements).[26] It should come as no surprise that they extend the analogy between RPA and video games beyond its legitimate reach. This problem, though, is not the only one faced by the US PR campaign.

A number of other false claims about the United States' RPA capabilities can be reduced to doubts about discrimination. The just war tradition and, indeed, America's own law of armed conflict require that the United States (and any belligerent, in the case of just war) discriminate between combatant and noncombatant.[27] Professor Brennan-Marquez asserts that "death, visited from the skies, isn't precise."[28] The advocacy group Anti-War Committee claims that "the physical distance between the drone and its shooter makes a lack of precision unavoidable."[29] Political scientist Michael Gross suggests that in a conflict with a nonstate actor such as al-Qaeda, militaries (including the US armed forces) most likely will assume that individuals in civilian clothes are combatants until otherwise demonstrated.[30]

The United States' failure to disclose information about its own use of RPAs has produced an additional noteworthy consequence. As was the case with nuclear weapons, America has been among the first to attain this kind of remote capability.[31] That said, Dr. Micah Zenko, a fellow at the Council on Foreign Relations, correctly points out that

"over the next decade, the U.S. near-monopoly on drone strikes will erode as more countries develop and hone this capability."[32] Just as the United States was in a position to craft the global standard for nuclear weapons practices, so can it help establish international norms for the acceptable use of remote weapons.[33] Despite its failure to disclose information critical to this cause, the US government has acknowledged the inevitable proliferation of remote weapons. According to the Obama administration, "If we want other nations to use these technologies responsibly, we must use them responsibly."[34] Given the heavy veil covering the RPA program, however, the international community cannot determine the United States' degree of responsibility. The disclosures recommended in this article would not only allow for but also foster international discussion on the acceptable use of remote weapons—a discussion that some would argue is imperative.[35]

The US government could address all of these issues by making two important disclosures, neither of which would violate national security requirements. First, it could publicize the already unclassified capabilities of the RPA weapons systems.[36] Assertions that RPA strikes are by nature indiscriminate are false. Though conditioned by an effective al-Qaeda PR campaign to believe otherwise, people who have done the research have found this to be the case. As Avery Plaw, a political scientist at the University of Massachusetts, observes, "The drone program compares favorably with similar operations and contemporary armed conflict more generally."[37] The International Committee of the Red Cross found that throughout armed conflicts of the twentieth century, 10 civilians were killed for every combatant.[38] Because the accounts vary so widely, a precise civilian casualty rate for RPA strikes is impossible to determine. Nevertheless, it is certainly less than .5 civilians per combatant and may be as low as .08 (20 to 125 times better than the historical standard set by twentieth-century conflicts).[39]

Second, the United States could publicize elements from its own internal rules of engagement for distinguishing civilians from enemy combatants.[40] In January 2012, leaders of the Afghanistan Interna-

tional Security Assistance Force (ISAF) met to discuss methods of eliminating civilian casualties in Afghanistan. Lt Gen Adrian Bradshaw, the ISAF's deputy commander at the time, told attendees that "eliminating Afghan civilian casualties is a high priority" and even a "moral obligation."[41] Countering Professor Gross's assumption above, the ISAF's priority suggests that the US military presumes *civilian* status until otherwise demonstrated and not the other way around. Further disclosures like this one, not of details but of priorities and general practices, would help assure the world's population that the United States takes the just war tradition's requirement of discrimination quite seriously.

Classification and Secrecy

As Professor Rosa Brooks rightly observes, the United States' use of RPAs is shrouded in secrecy.[42] This is true, as she suggests, not only for targeted killings but also for close air support operations in Afghanistan. This article distinguishes the poor PR campaign from issues of classification because the requirement to win the PR war does not supersede the one to keep classified material out of the hands of the enemy and, therefore, out of the hands of the public.

The appropriate way to view the epistemic problem in this context calls for recognizing two constants and one variable. The enemy's PR campaign resembles a constant in that it lies outside the US government's control. After all, in the PR domain, as in all the others, the enemy gets a vote. One should also consider classification a constant. Reasons exist for classifying information and for winning in the PR domain, but those reasons are independent of each another. One cannot expect the motivations for an effective PR campaign to outweigh those for classification; consequently, one should not expect to change the way the US military makes classification determinations for the sake of an effective PR campaign. In the context of such an effort, then, classification should be considered a constant. The one variable that America does control in the PR domain is its own PR campaign, discussed in the previous section.

Conclusion: The Way Ahead

The individual cannot solve the epistemic problem. One can, however, make two significant interpretive moves in reading and writing about RPA operations. First, one ought to know that the problem exists and interpret the information appropriately.

As long as the US government maintains radio silence on its RPA program, responsible readers must recognize that they are receiving only one side of a necessarily polarized story. Once readers realize that an enemy with a sophisticated and well-practiced PR machine at its disposal is engaged in information warfare, using the media as an instrument, they should view these reports cautiously rather than dogmatically. Such is the nature of the epistemic problem. Drawing merely upon news reporting, we simply cannot know exactly what happened in the cockpit or on the ground in a particular RPA strike. So what can we know? After we become aware of the epistemic problem, our interpretation of available data should concentrate on big questions rather than little ones.

The epistemic problem may result in insufficient information to determine whether RPAs are more or less discriminate than their traditionally manned sister platforms—but this is a little question. A big question is whether RPA technology changes the nature of discrimination. The evidence suggests that it does not. The epistemic problem may produce misunderstandings about how flying an RPA is like playing a video game—but this is a little question. A big question is whether the digital apparatus constitutes a sufficient condition for the dissociation between activity and reality. Even one case of post-traumatic stress disorder in an RPA crew member would indicate that it does not.[43] Whether a single RPA crew errs on a single RPA mission is (by comparison only) a little question. A big question is whether the RPA weapons systems in question provide a means for the crew to distinguish reliably between friend and foe.

A second duty in light of the epistemic problem is extraneous to the preceding argument but nevertheless necessary. Anyone speaking or writing about these issues has an obligation to make clear to the audience precisely the type of RPA, kind of mission, three-letter government agency, or area of responsibility under discussion. For example, some have argued that RPAs are unethical in that their use entails no risk.[44] Sometimes, though, risk is in fact present (e.g., when RPAs conduct close air support missions, the enemy may impose great risk on ground forces). These arguments, then, fail to distinguish between conflicts (like Afghanistan) that use RPAs to protect ground troops and notional conflicts that would use *only* RPAs to pursue military ends.[45] Similarly, some have argued that the use of RPAs makes the decision to go to war too easy, again based on absence of risk.[46] This argument also assumes an RPA-only war (a decision to go to war and use RPAs to support ground troops will still come at a heavy cost). The ensuing conclusions may prove valid for some future events, but theorists err in applying them to RPA operations in Afghanistan. Appropriately distinguishing between different uses of RPAs will limit confusion and mitigate the epistemic problem.

The US government can take a significant step toward solving the RPA epistemic problem—and such institutional action would be far more efficacious than that of individuals. As mentioned above, the US government, designating the Department of the Air Force as the lead agency, should conduct an active, international PR campaign in which it publicizes true information, showcasing the discriminatory capability of RPA weapons systems as well as internal safeguards (such as rules of engagement) against haphazard targeting. To this point, the world has heard only one side of a two-sided discussion and, unsurprisingly, has succumbed to it. Intelligent, well-intentioned people should have the opportunity to hear both sides so that they can develop an informed opinion.

All is not lost. An epistemic problem exists, but a meaningful conversation can commence nevertheless. Awareness of the problem

should influence one's thoughts and actions. Additionally, one should not submit to an omniscient technocracy, trusting that those privy to the secrets must know best and that, therefore, the individual need not know anything about it at all. On the contrary, to the extent that national security can be safeguarded, this article has argued that the federal government should not simply disclose but *publicize* much of its RPA program that remains in the dark. The battle for hearts and minds with respect to RPAs is being waged in the PR domain. Today, the enemy is winning. ✪

Notes

1. Mark Bowden, "The Killing Machines: How to Think about Drones," *Atlantic*, 14 August 2013, http://www.theatlantic.com/magazine/archive/2013/09/the-killing-machines-how-to-think-about-drones/309434/. The unmanned aircraft name game is ongoing. The US Air Force uses the term *remotely piloted aircraft* (*RPA*) whereas the other services use *unmanned air systems* (*UAS*). Nonmilitary sources typically refer to *drones*. Each term refers to the same group of systems. More importantly, this article refers to armed systems (most notably, Air Force MQ-1s and MQ-9s) operated by military personnel located in the continental United States. The article preserves the terms as they appear in quoted texts.

2. Peter Kreeft, *Socratic Logic: A Logic Text Using Socratic Method, Platonic Questions, and Aristotelian Principles*, ed. 3.1 (South Bend, IN: St. Augustine's Press, 2010), 26.

3. "What Is Propaganda?," United States Holocaust Memorial Museum, accessed 7 December 2013, http://www.ushmm.org/propaganda/resources/.

4. Johanna Fawkesa and Kevin Moloney, "Does the European Union (EU) Need a Propaganda Watchdog like the US Institute of Propaganda Analysis to Strengthen Its Democratic Civil Society and Free Markets?," *Public Relations Review* 34, issue 3 (September 2008): 209.

5. The poll, though, used the term *drone*. Audrey Kurth Cronin, "Why Drones Fail: When Tactics Drive Strategy," *Foreign Affairs* 92, no. 4 (July/August 2013): 49.

6. Kiel Brennan-Marquez, "A Progressive Defense of Drones," *Salon*, 24 May 2013, http://www.salon.com/2013/05/24/a_progressive_defense_of_drones/.

7. Eric Patterson and Teresa Casale, "Targeting Terror: The Ethical and Practical Implications of Targeted Killing," *International Journal of Intelligence and Counterintelligence* 18, no. 4 (21 August 2005): 647.

8. Daniel Byman, "Why Drones Work: The Case for Washington's Weapon of Choice," *Foreign Affairs* 92, no. 4 (July/August 2013): 37.

9. Cronin, "Why Drones Fail," 47.

10. Field Manual 7-98, *Operations in a Low-Intensity Conflict*, 19 October 1992, 3-1, http://www.bits.de/NRANEU/others/amd-us-archive/fm7-98(92).pdf.

11. Megan Smith and James Igoe Walsh, "Do Drone Strikes Degrade Al Qaeda? Evidence from Propaganda Output," *Terrorism and Political Violence* 25, no. 2 (10 January 2013): 314, http://www.jamesigoewalsh.com/tpv.pdf.

12. Ibid.

13. Ibid.

14. Ibid., 316.

15. Ibid.

16. Sarah Holewinski, "Do Less Harm: Protecting and Compensating Civilians in War," *Foreign Affairs* 92, no. 1 (January/February 2013): 17.

17. Jarret Brachman, "Watching the Watchers: Al Qaeda's Bold New Strategy Is All about Using Our Own Words and Actions against Us. And It's Working," *Foreign Policy*, 12 October 2010, http://www.foreignpolicy.com/articles/2010/10/11/watching_the_watchers. These quotations are from Brachman's paraphrase and are not necessarily Chesser's exact words.

18. Andrew Callam, "Drone Wars: Armed Unmanned Aerial Vehicles," *International Affairs Review* 18, no. 3 (Winter 2010), http://www.iar-gwu.org/node/144.

19. Bowden, "Killing Machines."

20. Brennan-Marquez, "Progressive Defense of Drones."

21. Michael Brooks, "Eyes in the Sky: Can You Play a Video Game? Then You Can Fly a Drone," *New Statesman* 141, issue 5110 (18 June 2012): 27–29.

22. D. A. Carson, *Exegetical Fallacies*, 2nd ed. (Grand Rapids, MI: Baker Academic, 1996), 92; and Norman L. Geisler and Ronald M. Brooks, *Come, Let Us Reason: An Introduction to Logical Thinking* (Grand Rapids, MI: Baker Books, 2004), 109.

23. Kreeft, *Socratic Logic,* 102.

24. "MQ-1B Predator," fact sheet, US Air Force, 20 July 2010, http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104469/mq-1b-predator.aspx; and "AGM-114R Multi-Purpose HELLFIRE II: Effective against 21st Century Threats," Lockheed Martin, 2011, 2, http://www.lockheedmartin.com/content/dam/lockheed/data/mfc/pc/hellfire-ii-missile/mfc-hellfire-ii-pc.pdf.

25. Or the director of the combined air operations center to whom targeting authority is delegated. Changing this notional example to a joint force air component commander would not affect its application to my argument. See Joint Publication 3-30, *Command and Control of Joint Air Operations*, 10 February 2014, E-1, http://www.dtic.mil/doctrine/new_pubs/jp3_30.pdf; and Curtis E. LeMay Center for Doctrine Development and Education, "Annex 3-0, Operations and Planning," 9 November 2012, 2n2, https://doctrine.af.mil/download.jsp?filename=3-0-Annex-OPERATIONS-PLANNING.pdf.

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Law Department, 2013), 13, http://www.loc.gov/rr/frd/Military_Law/pdf/LOAC-Deskbook-2013.pdf.

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29. Harrison Schmidt, Jennie Eisert, and Meredith Aby, "Stop Drone Warfare!," Anti-War Committee, 20 June 2012, http://antiwarcommittee.org/2012/06/20/stop-drone-warfare/.

30. Michael L. Gross, "Assassination and Targeted Killing: Law Enforcement, Execution or Self Defence?," *Journal of Applied Philosophy* 23, no. 3 (August 2006): 329.

31. "To date, only the United States, Israel, and the United Kingdom are believed to have used armed drones." Sarah Kreps and Micah Zenko, "The Next Drone Wars: Preparing for Proliferation," *Foreign Affairs* 93, no. 2 (March/April 2014), http://www.foreignaffairs.com/articles/140746/sarah-kreps-and-micah-zenko/the-next-drone-wars.

32. Micah Zenko, *Reforming U.S. Drone Strike Policies*, Council Special Report no. 65 (New York: Council on Foreign Relations, Center for Preventive Action, January 2013), 4.

33. Kreps and Zenko "Next Drone Wars."

34. Zenko, *Reforming U.S. Drone Strike Policies*, 5.

35. Kreps and Zenko "Next Drone Wars."

36. I distinguish here between the terms *declassify* and *publicize*. Unclassified information is available but not necessarily actively publicized by the US government. I am not advocating the declassification of information but merely publicizing to passive recipients the information already available to someone actively searching for it.

37. Scott Shane, "The Moral Case for Drones," *New York Times*, 14 July 2012, http://www.nytimes.com/2012/07/15/sunday-review/the-moral-case-for-drones.html?_r=0.

38. Rosa Brooks, "What's *Not* Wrong with Drones: The Wildly Overblown Case against Remote-Controlled War," *Foreign Policy*, 5 September 2012, http://www.foreignpolicy.com/articles/2012/09/05/whats_not_wrong_with_drones#sthash.eCd2QZZj.dpbs.

39. Ibid.

40. Brennan-Marquez, "Progressive Defense of Drones."

41. Lt Col David Olson, "ISAF Conducts Aviation Civilian Casualty Conference," Afghanistan International Security Assistance Force, 19 January 2012, http://www.isaf.nato.int/article/news/isaf-conducts-aviation-civilian-casualty-conference.html.

42. Rosa Brooks, "The War Professor: Can Obama Finally Make the Legal Case for His War on Terror?," *Foreign Policy*, 23 May 2013, http://www.foreignpolicy.com/articles/2013/05/22/the_war_professor#sthash.3OQBfgms.dpbs.

43. This argument hinges on the presupposition that video games do not result in cases of post-traumatic stress disorder—a presupposition upon which I am willing to rest.

44. Paul W. Kahn, "The Paradox of Riskless Warfare," *Philosophy and Public Policy Quarterly* 22, no. 3 (Summer 2002): 2–8, http://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=1325&context=fss_papers; and Suzy Killmister, "Remote Weaponry: The Ethical Implications," *Journal of Applied Philosophy* 25, no. 2 (May 2008): 121–33.

45. Someone may respond that reported RPA strikes in Yemen, Pakistan, and Somalia are representative of this case (an RPA-only conflict). If these strikes are carried out under the Authorization for the Use of Military Force, signed by Congress in 2001, in legal terms they are against al-Qaeda and affiliates and are therefore grounded in defense of US persons at home and abroad. See Brooks, "War Professor."

46. John Kaag and Sarah Kreps call this the moral hazard. See their article "The Moral Hazard of Drones," *New York Times*, 22 July 2012, http://opinionator.blogs.nytimes.com/2012/07/22/the-moral-hazard-of-drones/. See a similar argument formulated as "The Real Problem with Asymmetry," in Jai C. Galliott, "Uninhabited Aerial Vehicles and the Asymmetry Objection: A Response to Strawser," *Journal of Military Ethics* 11, no. 1 (January 2012): 62.

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Have Adversary Missiles Become a Revolution in Military Affairs?

William F. Bell

The United States last had relative parity with the missile forces of potential adversaries in the early 1990s.[1] Since then, the gap between our air and missile defense (AMD) capabilities and those of threat missile forces has continued to widen. Initially, this occurred because of the ability of our adversaries' rapidly increasing numbers of ballistic and cruise missiles and long-range rockets to overwhelm US forward-based AMD systems. For the most part, threat bal-

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listic missiles were unsophisticated variants of modified and improved SCUD missiles.[2] The late 1990s saw China, Russia, Iran, North Korea, and others fielding more sophisticated ballistic missiles that utilized solid fuel, inertial and Global Positioning System guidance, greater warhead lethality, extended ranges, improved mobility, and onboard and standoff countermeasures. These weapons were supported by increasingly advanced command and control (C2), doctrine, training, and targeting capabilities. At the same time, our opponents have seen the great success the United States has enjoyed with precision attack Tomahawk cruise missiles.

Adversary missile-attack doctrines, as demonstrated in numerous experiments and war games, have involved a low number of launches from static positions to large, complex salvoes from mobile forces.[3] Threat targeting has evolved from area targets (e.g., cities) to point targets (e.g., airfields and ports). The threat attacks in these war games and experiments have been supported by advances in terrestrial and aerial intelligence, surveillance, and reconnaissance (ISR); electronic warfare; unmanned aircraft systems (UAS); and probably space-based ISR. It appears that even the legacy missiles are being (relatively) improved inexpensively by having them retrofitted with advanced capabilities. The SCUDs of today are not the SCUDs of 1991; the SCUDs of the future will not be the SCUDs of today. Similarly, large and unsophisticated antiship cruise missiles (e.g., Styx) have evolved into advanced supersonic (soon hypersonic) antiship and land attack cruise missiles.

Improvements to the adversary's missile force capabilities as well as capacity (i.e., both technical improvements and growing numbers) continue and are widening the gap between those missiles and US AMD (see the figure below). This article maintains that the capabilities developed and employed by threat missile forces have evolved over the last decade from just another battlefield threat into a game-changing revolution in military affairs (RMA). Consequently, the US military must fundamentally change its approach to countering them.[4]

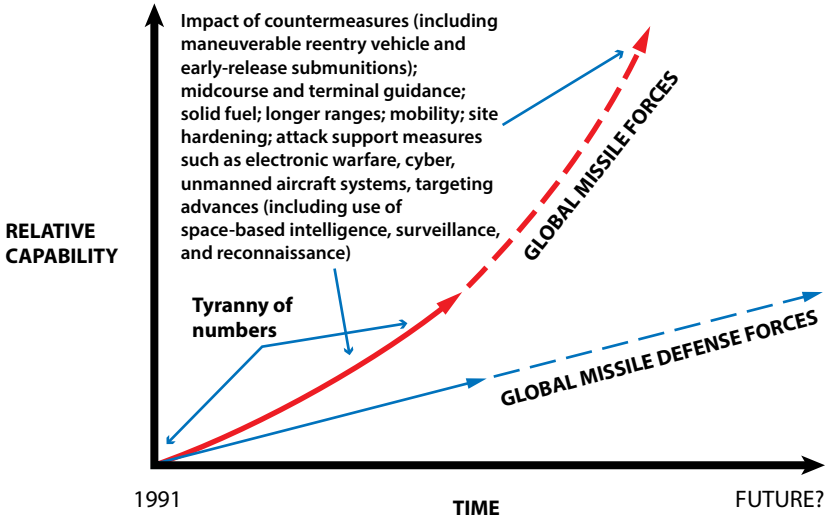

Figure. Trends in missiles and missile defense. The global gap between our missile defense and our adversaries' missile capabilities is growing and appears to be accelerating. This figure makes no attempt to quantify these trend lines but simply illustrates the problem in conceptual terms. (Adapted from Institute of Land Warfare, Association of the United States Army, *U.S. Army Integrated Air and Missile Defense Capabilities: Enabling Joint Force 2020 and Beyond*, Torchbearer National Security Report [Arlington, VA: Institute of Land Warfare, Association of the United States Army, May 2014], 13.)

What Is a Revolution in Military Affairs?

RMA is a widespread term but lacks a commonly agreed upon definition.[5] This article uses two of the most useful ones. First, Andrew F. Krepinevich asks,

> What is a military revolution? It is what occurs when the application of new technologies into a significant number of military systems combines with innovative operational concepts and organizational adaptation in a way that fundamentally alters the character and conduct of conflict. It does so by producing a dramatic increase—often an order of magnitude or greater—in the combat potential and military effectiveness of armed forces.[6]

The second definition, from a RAND study of 1999, is useful because it addresses the impact on current core competencies:

> An RMA involves a paradigm shift in the nature and conduct of military operations
> - which either *renders obsolete or irrelevant* one or more *core competencies* of a dominant player,
> - or creates one or more new core competencies, in some new dimension of warfare,
> - or both.[7] (emphasis in original)

To qualify as an RMA, threat missile forces would have to apply technologies synergistically in innovative ways that give them a significant increase in their strategic, operational, and tactical war-fighting capabilities so that they effectively render our current ability to counter them cost-ineffective and thereby affect our conduct of global power projection.

Just as no official definition of RMA exists, so is there no common agreement on RMAs throughout history. We do, however, see some common threads. For example, technologies that made up RMAs existed in many cases for a long time; RMAs defined warfare for a significant period following their introduction; and they were subsequently supplanted by other (counter) RMAs. Consider armored knights and castles. With the decline and fall of the Roman Empire, they were the RMAs of their era. Horse-mounted soldiers had existed for thousands of years prior to the feudal era, as had fortified locations, yet they defined military operations during their "time in the sun." They also helped define the economic, diplomatic, and social fabric of the era.

This state of affairs continued until the introduction of massed longbow archers during the Hundred Years' War between England and France. The battlefields of Crécy, Poitiers, and Agincourt quickly rendered the armored knight irrelevant. Non-nobles could slaughter members of the established order at distance with relative impunity and little expense before the knights could close with the bowmen. Heavier armor was not cost-effective against stronger bows or crossbows with

bodkin points in large numbers. Cavalry would still have a role on the battlefield but would not dominate as it had for so many centuries.

Similarly, castles made defense dominant until projectiles powered by gunpowder made them rapidly obsolete. It was not cost-effective to greatly increase the thickness of curtain walls because the creation of more powerful artillery proved relatively simple and inexpensive.[8] The introduction of massed, armor-penetrating longbows/crossbows and of gunpowder artillery fundamentally changed the nature of warfare and had huge political, social, and cultural implications for the feudal era. Just as powered projectiles rendered castles and armored horsemen obsolete in short order (with corresponding strategic and operational effects across the doctrine, organization, training, materiel, leadership and education, personnel, and facilities [DOTMLPF] spectrum), so does it seem plausible that large numbers of accurate, responsive, and lethal missiles with ever-longer ranges are having the same effect on "the established order" (i.e., US global power projection) in the early twenty-first century.

Why Did Bows and Gunpowder Become an RMA?

Bows existed for millenniums prior to the Hundred Years' War. Similarly, gunpowder was present for centuries before it upset the social order.[9] What was different? Why did they suddenly become "game changers"?

The game-changing factors were a synergistic mix of mass employment, innovative tactics, cost-effectiveness (they were much cheaper than castles and armor/horses), penetration power, accuracy, and range integrated with a few new technologies (e.g., iron and bronze castings for cannon) that doomed castles and armored horsemen.[10] Guns were a natural follow-on to gunpowder artillery and eventually became the RMA that eliminated the mass formation of longbows.[11] These game-changing factors are the same ones that are enabling the adversary's missile capabilities to upset the current established order

of US power projection based on aircraft carriers, intermediate staging bases, forward air bases, ports, and so forth, as well as their supporting missile defenses in the early twenty-first century. Like bows, guided missiles have been around for a long time (since World War II), but they now appear to have evolved into a game changer.[12]

Why Have Adversaries Chosen Missiles?

Consider our current enemies' strategic issue: they want freedom of action within their regions to execute their political and military strategic plans. However, they must confront the long-standing US strategy of balance of power enabled by a policy of selective global interference. Since the early days of the Cold War, the United States has built and relied upon global power projection to execute this strategy.[13] It has been the primary player on the world stage for decades, based upon its geographic isolation and power projection established during and after World War II. We must also note that when America has executed power-projection operations, regime change has frequently been the result. So the calculus for our potential adversaries is fairly simple: how do they gain regional freedom of action without risking regional US interference, especially when that could result in regime change?

Of course, the United States has long assumed that its power-projection strategy and enabling capabilities would deter many adversary actions that ran contrary to US interests. This assumption was and is naïve. In actuality, our potential adversaries were forced to develop cost-effective means to provide their desired freedom of action (antiaccess) or, if that failed, to ensure that America could not prevent the attainment of their regional objectives (area denial), all the while preserving their regimes.[14] It was not cost-effective for most of those adversaries to develop an air force that could compete with US Air Force / Navy manned aircraft, but they still had to project power regionally and protect themselves from US intervention. Their answer was to develop and field an ever-increasing number of missiles that could also be used

for delivery of weapons of mass destruction (WMD).[15] In a very general sense, a missile RMA is the ultimate expression of asymmetric warfare because it threatens adversaries at all levels in ways neither easily nor inexpensively countered.[16]

What Characteristics of Adversary Missile Capabilities Enable Them as an RMA?

Our potential enemies have taken a horizontally integrated and holistic (or cross-domain) approach to developing their missile capabilities into an RMA.[17]

Survivability

Extensive denial and deception planning seems a fundamental part of all doctrines of threat missile forces. Underground facilities supporting a "shell game" with high-fidelity dummies and decoys are a part of their solution.[18] Our adversaries have seen the publicly reported difficulty the United States has encountered in finding and killing mobile targets in its recent wars; thus, missile mobility is of key importance. Kosovo, the first Gulf War, and Operation Odyssey Dawn are well-known examples of our trouble with finding targets on the ground.[19] Furthermore, we will likely see a growing proliferation of high-end integrated air defense systems primarily to protect WMDs, C2, and missile-delivery systems. The United States must assume that its foes have a pretty good idea of US signals/imagery/electronic intelligence capabilities that enable time-sensitive targeting and will seek either to deceive or deny us that intelligence. Adversaries are also investing in launcher mobility as another survival capability.[20] Attacking a missile launch point 20 minutes after the launcher has departed is wasted effort.[21]

Responsiveness

Our adversaries are shifting to solid-fuel missile technology because of the responsiveness factor. Missiles that don't have to be fueled prior to

launch can support rapid strikes on targets of opportunity. This capability also makes training much easier and improves survivability insofar as the missile units have smaller footprints, impeding detection by US ISR. Moreover, adversaries are fighting on their own ground and can establish numerous presurveyed launch points located near dispersed hiding sites and prestocked reloading sites.[22]

Accurate Targeting

Without near-real-time precision ISR, no precision attacks can occur. This is true for both the United States and its potential opponents. America has taught the entire world this lesson over the last 10 years. In fact, our enemies have observed that we are so convinced of our ability to conduct precision targeting and attack that we are doing away with area effect weapons in order to meet international treaty obligations. Much of the US ability to carry out precision targeting comes from either space or UAS ISR. Potential adversaries are developing similar capabilities to support the targeting of missiles (e.g., UASs) while scheming to degrade/disrupt/deny America's space-based and aerial ISR of their missile forces. Several of our foes are exploring counterspace options as a means of further disrupting US space-based ISR.[23]

Effectiveness

Adversary missiles are being deployed in numbers and with technical sophistication to defeat likely AMD operations. If these missiles are not perceived as capable of producing the desired effects due to US and allied missile defenses, then all of their efforts are for naught. Hence, we see various adversary capabilities under development to degrade AMD sensors (e.g., advanced low-power jamming); destroy those sensors (e.g., special operations forces, Harpy UASs, electromagnetic pulse, and antiradiation warheads); degrade AMD C2 (e.g., cyber spoofing, data link, and Global Positioning System jammers); saturate AMD (e.g., large missile volley sizes, early-release submunitions, and on-

board countermeasures); and defeat our ballistic missile defense interceptors (e.g., maneuverable reentry vehicles).[24]

Cost Benefits

Missiles are cheaper than the offensive air force they replace.[25] Furthermore, they appear significantly less expensive than the missile defense that must be developed to counter them. This fact is critical if they are to be fielded in sufficient numbers to produce the desired strategic and operational regional effect.[26] One estimate for the cost of old-model SCUD missiles is from less than $1 million to $3 million.[27] Other sources report the cost of the Chinese CSS-6 and CSS-7 at $500,000 and of Chinese air launched cruise missiles at $175,000.[28] US Patriot missiles that currently are intended to counter them are individually much more expensive, and it is likely that more than one Patriot would be fired at each incoming threat missile. Although newer solid-fuel missiles (e.g., Iran's Fateh 110 or Russia's SS-26) are probably more costly, the improved Patriot and naval standard missiles (Aegis) are also significantly more expensive. Further, the more modern threat missiles have much greater effectiveness. Consider the number of missiles a country can purchase against the cost of one modern aircraft. The same is true for aircraft carriers and antiship missiles.[29] If the new USS *Gerald Ford* costs $13 billion and a DF-21D antiship ballistic missile costs $11 million, then the Chinese could build over 1,200 missiles for the cost of every carrier that the United States constructs going into the future.[30] The trend toward warhead upgrades with early-release, terminally guided submunitions and accurate, cheap, long-range rockets and supersonic/hypersonic cruise missiles exacerbates the AMD problem by at least an order of magnitude.

Credibility

Our possible opponents expend significant resources each year on improving the reliability of their missiles, training their crews, and demonstrating their ability to orchestrate increasingly large, complex mis-

sile attacks.[31] We struggle to shoot several missiles per year in testing whereas they fire large salvoes despite the impact on their national treasury and defense budgets. The repeated testing of missiles also has a positive effect on other countries in the region (from the adversary's perspective, of course).[32]

Command and Control

Infrastructures for missile forces are being developed to make them controllable under all circumstances. Because threat missiles are frequently coupled closely to their WMD programs, they fall under the same C2 concepts—much like our widely reported nuclear C2.[33] This means survivable, redundant, isolated C2 with the ability to function in degraded environments. All of our adversaries have studied how the United States took down the Iraqi integrated air defense system and national C2; furthermore, many of them have already been subjected to disruptive cyber attacks in other areas. We must assume they will move to mitigate these cyber threats and adjust their C2 architectures accordingly.

All of the above characteristics have three purposes: (1) to deter the United States from entering the opponent's region during a crisis if it is not already there or to deter America from actions if it is present in the region (i.e., the hostage effect); (2) to prevent US forces (either initial-entry or reinforcing troops) from gaining access to the adversary's region in times of conflict; and (3) if (1) and/or (2) fail, to make it too expensive for America to stay in the fight and prevent regime change. In short, adversaries may in fact not be able to defeat Army brigade combat teams in a fight, but if they prevent them from getting into the region or from having freedom of maneuver there, that fact becomes irrelevant.

If Adversary Missile Forces Are an RMA, What Are the Implications?

Historical examples of attempts to counter RMAs typically suggest several insights. Incremental improvements in the weapon systems that the RMA attacks rarely succeed, and it is frequently prohibitive in terms of cost and operations to improve those systems significantly. For example, throwing more massed knights at a longbow-supported position would have little effect. Putting thicker armor on the French knights was very expensive and relatively easy to counter (to say nothing of the effect of additional weight on the mobility and stamina of the horses). The costly proposition of thickening the stone curtain walls of castles would not have much effect on artillery, which could easily adjust. A key question becomes, can the United States afford to field sufficient missile defense forces and equip them with adequate missiles to counter the threat's missile forces in the future? If the answer is no and if we intend to preserve our global power projection, then we must look beyond our current capabilities. Adversary RMAs generally require a cost-effective RMA to counter them. More of the same is unlikely to succeed. Historically, it appears that a game changer can be effectively countered only with a game changer, and it takes time to develop and converge the technologies necessary to do so.

RMAs seem to be developed and employed by countries as a reaction to their perceived weaknesses (e.g., their inability to counter US power projection). Global powers have less incentive to develop RMAs because of their investments in the things that allowed them to become global powers. In fact, we frequently find considerable bureaucratic resistance to doing so.[34] The United States had no need to cultivate missiles as an RMA since it had developed and deployed forward-based air forces and carrier battle groups for power projection. In fact, missiles were the adversarial reaction to those US power-projection capabilities. Moreover, the Intermediate-Range Nuclear Forces Treaty limits the options that America can deploy.[35]

The country that develops and fields an RMA has no incentive to stop those processes until the RMA loses its effectiveness. We should expect to see more and more modernized missiles until our AMD proves that these weapons can no longer assure our adversary's regional dominance and regime survival.

RMAs by themselves do not guarantee ultimate victory in a conflict. Longbows were devastating to the French nobility, but France still won the Hundred Years' War.[36] RMAs appear to have their greatest impact before the other side can adjust, especially if they are used in conjunction with strategic or operational surprise. At Crécy, Poitiers, and Agincourt, the longbow archers proved dominant; later at Patay, they were slaughtered. German panzer divisions were arguably an RMA in 1939 when they overran Poland and subsequently France in 1940.[37] Yet, they were stopped cold by the Soviets at Kursk in 1943. The US RMA of global power projection based upon forward air bases and carriers has yet to engage an adversary with a large, modern, well-trained missile force. Saddam Hussein's missile forces of 1991 have more in common with the German V-1/V-2 force of 1944 than the Chinese, Russian, North Korean, or Iranian missile forces of 2014.

RMAs appear to function best when they are part of a holistic and integrated "system of systems." Longbows were supported by dismounted knights and men at arms and defended by field fortifications (e.g., sharpened stakes). Artillery battering of a castle could be subjected to surprise sorties, and the structure was defended by field fortifications with infantry and backed by cavalry reserves. German panzer divisions employed innovative tactics supported by radios and close integration with motorized infantry, artillery, antitank forces, close air support, and so forth. Missiles best become a game changer when supported by full-spectrum ISR for rapid targeting, high-fidelity decoys and dummies, isolated and redundant communication networks, modern air defenses, stealthy UASs, advanced electronic warfare and cyber capabilities, and robust, redundant underground facilities.

RMAs frequently produced significant disruptive effects that went beyond those of the military, including those of a second- and third-order social, political, and economic nature. Consider the impact of the longbow and the demise of castles on feudal Europe. The RMA caused some of these disruptive effects; others resulted from capabilities developed to counter the RMA. We know intuitively that any curtailment of the United States' ability to conduct global power projection could have significant, long-term social, political, and economic repercussions worldwide. At the very least, it would give rise to regional powers.

Analysis

All of that said, have threat missile forces evolved into an RMA? It certainly appears so even though we typically do not know or understand an RMA as such until after battlefield disaster(s). Certainly the last four years of US military service war games have shown strong indications that missiles not only have evolved into a game changer but also will present formidable challenges at the strategic, operational, and tactical levels.[38] The very existence of a game-changing RMA missile threat has altered many a US war-game-planning mission analysis and/or "decision calculus" in reference to such factors as whether to operate the US desired forces (who), in a contested area (where), and at a time during which their operations are most necessary (when). In short, war-game results indicate an increased trend toward threat missile "risk avoidance" with that weapon's ranges defining the boundary of some of our operations. It seems certain that many of our potential adversaries believe their missiles are game changers based on the number of resources dedicated to further development.

If missiles have transitioned into an RMA in the last 10 years or so, then it would follow that we ignore that shift at considerable peril. Whereas it is true that the military services are starting to come to grips conceptually with the adverse potential of threat missile forces, military acquisition programs appear to have yet to catch up with this thinking. Much of this is probably due to the same historical bureau-

cratic resistance that has always hindered predisaster reaction to potential RMAs. We acknowledge that reacting to a *potential* RMA is risky because it could waste valuable resources. Historically, it is more common to wait until the RMA has demonstrated major, adverse effects. Unfortunately, that course can prove rather hard on those on the receiving end (e.g., our forward-deployed forces).

If missiles are an RMA, it follows that another RMA is necessary to counter them effectively and efficiently. Incremental improvements to our missile defense capabilities appear unlikely to succeed in the midterm to long term. This is not to suggest that we should not buy more and better missiles, improve our current sensors, make our C2 systems more capable, and so forth. It does suggest, however, that such improvements likely will not provide any lasting benefit since bolstering their effectiveness against missile threats will be increasingly expensive, and the gap between missiles and missile defenses shown in the figure above will continue to widen until the development and fielding of a counter RMA.

We must consider other implications if missiles are indeed an RMA. Although the United States should assume that it would eventually adjust to their use during a conflict, their first use may prove quite damaging. Prudence suggests that America pay far more attention to the actions that could keep its high-value assets from being targeted or, if targeted, much more survivable during those initial missile attacks (i.e., passive defense). Hardening of critical forward-deployed assets, robust dispersal plans, and investments in decoys/dummies should play an expanded role in US defense planning. If one of our assets is too valuable to lose, then we should move it out of likely missile range.

In the event that missiles become an RMA for our adversary, it follows that they will become much more sensitive to crisis deployments of substantial AMD forces into their region. Instead of our "defensive forces" acting as a deterrent to threat offensive actions, they may, in fact, trigger those attacks.[39]

If missiles are an RMA and their initial use is effective against our carriers and forward airfields, then the adversary has put his otherwise inferior air force into a position of potential air superiority. This possibility has huge implications for our regional ground forces, which have not been subjected to serious air attacks since World War II. In the aftermath of the Gulf War, the US Army inactivated its division and corps short-range air defenses based upon the promise of future air superiority.[40] If this promise is now a false one, the Army could find itself in serious trouble. This situation is further compounded by the rapid growth of adversaries' UAS inventories, shown in war games to represent a serious threat.

The possibility of missiles becoming an RMA calls for serious efforts to find a counter RMA. We are not certain what this should be, but some of its characteristics are fairly obvious. First and perhaps foremost, we must be able to afford the AMD solution(s). Ideally, the cost of destroying an incoming missile is far less than that of the adversary missile, and doing so must be within the fiscal means of our friends and allies. Second, the AMD solution(s) must be at least as mobile and deployable as the assets it must protect. Third, an American AMD RMA would necessarily be part of a system of systems. For example, a key aspect of the AMD solution(s) must be the ability to obtain useful target information from a wide variety of sources so that our sensors are not a "single point of failure" for our AMDs. It makes little sense to develop and field an AMD capable of a high volume of fire unless our sensors and fire control have kept pace. Fourth (and preferably), our AMD supporting sensors would be effective, passive ones so that adversaries have no warning of our pending engagement of their missiles or knowledge of where the engagement comes from. Active sensors like radar reveal location as soon as they are turned on. Fifth, an AMD RMA would also have to possess a high degree of horizontally integrated automation across *all* services/countries to effectively counter large and sophisticated missile attacks supported by electronic warfare, UASs, indirect-fire weapons, cyber, aircraft, and the like.[41] It is very unlikely that a single-service solution would suffice. Future AMD acquisi-

tions must make this integration capability a nonnegotiable prerequisite if we wish to maximize joint synergy; thus, current doctrinal revisions and training must make complete integration a priority. We can no longer afford service-centric stovepipe solutions, either operationally or fiscally.[42]

Conclusions

Of course, we cannot just throw up our hands and wait until someone develops a counter RMA. We can do much to maximize our current AMD capabilities. Remember again that the French eventually won the Hundred Years' War, but they did stop charging fixed defenses backed by massed longbows. We may have to buy more missile defense assets as well as continue to upgrade those we currently possess despite their growing expense and relative potential for ineffectiveness. We may also have to consider politically sensitive decisions. For example, if we acknowledge that missiles are an RMA and concede that we cannot defend our most forward air bases or carriers operating close to shore, then perhaps we should move them and their supporting missile defense forces out of the reach of short-range missiles (easier said than done because of the global strategic and regional political effects).

The adversary's massed, structured attacks that combine different types of missiles and enablers are difficult to counter. A key to survival would appear to employ all possible capabilities to desynchronize those strikes.[43] To enable this response, we have noticed in war games a growing requirement to develop and field longer-range and faster standoff weapons that go beyond dependence on manned aircraft. For instance, carrier aviation has difficulty operating against targets in the littorals when the unrefueled range of an F-35 is 690 miles but the range of a DF-21D antiship missile that could attack an aircraft carrier is 1,087 miles.[44] Killing the missile launchers after they launch but before they can move would certainly be a big help in reducing threats over time.[45] Either kinetically or nonkinetically attacking the missile

attack C2 link, space-based ISR, logistics, and enablers is obviously highly desirable if we wish to disrupt missile attacks. We may still put both our high-value assets and our AMD forces within the missile RMA's "sweet spot" for political and diplomatic purposes (deterrence and regional engagement), but we must accept the fact that this may not constitute an effective defensive posture and that many of those forces could be lost in the early stages of a conflict.

Moreover, other actions could be taken. Depending upon the operation, ground forces should assume that they will be attacked by missiles (and aircraft) and reenergize the use of extensive planning for and training in passive defense—*reenergize* because in many cases, this involves relearning the lessons of the Cold War in Europe where we assumed serious threats to our air superiority. We should take another look at our AMD organizational structures because currently the range of threat missiles can exceed the size of our organizational boundaries. Similarly, the Missile Defense Agency now focuses upon ballistic missile defense in accordance with its charter, yet adversaries probably will combine ballistic missiles with cruise missiles, UASs, and aircraft in a single strike. This suggests that perhaps the agency's responsibilities should be expanded to avoid creating unnecessary gaps in our defenses.

We may need to consider an additional strategic factor if missiles have in fact become an RMA. In the past, the initial massive introduction of an RMA to a battlefield has caused significant psychological dislocations of leadership at the highest levels of the affected country—witness the reaction of Allied governments and militaries to the German blitzkrieg of 1939–40. The pervasiveness of the Internet and social media could significantly speed and intensify RMA-induced psychological shocks to the affected governments and populations, which, in turn, could cause "analysis paralysis" that would give additional advantage to the adversary. This phenomenon has in fact been observed in several recent service-level war games. These types of psychological shocks should be incorporated into high-level strategic war games to

facilitate understanding among senior decision makers as a step toward mitigation of adverse political effects.

One last point to consider regarding missiles as an RMA concerns the impact of their first use on the current world order. For example, if the United States suddenly finds its ability to conduct cost-effective global power projection curtailed, we could anticipate a dramatic political and diplomatic shift in favor of regional centers of power. This development, in turn, would likely create difficulties for our global system of alliances. If America cannot protect its regional friends and allies, then they may be reluctant to support US positions.[46] They may also be more interested in developing classes of strategic weapons for their self-protection, an action that could run contrary to US interests. Global stability would likely suffer with corresponding economic shocks.

The opposite is true if adversary missiles are not an RMA. In this case, apparent insights from the recent service war games are either overstated or invalid. Our incremental missile defense improvements will therefore prove sufficient, and missiles will pose no threat to our global projection of power. The first attacks of the next conflict will be serious but not devastating. Further, we can avoid expensive research and development efforts for a counter RMD.

The evidence, however, indicates that our adversaries' missile capabilities are, in fact, an RMA. The United States and its allies can either choose to overcome internal bureaucratic resistance and address this issue now or wait until future battlefield disasters create the political impetus for change. ✪

Notes

1. By relative parity, the author means that missile defenses had a rough balance versus threat missiles. The exact results of the Patriot engagements have been widely debated, but we generally agree that this missile negated some of the threats, that those engagements reassured coalition allies, and that the Patriot probably kept Israel out of the first Gulf War.

This "relative parity" statement is more than simply a function of offensive missile versus defensive missile. For example, threat missile attack doctrine called for launching inaccurate single missiles at relatively predictable times into Patriot-defended areas with minimal ability to conduct a battle damage assessment, except for that announced on public news broadcasts. Threat technical capabilities, total numbers of available missiles, and missile attack doctrine have evolved significantly since 1991. The consideration of missile defenses against strategic threats to the United States (e.g., intercontinental ballistic missiles) lies outside the scope of this article.

2. The SCUD, in turn, was based upon the German V-2 missiles of World War II. SCUDs and their variants have been widely proliferated and exist worldwide in large numbers.

3. Insights used in this paper were based upon US Army Space and Missile Defense Command / Future Warfare Center / Battle Lab / Concepts and Wargames Division consolidated observations from Unified Engagement 08, Unified Quest 08, Future Game 09, Unified Quest 09, Unified Quest 10, Unified Quest 12 PLANEX, Unified Quest 12 Capstone, Unified Engagement 10, Nimble Titan 10, Nimble Titan 12, Expeditionary Warrior 12, Unified Engagement 12, Schriever Wargame 12, Future Game 13, Unified Quest 13 Capstone, Army Joint Forcible Entry Experiment, Army Combined Arms Maneuver–Wide Area Security Experiment, and Army Gain and Maintain Operational Access Experiment–Army Fires Experiment Tactical to Strategic.

4. The term *threat missile forces* refers to ballistic missiles, cruise missiles, and long-range rockets (many of which have characteristics similar to those of ballistic missiles).

5. The term *revolution in military affairs* (*RMA*), popular in the 1990s, was used to describe a revolutionary change in warfare. Although *RMA* has fallen out of use somewhat in the last decade, I am using the term because it seems to offer a common frame of reference to many readers.

6. Andrew F. Krepinevich, "Cavalry to Computer: The Pattern of Military Revolutions," *National Interest*, no. 37 (Fall 1994): 30.

7. Richard O. Hundley, *Past Revolutions, Future Transformations: What Can the History of Revolutions in Military Affairs Tell Us about Transforming the U.S. Military?*, MR-1029-DARPA (Santa Monica, CA: RAND, 1999), 9.

8. Fortifications eventually underwent a radical redesign so that the defense could reset the balance (and to a large measure regain dominance until the appearance of tanks in World War I).

9. Gunpowder artillery forces became more common during the Hundred Years' War but, admittedly, remained relatively weak until after that war.

10. This included the dismounting of knights and men at arms and equipping them with pole arms to prevent the adversary's surviving mounted knights from breaking through. After the introduction of powered projectiles (crossbows/longbows and cannon), castles and armored cavalry did not go away. They were still important, but their role shifted. Castles became magazines, and one had to keep the adversary at arm's length from the castles/magazines or suffer siege. Cavalry became lighter and key to ISR collection and exploitation. For a discussion on innovative technology versus cost-benefits, see T. X. Hammes's excellent article "The Future of Warfare: Small, Many, Smart vs. Few & Exquisite?," War on the Rocks, 16 July 2014, http://warontherocks.com/2014/07/the-future-of-warfare-small-many-smart-vs-few-exquisite/.

11. Note that the combat effectiveness of massed longbows had been previously demonstrated in England starting in the late thirteenth century. One finds (1) a tendency not to give the threat (the English) credit for studying a great power (France) and for drawing lessons that the English then applied to meet their operational and strategic goals, and (2) a failure to look at how technologies can be combined and applied to solve military problems—that is, a failure of operational imagination combined with bureaucratic resistance (i.e., the nobility). This point is important since historically it appears that these same factors have prevented most adaptations to an RMA prior to a battlefield disaster—neglecting to understand the nature of the threat and how it has evolved as well as failing to adapt in meaningful ways because of unwillingness to discard what has worked in the past.

12. Andrew F. Krepinevich Jr., "Strategy in a Time of Austerity: Why the Pentagon Should Focus on Assuring Access," *Foreign Affairs* 91, no. 6 (November/December 2012): 58–69.

13. Jan van Tol et al., *AirSea Battle: A Point-of-Departure Operational Concept* (Washington, DC: Center for Strategic and Budgetary Assessments, 2010), 2.

14. *Antiaccess* refers to "those capabilities, usually long-range, designed to prevent an advancing enemy from entering an operational area." Department of Defense, *Joint Operational Access Concept (JOAC)*, version 1.0 (Washington, DC: Department of Defense, 17 January 2012), 40, http://www.defense.gov/pubs/pdfs/joac_jan%202012_signed.pdf. *Area denial* refers to "those capabilities, usually of shorter range, designed not to keep the enemy out but to limit his freedom of action within the operational area." Ibid.

15. It is certainly true that our potential adversaries have many other antiacess/area-denial (A2AD) capabilities (e.g., mines, UASs, submarines, and large militias), but their missile forces are the core of their A2AD strategies—witness the number of resources they are dedicating to them. The adversary's coupling of WMD and missile-delivery capabilities is wonderfully described in Paul Bracken's book *Fire in the East: The Rise of Asian Military Power and the Second Nuclear Age* (New York: HarperCollins, 1999), which notes that the existence of threat WMDs makes all threat area-denial actions more effective even if these weapons are never used. If WMD capabilities keep regime change from occurring, then time is on the side of that adversary and costs imposed by his area-denial efforts will continue to escalate. The adversary's WMD capabilities place operational restraints upon the United States by creating potential "red lines." The enemy may be far less constrained, as appears to be the case in recent service Title 10 war games.

16. See, for example, Kamlesh K. Agnihotri, "China's 'Anti-ship Ballistic Missile' Based Anti-access Concept: Implications of a Southward Re-orientation," *Journal of Defence Studies* 7, issue 1 (January 2013): 19–20; Justin Kelly, "Fighting China: Airsea Battle and Australia," *Australian Army Journal* 9, no. 3 (Summer 2012): 157–58; and Daniel Hartnett, *Air-Sea Battle, China, and the U.S. Rebalance to Asia* (Washington, DC: Center for National Policy, November 2013), 3.

17. In addition to other references noted in this section, the author used his personal observations from the following: Unified Engagement 08, Unified Quest 08, Future Game 09, Unified Quest 09, Unified Quest 10, Unified Quest 12 PLANEX, Unified Quest 12 Capstone, Unified Quest 13 Deep Futures, Unified Engagement 10, Nimble Titan 10, Schriever Wargame 12, Unified Engagement 12, Nimble Titan 12, Future Game 13, Army Joint Forcible Entry Experiment, Army Combined Arms Maneuver–Wide Area Security Experiment, Army Gain and Maintain Operational Access Experiment–Army Fires Experiment Tactical to Strategic, and Army SIMEX 13.

18. See, for example, Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China, 2013* (Washington, DC: Office of the Secretary of Defense, 2013), 31.

19. For example, from Kosovo "it is also striking that NATO could not find and destroy most systems that were mobile and which did not actively use their radars and that the SA-6—the only quasi-modern and effective system in Serbian inventory—largely survived the war." Anthony H. Cordesman, *The Lessons and Non-Lessons of the Air and Missile Campaign in Kosovo* (Washington, DC: Center for Strategic and International Studies, August 2000), 187, http://csis.org/files/media/csis/pubs/kosovolessons-full.pdf. An SA-6 has mobility comparable to that of a modern missile transporter erector launcher. For two videos of abandoned SCUDs discovered after Odyssey Dawn that were not apparently targeted, see "SCUD-B Missiles Found in Libya," Military.com, 4 November 2011, http://www.economat.armees.com/video/guided-missiles/multipurpose-missiles/scud-b-missiles-found-in-libya/1258775990001/; and "Rebels Find Scud Missile in Sirte," Military.com, 17 October 2011, http://www.economat.armees.com/video/guided-missiles/multipurpose-missiles/rebels-find-scud-missile-in-sirte/1222311595001/.

20. Kenneth Allen and Maryanne Kivlehan-Wise, "Implementing PLA Second Artillery Doctrinal Reforms," in *China's Revolution in Doctrinal Affairs: Emerging Trends in the Operational Arts of the Chinese People's Liberation Army*, ed. James C. Mulvenon and David Finkelstein (Alexandria, VA: Center for Naval Analysis, 2005), 159–60, http://www.defensegroupinc.com/cira/pdf/doctrinebook_ch6.pdf.

21. Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report* (Washington, DC: Office of the Secretary of the Air Force, 1993), 83–90.

22. Matthew Fargo, "Ballistic Missile Technology 101—Rocket Fuel" (Washington, DC: Center for Strategic and International Studies, 8 August 2012), https://csis.org/blog/ballistic-missile-technology-101-rocket-fuel. See also Sean O'Connor, "PLA Second Artillery Corps," Technical Report APA-TR-2009-1204, Air Power Australia, December 2009, http://www.ausairpower.net/APA-PLA-Second-Artillery-Corps.html.

23. For an excellent description of how advanced ISR capabilities enable missile attacks, see Ian Easton, *China's Evolving Reconnaissance-Strike Capabilities: Implications for the U.S.-Japan Alliance* (Tokyo: Japan Institute of International Affairs, February 2014), http://www.project2049.net/documents/Chinas_Evolving_Reconnaissance_Strike_Capabilities_Easton.pdf.

24. Lee Fuell, *Presentation to the U.S.-China Economic and Security Review Commission: Broad Trends in Chinese Air Force and Missile Modernization* (Washington, DC: Department of the Air Force, 30 January 2014), 7, http://www.uscc.gov/sites/default/files/Lee%20Fuell_Testimony1.30.14.pdf; and Office of the Secretary of Defense, *Annual Report to Congress*, 5–6, 31–33.

25. Current estimates for the flyaway cost of a single F-35 range from $600 million to more than $750 million.

26. "However, DOD is still investing heavily in programs that may be vulnerable to A2/AD strategies." LTG David W. Barno, USA, Retired, et al., *Sustainable Pre-eminence: Reforming the U.S. Military at a Time of Strategic Change*, Responsible Defense Series (Washington, DC: Center for a New American Society, May 2012), 19, http://www.cnas.org/files/documents/publications/CNAS_SustainablePreeminence_BarnoBensahelIrvineSharp_0.pdf.

27. Squadron Leader R. S. Clarke, *The Regional Emergence of Strategic Missiles: A Force of Rooks for a Black King*, Air Power Studies Centre Working Paper no. 55 (Commonwealth of Australia: Air Power Studies Centre, 1997), http://fas.org/irp/threat/missile/paper55.htm.

28. Yuen Lin, "Probing the Capability of Taiwan's Antiballistic Missiles," *Kuang Chiao Ching*, 16 August 1998, 54–61.

29. Toshi Yoshihara and James R. Holmes, *Red Star over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy* (Annapolis, MD: Naval Institute Press, 2010), 102.

30. CAPT Henry J. Hendrix, USN, *At What Cost a Carrier?*, Disruptive Defense Papers (Washington, DC: Center for a New American Society, March 2013), 7, http://www.cnas.org/files/documents/publications/CNAS%20Carrier_Hendrix_FINAL.pdf.

31. Allen and Kivlehan-Wise, "Implementing PLA Second Artillery Doctrinal Reforms," 196–98.

32. The Missile Defense Agency has conducted 80 hit-to-kill intercept tests since 2001, including Aegis, ground-based midcourse defense, Terminal High Altitude Area Defense, and Patriot Advanced Capability–3—an average of roughly six per year. "Ballistic Missile Defense Intercept Flight Test Record," fact sheet, Missile Defense Agency, 22 June 2014, http://www.mda.mil/global/documents/pdf/testrecord.pdf. On 18 April 2014, North Korea test-fired 30 short-range missiles in a little over two hours. Bonnie Malkin, "North Korea Test Fires 30 Missiles into the Sea," *Telegraph*, 22 March 2014, http://www.telegraph.co.uk/news/worldnews/asia/northkorea/10716033/North-Korea-test-fires-30-missiles-into-the-sea.html. On 9 July 2008, Iran launched nine missiles in a single morning. *Wikipedia: The Free Encyclopedia*, s.v. "Great Prophet III," http://en.wikipedia.org/wiki/Great_Prophet_III. "The three day exercise, called Great Prophet 7, involves firing 'tens of different missiles' at bases modeled after United States military installations in countries like Afghanistan and Saudi Arabia, Iran's Revolutionary Guards military force told IRNA, AFP reports." "Iran Starts War Games after Being Hit with Sanctions over Its Nuclear Program," *Fox News*, 2 July 2012, http://www.foxnews.com/world/2012/07/02/iran-starts-war-games-after-being-hit-with-sanctions-over-its-nuclear-program/. See also Amaani Lyle, "Official Discusses Chinese Air Force, Missile Trends," American Forces Press Service, 30 January 2014, http://www.defense.gov/news/newsarticle.aspx?id=121582.

33. See Bracken, *Fire in the East*.

34. Note the difficulty that Brig Gen William "Billy" Mitchell had in convincing senior Navy personnel of the potential of aircraft in attacking and sinking ships. He is said to have asserted that 1,000 bombers could be built for the cost of one battleship. Of course the Japanese at Pearl Harbor drove the lesson home. Again note the cost differential between a modern fourth- or fifth-generation strike fighter and adversary missiles.

35. Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles, signed at Washington, 8 December 1987, Articles IV and V, http://www.nti.org/media/pdfs/aptinf.pdf?_=1316643952&_=1316643952.

36. The English lost all of their continental territory except the Pas-de-Calais.

37. The French and British had better and more tanks than the Germans in 1940, but they were not part of an integrated system of systems with other battlefield enablers like the German tanks; therefore, they were defeated in detail.

38. Each of the four US military services conducts an annual war game that looks out at least 10 years. These are usually referred to as "Title 10" war games, which typically focus

on potential future operational scenarios validated by the Defense Intelligence Agency. Each war game is supported by a "thinking" Red Team that operates within the doctrine and projected capabilities of the "threat" country portrayed in the war game.

39. This "triggering" phenomenon was observed in several recent war games. As soon as the adversary detected the initial arrival of US AMD forces in his theater during a crisis, he attacked with overwhelming missile strikes. The enemy's rationale was that he should use his missile capabilities while they are at their most effective.

40. "The Army is now engaged in a large scale restructuring of its forces, which includes reducing the numbers of SHORAD [short-range air defense] and FA [field artillery] units and changing their composition while increasing the number of frontline combat units. . . . It would eliminate all SHORAD units in the Army and restructure FA units into a smaller number of larger battalions (eliminating numerous brigade, battalion, and company headquarters) while doing away with corps-level cannon artillery battalions. Finally, it would eliminate some support units associated with the discontinued SHORAD and FA units. . . . The rationale for doing away with SHORAD units is that U.S. tactical aircraft have rapidly achieved air superiority (and sometimes full air supremacy) in every conflict they have engaged in since World War II and that U.S. SHORAD units have not destroyed a hostile aircraft since 1950." Congressional Budget Office, *Budget Options* (Washington, DC: Congress of the United States, Congressional Budget Office, February 2005), 12, https://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/60xx/doc6075/02-15-budgetoptions.pdf. The Army plan was later modified to retain two SHORAD battalions (5-5 Air Defense Artillery and 2-44 Air Defense Artillery) to perform counter-rocket, artillery, and mortar (C-RAM) defense of base camps in Iraq and Afghanistan.

41. By "horizontally integrated automation," I mean that, in real time, we will need to automatically share data with all other battlefield C2 systems, rapidly process all received data into useful information, and prioritize efforts and decisions based upon that information.

42. By "service-centric stovepipe solutions," the author means solutions that are neither integrated nor easily integratable into a holistic joint and coalition AMD architecture.

43. The "desynchronization" of an adversary's ability to orchestrate massive sustained attacks was also at the heart of the Air Land Battle Concept of the 1980s. Van Tol et al., *AirSea Battle*, 5–7.

44. Hendrix, *At What Cost a Carrier?*, 8. Further, we would not likely fly air-to-air refueling tankers within the range of an adversary's modern air defense systems. For example, the Russian S-400 has an engagement range of 250 miles, and the Russian S-500 has a planned range of 373 miles. Van Tol et al., *AirSea Battle*, 25.

45. Attacking missile launchers on an adversary's mainland would be a critical strategic decision because it could give him justification for striking US territory. Moreover, a decision to attack an opponent preemptively, before he could initiate hostilities, has significant international implications, especially if coalition members are involved. In the absence of a political decision to permit preemptive attack, the ability to withstand the adversary's initial attacks is paramount.

46. Van Tol et al., *AirSea Battle*, 13–14.

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Leadership Development

A Senior Leader Case Study

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Brig Gen Thomas Sharpy, former director of the Air Force General Officer Management Office, identified the need for an internal assessment of the US Air Force's leadership development process, also known as the developmental team (DT), to determine its effectiveness in creating excellent leaders to meet current and future needs. DTs are part of the Air Force's overarching force-development

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program, a requirement-driven initiative to train and educate the service's active duty, reserve, and civilian personnel through a purposeful, career-long process of personal and professional development.[1] Air Force leaders use force development to engender organizational and occupational competencies through education, skills training, and practical experience. According to the service, DTs are its conduit that aligns force-development systems with frameworks and organization policy; moreover, the service's force developers use them to generate career paths for personnel.[2] DT membership includes a general officer as the chair, a career field manager, an assignments team representative, and other senior officer (or civilian equivalent) stakeholders from the Air Staff or major command headquarters.

The 2011 DT survey findings (table 1) indicate that many field grade officers do not understand the value of the DT program.[3] Since previous studies were downward focused, the present study sought to understand how senior leaders believe that the Air Force's DTs guide the development of officers to meet strategic objectives. This exploration involved a review of literature as well as online questionnaires completed by members of the DTs. The *big picture* provided by the study might enable Air Force leaders to make adjustments to the program where and when necessary to produce more effective officers and, ultimately, to create a more competent and productive military force. This article explores and addresses areas of potential improvement for an enhanced Air Force DT process that will be better postured to groom senior officers to meet or exceed the DT program's objectives.

Table 1. Low-level agreement rates among field grade officers regarding Air Force developmental teams (2011)

Agree	*Condition*
25%	Strongly agreed or agreed that their DT helps them plan their career path
39%	Strongly agreed or agreed that they know when their DT meets
27%	Strongly agreed or agreed that they are aware of the personnel that comprise their DT
29%	Strongly agreed or agreed that they have adequate opportunity to present information to their DT
12%	Strongly agreed or agreed that their DT communicates directly with them
19%	Strongly agreed or agreed that DT vectors help them achieve short-term career-development goals

Source: Lt Col Paul Valenzuela, analysis briefing presented to the Air Force Deputy Chief of Staff for Manpower and Personnel, subject: 2011 Development Team Officer Experience and Satisfaction Survey, 26 April 2012.

Graduates of ineffective or inadequate leadership development programs adversely affect many organizations and are often accompanied by greater operating costs.[4] Effective leaders are typically a key foundation for organizational success and growth, making the need for mature leadership development programs a problem that both private and public sectors must address aggressively.[5] A major finding from a US Army survey indicated that 39 percent of leaders considered *developing others* the lowest-rated core competency.[6] Between 2007 and 2011, the Air Force conducted baseline and follow-up studies on the DTs. The authors of these studies examined service members' understanding of the program, not its ability to develop leaders who meet strategic objectives. The specific problem is a lack of analysis designed to determine whether or not the DTs meet the service's current and future leadership needs.

The authors' qualitative case study explored the influence of the DTs' processes on Air Force field grade officers worldwide to determine

the efficacy of those processes for identifying, selecting, and/or developing leaders who meet the service's requirements. The Air Force defines the DT process as the conduit among its policy, force-development systems, and organizational frameworks used to generate career paths for personnel.[7] DT representatives in the form of general officers or their delegates completed 14 questionnaires to contribute feedback to the study, whose findings might allow the application of current business theories and practices, as they pertain to leadership development, to the Air Force. An improved leadership development program might help the US military protect the American people and maintain *regional stability*.[8] Consequently, the study posed the following central research question: *How effective are the Air Force's DTs at developing leaders to meet current and future needs?* The next section explores that query.

Research Framework and Applications to Professional Practice

The top 5 percent of companies with effective leadership practices dedicate twice as much effort as other businesses to leadership development, a clear indication that the latter is a factor in organizational success.[9] The current study of the effectiveness of Air Force DTs examined the processes of a leadership development program within the service and led to a transferable business model of leadership development. This model could be utilized by leaders of private or public organizations to conduct self-assessments of their respective leadership development programs (fig. 1 and table 2).

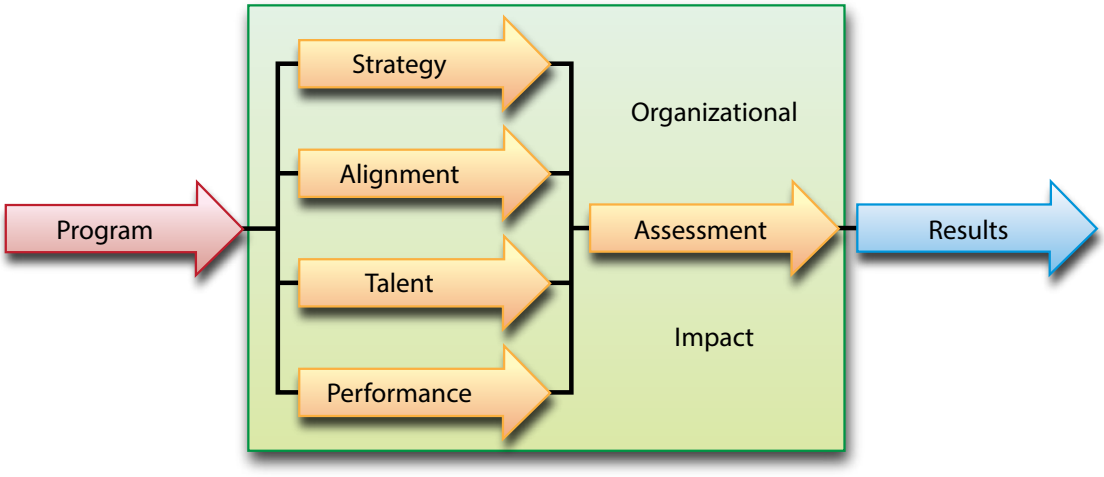

Figure 1. Leader-Input Framework for Evaluation (LIFE)

Table 2. Investigative questions to support the LIFE model

Element	*Investigative Question*
Strategy	How does (development program) posture (or fail to posture) leaders to meet organizational objectives?
Objective Alignment	How do the objectives of (development program) align (or fail to align) with the organization's strategic objectives?
Talent Management	How does (development program) adequately posture (or fail to posture) officer talent capable of filling talent gaps within the organization?
Performance Measurement	How does (development program) measure (or fail to measure) leaders' past performance when determining internal moves, developmental education, and leadership positions?
Assessment	How effective (or ineffective) is (development program) at assessing the results of its graduates to ensure they meet organizational objectives?
Impact on Environment	How does the (development program) affect (or not affect) the overall organizational environment?

The LIFE model in figure 1 stems from conceptualizing and integrating elements of leadership development in the work of Stephen Cohen, Lisa Gabel, Kate Harker, and Ethan Sanders, as well as Air Force elements of organizational development.[10] Combining these elements with the descriptions of each theme (table 2) allows program developers, assessors, and executives to easily understand and adapt the model. Further, it can contribute to business practice by giving leaders of public and private organizations a framework for conducting a self-assessment of their leadership development program. The LIFE model could help them determine if their leadership development program (a) is aligned with the organization's strategy, (b) develops leaders who become transferrable across the organization as they become more senior, (c) adequately measures and assesses performance of students and graduates, and (d) does not harm the organization. Such a tool offers an inexpensive alternative to hiring consultants, especially during a period when rising fees curtail the use of auditors.[11]

Senior Leader Insight into the Developmental Team Process

The authors employed a qualitative case study approach to investigate the effectiveness of DT processes by asking members of the teams to assess their own program, comparing it with the framework used to establish the structure of the questionnaire. Of the 20 DTs contacted, 14 DT representatives provided feedback concerning their respective team (fig. 2). The 47 percent response rate more than quadrupled the expected 10.5 percent average for questionnaires.[12] The unusually high response rate, coupled with the rich detail provided by the respondents, yielded a large amount of qualitative data for analysis.

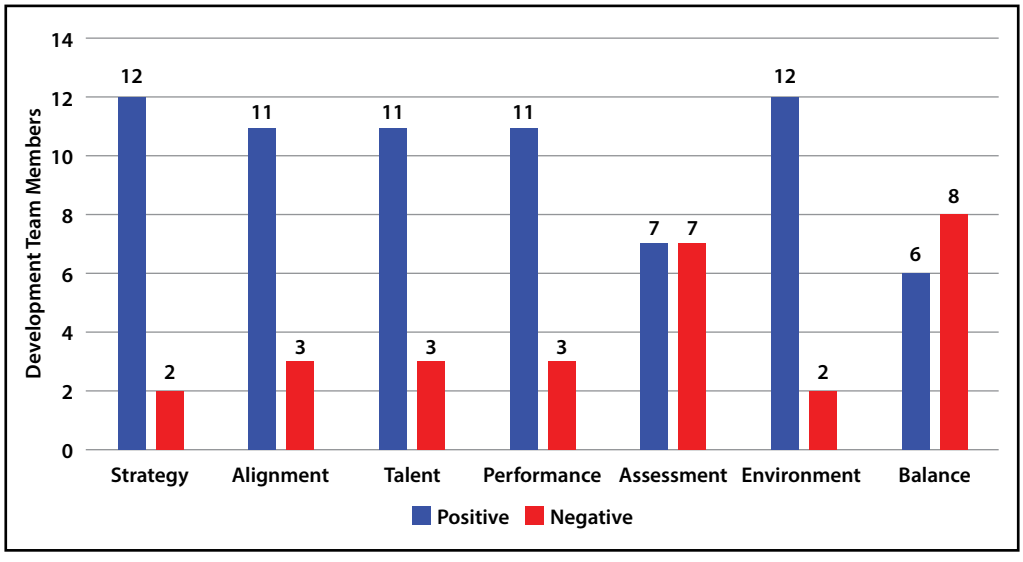

Figure 2. Frequencies of positive and negative responses for each theme

Theme One: Strategy

The study found a strong consensus among participants that the DTs developed leaders to meet the Air Force's current and future needs. The most frequently cited conduit for strategic development, *assignment selection*, was mentioned by all participants, followed by *developmental education*. Three of the participants also mentioned the use of *command selection* as a means of developing leaders to meet the service's strategic requirements. Eighty-six percent of the participants, as experts in the developmental process, responded that their vectors produce well-rounded officers who mature into leaders capable of meeting military and national strategic demands. One of the individuals specifically described *how* those vectors do/do not meet strategic objectives through deliberate placement; however, the respondent felt that the DTs were not vectoring officers to the most critical places to align with national strategic requirements. Note the following specific comments of the participants:

- "[The DT postures leaders to meet the Air Force's strategic objectives] through vectoring and development, school selection, and command selection."
- "Based on guidance received, the DT adjusts vectoring to meet overall strategic needs."
- "Vectors are designed to mature individuals to be future Air Force leaders . . . [instead of] experts in a given career field."
- "I don't believe the DT's are very good at reacting to national strategic objectives. The department recently determined that cyber is a priority in the national security strategy, yet the USAF is staffing US Cyber Command below requirements."

Theme Two: Objective Alignment

The study elicited mixed responses on how DT objectives aligned with Air Force objectives, but all participants agreed that they were nevertheless aligned. In 79 percent of their remarks, respondents felt that the objectives of their specific DT aligned with their career-field objectives first and, in doing so, automatically somehow aligned with bigger Air Force objectives. Participant no. 8 was very clear on how a career-field-specific focus meets such objectives, but no. 10 expressed grave concern about the lack of standardization among different career fields. The practice of sending officers to multiple commands in some career fields as opposed to just one command was a major concern because of the imbalance it creates in the officers' records as they compete for promotion.

- "The DT objectives align with the career field first and the greater USAF strategic objectives second."
- "I feel the DTs meet the [big Air Force] intent. Their requirements flow down as readiness taskings or as the chief's priorities, and we ensure we meet/fill those requirements."

- "DTs are designed to maximize capabilities of all Airmen so the service can provide air, space, and cyberspace power to support US national security. This is right out of the force development instruction 36-2640 [Air Force Instruction 36-2640, *Executing Total Force Development*, 16 December 2008]. I believe our DT is pretty effective at developing officers that have the breadth and depth to maximize their capability as senior officers."

Theme Three: Talent Management

A review of data collected about the talent-management theme yielded a 79 percent positive indication that the program effectively developed officers with the talent to fill gaps throughout the organization should they need to be moved around. Some participants clearly described how their respective DTs produce well-rounded leaders through a mixture of tactical, operational, and strategic assignments within and outside their field; a few others specifically responded that their teams developed officers primarily to support their career field. The remaining respondents indicated that their career field DT developed officers using career-field-specific manpower positions but also provided career-broadening opportunities to selected officers to make them better rounded. In one instance, a participant described how personal bias built into the DT process interferes with the development of qualified candidates.

- "The DT will meet the career field objectives first while broadening officers for other USAF strategic priorities."
- "Our officers are pretty universal. We often transition between operations, training, and support assignments as we develop through the ranks. By the time they are midlevel colonels, the officers have the full-spectrum perspective of the service and are now usable across many positions."
- "On the negative side, personal knowledge of individuals has on occasion interfered with the progress and advancement of otherwise qualified individuals."

- "The DT has been able to release officers for leadership opportunities . . . [and] create a well-rounded officer . . . [who can] fill USAF gaps."

Theme Four: Performance Measurement

The 79 percent of participants who responded positively to the performance-measurement question described the same process for the measurement of officers' past performance and their potential to serve in more demanding positions. Each response included remarks about a complete records review consisting of performance evaluations, assignment history, awards and decorations, and discussion among group members who might have personal experience working with a particular officer. Every respondent felt that the performance-measurement process employed by the DTs was sufficient to realize the teams' objectives. In a few cases, participants representing a smaller career field were less convinced that their recommendations to command selection boards held much weight since they had their own cross-functional boards to choose from before going to the DT for input. Two individuals thought that the performance of officers working outside their comfort zone in career-broadening positions should carry more weight toward their potential as future leaders and that the DT functional reviewers should not resent them.

- "[The DTs measure an officer's past performance via an] in-depth review of officer records by all DT voting participants. Factors like previous assignments, OPRs [officer performance reports], decorations, senior officer recommendations, and timing are considered in the decision process."
- "This is a pretty basic process that occurs at almost every type of USAF board."
- "The boards where I was able to attend and/or lead always measured the complete records of candidates for advancement."

- "[I have seen my DT show] contempt for those performing outside of their functional area."

Theme Five: Assessment

Only 50 percent of the participants agreed that the Air Force's DT semiannual meetings afford them adequate opportunity to track the progress of previously vectored officers to assess their decisions. Smaller DTs appear to have fewer problems with assessment than do the larger teams because of the more easily manageable size of their career fields. The remaining respondents believed that the shifting composition of team membership from session to session prevents DTs from adequately assessing progress. Two individuals directly stated that the teams do not conduct an assessment of past decisions.

- "We have a small career field, so we are better able to track the individual."
- "I do not know of any deliberate process used to backward-assess."
- "The boards are not always suited to reassess the success or failures of the decisions previously made. Most of the time, the members have been switched out, and previous recommendations and their basis are unknown."
- "[Assessment is] probably the weakest area in the design of the DT process."
- "This is a limiting factor. Measures (internal to the career field) are now being put in place to reassess progress."

Theme Six: Impact on the Organizational Environment

Only 14 percent of the respondents felt that the DTs negatively affected the Air Force; the remainder believed otherwise. In one case, a participant expressed initial concern about the potentially adverse effect that DTs would have on an officer's senior leadership. The same person expressed his alignment toward the DTs once he witnessed how

they benefited the service. As senior officers in that field of practice, many participants felt that the DTs included the most suitable leaders to make recommendations on the future path of more junior officers. Several also claimed that the teams, command screening boards, and senior raters all worked well together to create an atmosphere conducive to effective mentorship of the officer being evaluated.

- "DT officers should be in the best position to direct the path of the officers in their career field."
- "I initially worried about the power the DT would have over the senior raters at each wing and major command, but I am now a believer of the DT system."
- "The Air Force Personnel Center relies on DTs to make sound decisions and influence processes, and their determinations are generally taken as gospel."
- "The DT's feedback should allow mentorship to be more focused. By giving an honest assessment and actionable goals, members should know where they stand relative to their peers. This should stimulate performance across the larger Air Force."

Theme Seven: Effect on Organizational Balance

A clear lack of standardization across the various DTs was evident in responses to the custom question, developed for Headquarters Air Force Force Development Integration Division (AF/A1DI), concerning organizational balance. Air Force leadership should take note of the fact that 57 percent of the respondents commented on a lack of balance in how the DTs functioned. Only two acknowledged the existence of a check-and-balance system; the rest were either unsure or said it was dysfunctional. Gen Ronald R. Fogleman, former Air Force chief of staff, expressed the importance of uniformly knowing the standards, applying them consistently, and nonselectively enforcing them; however, the DTs do not appear to meet those criteria.[13]

- "Senior raters select commanders from command lists developed during commanders' boards held at the Air Force Personnel Center. Senior raters still determine who gets DPs [definitely promote] for promotion, so all of these processes complement each other."
- "The DT shouldn't be a training experience for the leader, and the lack of more senior leadership (general officer or civilian equivalent) can be a detriment as well. I remember attending one DT where our DT chair was a GS-15 while the DT across the hall was a two-star general. I think you can appreciate the inequality."
- "There do not appear to be checks and balances."
- "I don't know."
- "I don't know that there is a check and balance at the Air Force Pentagon level."

Summary of Findings

According to the results of management-level review of the DT process, the Air Force's DTs meet strategic objectives and are aligned with the strategic needs of the service, Department of Defense, and United States. DT objectives also align with higher-level strategic needs as clarified in Air Force Instruction 36-2640, *Executing Total Force Development*.[14] DT chairs, career field managers, panel members, and assignments officers work cooperatively to posture officers throughout their careers to gain the experience, breadth, and depth necessary to become senior leaders capable of filling talent gaps across the organization. A thorough review of officer performance reports, past positions, awards, decorations, and senior leader recommendations is integral to the success of the DT process; moreover, it is standardized among the DTs. The benefits that the current DT process brings to the service's organizational environment far exceed any negative effects. The processes have gained the confidence of most of the people who oversee the program. They agree that, as the experts in their field, DTs are the

appropriate entity to influence the careers of the more junior officers that they develop.

Currently the Air Force's teams have neither a standardized nor an effective way of assessing the results of their decisions, a situation that might prove detrimental to the future of the program. DTs need to recognize poor choices of the past to (a) prevent repeating the same decisions in the future and/or (b) correct previous decisions. The small size of the service's force development section might play a role in the lack of standardization across the DTs. The 57 percent negative response rate regarding balance and standardization across the DTs clearly indicates a problem.

It is important to note that the results of this case study are based on feedback provided by the DT board members. The findings do not necessarily agree with the authors' opinion regarding the effectiveness of the DT. Furthermore, a sister study that chose to explore the DT process from a customer perspective (e.g., officers affected by the DT) might reveal different results. In a discussion about the project, AF/A1DI expressed concern about the systematic threats generated when the teams are administered by specific career fields rather than by the service as a whole. A 2011 survey confirmed that apprehension when it revealed a great deal of confusion from Air Force officers regarding the DTs.[15] Previous studies by the RAND Corporation on DTs contradict the opinions expressed above by the teams' board members.[16] During the aforementioned research, assignments officers felt that some DTs build records (e.g., single-unit retrieval formats) instead of leaders while others misuse or misunderstand the vector process and intent altogether.[17]

Implications for Social Change

In an empirical study, Lawrence Korb, P. W. Singer, Heather Hurlburt, and Robert Hunter determined that the future security of the United States relies on a smarter military developed through educa-

tion.[18] Indeed, the military plays an important role in the nation's economic, political, social, and cultural prosperity.[19] The foregoing discussion highlights an important element of leader development, but education alone does not make a good leader; it should be coupled with practical training, mentoring, and experience as well. Gary Yukl, Jennifer George, and Gareth Jones emphasized the importance of organizational leaders to the survival and prosperity of their organization.[20] As a primary component of national defense, US air superiority also depends upon educated leaders to ensure the continuation and well-being of the Air Force and contribute to the future stability of the United States and its international allies. The Air Force could use the findings and recommendations of this study to improve the quality of its force-development program, resulting in better educated, trained, and experienced leaders to guide the organization.

Recommendations for Action

Based on the findings of the study, we recommend the following to address areas of the DT process that require the most attention. These recommendations are specific to the Air Force's DTs and may or may not be transferrable to other organizations with deficiencies in their leadership-development process in similar areas.

Theme Five: Assessment

Since the 1900s, program assessment has been a cornerstone of organizational success.[21] Assessment connects what leaders of an organization set out to achieve with what they actually accomplish. The Air Force must develop a better way for DTs, especially its larger ones, to assess actions that determine if the teams attained their goals and that identify those they failed to do so.[22]

One option for assessment involves duplicating the program used by Air Education and Training Command to assess technical-training graduates. The process entails submitting brief surveys to gaining su-

pervisors that include questions about the quality of the graduate and their level of satisfaction with the qualifications and leadership ability of the officer vectored to them by the DT. A second or complementary option is a self-assessment questionnaire given to the officer vectored by the DT. Both options could remain anonymous and/or confidential to protect the career of the officer yet still provide feedback to the DTs on their decision. If completed in tandem, these two methods would offer a 360-degree, or multisource, feedback mechanism for Air Force leadership on the effectiveness of the DTs and indicate areas for improvement, if applicable. Survey distribution could be easily managed and less costly than using internal tracking or hiring outside auditors/contractors to conduct assessments on behalf of the Air Force.

A third option would take the form of a more deliberate, internal tracking of an officer's progress through comprehensive evaluation of performance during a vectored assignment that would immediately identify placement errors and possible reasons for them. This option would prove more taxing on a program that has already been downsized, and current government budget cuts would likely prevent its implementation. Some career fields plan to develop an internal assessment method such as the one described. If the aforementioned internal assessment method is successful, then AF/A1DI could explore the transferability of the method for implementation consideration across all DTs.

Theme Seven: Effect on Organizational Balance

The DT oversight office has expressed concern that the lack of standardization and balance across career-field-focused DTs might adversely affect the larger Air Force. To investigate this apprehension, we introduced a final subquestion designed to explore standardization among the various DTs and determine the effect of those teams on organizational balance.

Because the results reflected a lack of standardization among the various DTs, the service's Force Development Integration Division

could benefit by concentrating on resolving the standardization issue. A study by Liv Langfeldt, Bjørn Stensaker, Lee Harvey, Jeroen Huisman, and Don Westerheijden recommends peer review in the form of observers as a method of quality assurance to help identify shortfalls and standardize processes.[23] They note that most processes are an interrelated mixture of professional judgments and standardized guidelines.[24] In some cases, elements left to the judgment of the executors could have instead been made a part of standardized processes. Because the Air Force's DTs might have the same problem, force-development observers that frequent the various teams might improve the latter's standardization. Such an option would add personnel to the force-development section of the Air Staff and more travel funds to support the observation efforts.

Summary and Conclusions

The authors' in-depth qualitative case study identified seven themes for examining the effectiveness of the Air Force's DT process from the perspective of a program implementer. The benefits provided by this research are twofold. First, it serves as a validated source of information for Air Force officers affected by the DT, allowing them to understand the views of their senior leaders. Armed with such data, they can support or drive change to the process through detailed, constructive feedback to their respective functional community leaders. Second, Air Force leaders can utilize findings from the analysis of data within each theme to identify, diagnose, and address areas for improving or enriching the DT program. Changes to the program would require additional funds and/or manpower for AF/A1DI. Our review of professional and academic literature pertaining to leadership development revealed a direct relationship between enriched leadership improvement programs and value-added organizational effectiveness. By addressing areas of potential improvement, the Air Force can produce an enhanced DT process that will be better postured to groom senior officers who meet or exceed the program's objectives. ✪

Notes

1. See Air Force Instruction (AFI) 36-2640, *Executing Total Force Development*, 16 December 2008, http://static.e-publishing.af.mil/production/1/af_a1/publication/afi36-2640/afi36-2640_(certified_current)).pdf.
2. See AFI 36-2301, *Developmental Education*, 16 July 2010, http://static.e-publishing.af.mil/production/1/af_a1/publication/afi36-2301/afi36-2301.pdf.
3. Lt Col Paul Valenzuela, analysis briefing presented to the Air Force Deputy Chief of Staff for Manpower and Personnel, subject: 2011 Development Team Officer Experience and Satisfaction Survey, 26 April 2012. During the briefing, officers affected by the DT made a number of negative comments regarding their confusion and disapproval of the program. This one-sided perspective drove the Air Force General Officer Management Office to recommend the subject to the authors for study.
4. Rick D. Clevette and Stephen L. Cohen, "Selling and Implementing Leadership Development: Chapter, Verse, and Lessons Learned from Carlson's Story," *Performance Improvement* 46, no. 6 (18 April 2007): 15–24; and Jason B. Kaminsky, "Impact of Nontechnical Leadership Practices on IT Project Success," *Journal of Leadership Studies* 6, no. 1 (Spring 2012): 30–49.
5. Francis Amagoh, "Leadership Development and Leader Effectiveness," *Management Decision* 47, no. 6 (2009): 989–99.
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Aviation Security Cooperation

Advancing Global Vigilance, Global Reach, and Global Power in a Dynamic World

Mort Rolleston
Lt Col Ric "Trimmy" Trimillos, USAF
Tom Gill

> *Airpower is more than dropping bombs, strafing targets, firing missiles, providing precision navigation and timing, or protecting networks. It is also a way of influencing world situations in ways which support national objectives. . . . Through careful building of partnerships, Air Force forces can favorably shape the strategic environment by assessing, advising, training, and assisting host nation air forces in their efforts to counter internal or external threats.*
>
> —*Volume I, Basic Doctrine*

Given the stark fiscal constraints on the federal budget today, the US military faces hard decisions about which conventional capabilities to develop and deploy to address the wide range of challenges and global demands facing the nation.[1] The military services, including the US Air Force, have long argued that "traditional" capabilities for deterring and/or defeating nation-states would adequately handle "nontraditional" or "irregular" threats from nonstate actors such as terrorists or insurgents.[2] In recent years, the exclusive focus of the Air Force's strategic planning and programming for confronting future traditional challenges related to operating in highly contested environments has put other Air Force capabilities important to the nation at grave risk.[3] For example, as the war in Afghanistan draws down, the service is con-

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sidering divesting or drastically reducing its ability to organize, train, and equip (OT&E) general purpose force (GPF) air advisors.[4]

Such a divestiture would negatively affect America's security cooperation (SC) efforts at a time when it is relying far more on partner nations to address both traditional and nontraditional challenges to enduring US strategic interests. Furthermore, a divestiture would revert to the historic Air Force pattern of assuming that GPF air advisors and other SC-relevant personnel are no longer needed when major "irregular" conflicts are finished and that these skills can simply be resurrected, like a phoenix out of the ashes, on demand. Our recent experiences in Iraq and Afghanistan clearly demonstrate the disastrous consequences of that assumption.

Instead, this article argues that it is in the Air Force's interests to OT&E an effective standing operational SC capability in the GPF. Doing so would help the service realize its vision of global vigilance, global reach, and global power; help deal with the challenges of highly contested environments; and provide a low-cost way to support US strategic interests and the nation's emphasis on shaping the strategic environment to prevent or deter conflict. It then details the requirements for attaining such a standing operational SC capability—basically, only an investment of dozens of billets and tens of millions of dollars annually in the short term.

Defining and Scoping Security Cooperation: What Exactly Are We Talking About?

Like many areas involving the US government or military, a myriad of confusing, overlapping terminology is associated with US assistance to other nations. In general, the different terms reflect a combination of who offers the assistance, its purpose or desired outcome, and/or the authority or law under which it is provided.[5] The best overarching term to describe the work that the Air Force is often tasked to support or help execute when it assists other nations is *security cooperation*.

The *Department of Defense Dictionary of Military and Associated Terms* defines SC as "all Department of Defense interactions with foreign defense establishments to build defense relationships that promote specific US security interests, develop allied and friendly military capabilities for self-defense and multinational operations, and provide US forces with peacetime and contingency access to a host nation."[6] SC includes all security assistance, foreign internal defense, international armaments cooperation, and security force assistance (SFA) conducted by the DOD.[7]

Why Should the Air Force Organize, Train, and Equip to Support US Security Cooperation Efforts?

Security Cooperation Is a Key Enabler of Global Vigilance, Global Reach, and Global Power

When the Air Force articulates the value it brings to the nation, it contends that by effectively conducting its five core missions, it provides global vigilance, global reach, and global power.[8] In turn, these capabilities serve America's long-term security interests by giving its leaders unmatched options to confront an unpredictable future by helping to deter conflict, control escalation, and, when tasked, destroy an adversary's military capacity.[9]

The recently released Air Force strategy acknowledges that "the Air Force must increasingly look internationally to effectively deliver *Global Vigilance—Global Reach—Global Power*. Partnerships enhance deterrence, build regional stability, offset costs, increase capability and capacity, and ensure access."[10] Indeed, the Air Force cannot achieve global vigilance, global reach, and global power without forward presence outside US territory. The service's space-based command and control and intelligence, surveillance, and reconnaissance assets, as well as tanker-assisted air assets based on American territory, can conduct its core missions only on a limited global scale that cannot effec-

tively support US strategic interests.[11] In addition, America's existing close strategic and regional partners cannot provide enough bases free from the threat of an adversary's long-range precision-strike munitions to enable effective air operations in areas of the world where US forces will likely have to operate.[12] The United States establishes and sustains access and thus forward presence in many countries around the globe through SC.[13]

SC also builds partner capacity and improves interoperability between US and partner nation air forces in key areas and countries critical to achieve global vigilance, global reach, and global power. For example, the Air-Sea Battle concept argues that SC engagement "ensures conceptual alignment with our partners and allies, builds necessary partner capacity and strengthens our relationships which facilitate and assure access to multiple domains in the event conflict occurs."[14] In addition, SC can improve interoperability between regional partner nations and the United States in areas such as integrated air and missile defense and maritime domain awareness critical to operating in highly contested environments. More capable partner nations in these environments may also reduce the necessary US forward footprint vulnerable to threats in those environments. Attaining the necessary interoperability and trust to encourage willing and capable partner nations in this way takes years of engagement involving long-term planning and a concerted effort to shape the environment prior to a crisis. As Gen James Amos, US Marine Corps commandant, is fond of saying, "You can't surge trust."[15] Furthermore, improved airspace and basing access to more nations in-theater would also greatly complicate an enemy's calculus and improve the chances of deterring aggressive action. Finally, SC that assists priority nations in establishing their own stability and/or contributing to regional security enables the US military to focus more on the direct challenges to global vigilance, global reach, and global power.

The Air Force Enjoys a Huge "Bang for the Buck" for Its Modest Investment in Security Cooperation

The Air Force's combined efforts to OT&E the GPF to support US SC, summarized later in this article, *cost the service only about $35 million a year in discretionary operation and maintenance (O&M) funding and 400–500 billets*.[16] This tiny expenditure leverages billions of dollars of US government and partner nation spending, making SC one of the Air Force's most potent investments. For example, the service influences over $135 billion of its partner nations' spending for capability development through 2,600 foreign military sales cases with 95 nations.[17] Moreover, since fiscal year (FY) 2008, the Air Force has negotiated and signed 162 international agreements with 37 nations, leveraging $13.2 billion in total foreign contributions.[18]

Harder to quantify, but also effective, are the SC activities the Air Force executes but are funded by other US government organizations. One example is the roughly $100-million-a-year International Military Education and Training program underwritten by the State Department, which augments the ability of partner nations' military forces to support combined operations and interoperability with US and regional coalition forces. Moreover, Section 1206 of the National Defense Authorization Act gives the secretary of defense the authority to train and equip foreign military forces for counterterrorism and stability operations, as well as foreign security forces for counterterrorism operations. Total funding thus far for Section 1206 since its inception in FY 2006 exceeds $2.2 billion.[19]

Combatant Commanders Need GPF Airmen Capable of Effectively Executing Security Cooperation Activities

Gen Mark Welsh, chief of staff of the Air Force, recently noted that partnership-building capability engagements by combatant commanders are not going away.[20] In reality, those commanders will continue to task the Air Force to provide personnel to support aviation-related SC for the foreseeable future. Not including overseas contingency-operation-

funded events in Afghanistan and Iraq, in FY 2016 and beyond, the service is expected to support at least 1,180 SC events needing more than 157,000 contact days in over 80 nations across the world per year.[21] That is the equivalent of 631 man-years of contact days with partner nations potentially involving over 3,000 Airmen per year.[22]

This high demand for events in permissive or uncertain environments is a major reason for using GPF Airmen in addition to combat aviation advisors from special operations forces (SOF). The limited supply of SOF assets should be employed against the growing demand of operations in hostile environments executing complex mission sets. GPF air advisors are neither a replacement for nor meant to duplicate SOF combat aviation advisors. Combatant commander and Air Force forces (AFFOR) planners need to understand how to employ and, when necessary, integrate both SOF and GPF assets efficiently to most effectively produce desired effects.

The Air Force Has Been Directed to Effectively Support America's Security Cooperation Efforts

Strategic guidance from the president, secretary of defense, and the chairman of the Joint Chiefs of Staff offers consistent, detailed language describing the importance of SC in building partner capacity and shaping the global environment to support and realize enduring US strategic interests against both traditional and nontraditional challenges.[23] Taken together at the unclassified level, these sources of guidance boil down to the following related points:

1. *SC enhances homeland security*, enabling partner nations to counter threats to US interests and reducing the likelihood that these threats will reach America's shores. Indeed, the United States cannot counter these threats alone and needs the assistance of other nations.[24]
2. *SC reduces the odds of the United States sending forces abroad to address future crises by enabling partner nations to act when military*

force is necessary in a crisis.[25] Consequently, the US military can turn its attention to the more serious threats to its interests.

3. *SC improves the odds of US access to, interoperability with, and/or cooperation with partner nations in future crises*.[26] SC often marks the start of an enduring defense relationship between the United States and the partner nation. For example, given that the life cycles of aviation-related platforms and infrastructure often exceed 30 years, these relationships help build the long-term trust that translates to enhanced access and interoperability.
4. *SC enhances regional security and stability relevant to US interests* by improving a partner nation's ability to gain or maintain internal security and/or contribute directly to regional stability.[27]
5. *SC helps the United States shape the global environment and increase its influence* by promoting partner support for US interests and shared universal values.[28]

Real-world examples of each of these SC benefits that involve or involved the Air Force exist at the "for official use only" and classified levels. As a result, the president directed the US military to strengthen its capacity to partner with other nations, train and assist their forces, and ensure that US defense strategy and policy are closely synchronized with American security-sector assistance efforts.[29] Moreover, the secretary of defense has ordered the services to (1) develop, maintain, institutionalize, and provide forces to conduct SC in support of combatant commanders' requirements;[30] (2) acquire both standard and nonstandard equipment necessary to conduct SFA-related activities;[31] (3) establish personnel, training, education, and reporting requirements to conduct SFA-related activities;[32] and (4) maintain scalable organizations to train and advise foreign security.[33] In turn, the Air Force's senior leadership has provided direction to the service consistent with the strategic guidance summarized above in various, mostly nonpublic, documents.[34] General Welsh recently stated that "our international partnerships are a significant tool in an era of declining budgets. We will continue to build partnerships in order to modernize and enhance

our security alliances and increase the capability and capacities of our friends."[35]

How Should the Air Force's General Purpose Forces Organize, Train, and Equip to Effectively Support US Security Cooperation Efforts Overseas?

Organize

The service's GPF is organized to support US SC efforts by using a combination of (1) full-time designated standing advisory units, (2) expeditionary forces of small teams or individuals either deployed or on short-duration temporary duty, and (3) manpower billets dedicated to full-time, SC-related positions.[36] There are only three full-time GPF-designated units that have an SC-related mission in their unit's document statement and that report operational readiness in the Defense Readiness Reporting System: the 571st Mobility Support Advisory Squadron (MSAS), dedicated to US Southern Command's area of responsibility (AOR); the 818 MSAS, dedicated to US Africa Command's AOR; and the 435th Contingency Response Group (CRG) Air Advisor Branch, dedicated to US European Command's AOR.[37]

Additional units and programs could be tasked to conduct SC as a primary or secondary mission and report readiness instead of executing SC missions as expeditionary forces. US Pacific Air Forces' 36 CRG contains a flight dedicated to SC missions supporting the US Pacific Command's AOR. US Air Forces Central Command's Air Warfare Center helps build partner capacity in support of the Air Force's Theater Security Cooperation Plan.[38] The Inter-American Air Forces Academy trains officers and enlisted service members predominantly from Central and South American countries.[39] Additionally, the following programs and units execute SC as expeditionary forces:

- The International Health Specialists Program plans, leads, and executes health-related regional SC activities around the world and helps coordinate US military support to interagency disaster response, humanitarian assistance, and health-care infrastructure.
- The National Guard Bureau's State Partnership Program has developed partnerships between nearly every state's Guard Bureau (including Air National Guard units) and one or more nations throughout the world.[40]
- The 438th Air Expeditionary Wing is aligned under the North Atlantic Treaty Organization to conduct aviation foreign internal defense with Air Force and nonstandard fixed-wing aircraft to develop a "fully independent and operationally capable Afghan 'air force' that meets the security requirements of Afghanistan today . . . and tomorrow."[41]

Expeditionary forces may flow from these units or ad hoc from the Air Force at large via multiple task or volunteer methodologies. Primarily, combatant commands submit a request for forces through the global force management (GFM) system because they are executed under Title 10 authorities. Often, however, these events are executed via temporary duty orders rather than deployment orders because they are usually short notice and there is not enough time to properly execute a request for forces. Further, the Air Force Security Assistance Training office finds volunteers to fill security assistance needs in conjunction with a foreign military sale or other Title 22 funding authorities of the State Department.

The Air Force also maintains staff positions to plan and execute SC activities. Each AFFOR staff includes SC planners. One hundred fifty-nine SC officers serve on country teams as members of the Office of Defense Cooperation and similar organizations as SC liaisons with other nations. The Office of the Deputy Undersecretary of the Air Force for International Affairs (SAF/IA) maintains a workforce of roughly 100 Airmen to support US arms sales and manage the community of SC practitioners comprised of personnel exchange officers, re-

gional affairs strategists, and political military affairs strategists. SAF/IA also has a staff that develops SC strategy for the Air Force and authors policy guidance to implement SC governing directives of the State Department and Congress.

Despite these efforts, recent internal Air Force analyses by subject-matter experts from across SC-related units and organizations highlight that the service cannot generate enough GPF standing units or expeditionary teams to meet the combatant commands' and SAF/IA's demand for SC personnel. Recognizing that the Air Force is a supply-based service, they recommend that the Air Force spend approximately $2.6 million more in Air Force O&M funding annually and commit 80 additional billets.[42] Doing so will

- develop a nonstandard fixed-wing assessment and advisory capability within the 571 and 818 MSAS;
- assign common SFA mission-essential tasks to designated units in order to track their readiness for executing this mission (ideal candidates include the Inter-American Air Forces Academy; US Air Forces Central Command's Air Warfare Center; the 36 CRG at Guam; the 36th Airlift Squadron at Yokota Air Base, Japan; the 612th Air Base Squadron in Honduras; and the soon-to-stand-up 81st Fighter Squadron tasked to conduct A-29 training with Afghan pilots and maintainers); and
- expand the current 10-person building-partner cell within the 36 CRG at Guam to a fully manned advisory squadron with 77 billets.

Although these recommendations should meet most of the known FY 2016 SC requirements of the Air Force, the same experts widely expect these requirements to increase substantially in the longer term. To meet this long-term demand, they believe that, in addition to the short-term adjustments above, the Air Force will also need to stand up two additional GPF advisor squadrons—one each for the Pacific and African AORs. Effectively meeting both the short-term FY 2016 requirements and the anticipated longer-term demand would require ap-

proximately $9 million in additional Air Force O&M funding per year and 229 more billets.[43]

Recent internal Air Force analyses also indicate a need to address how the service presents forces to the combatant commander and executes missions enacted by the State Department. Currently, Joint Staff business rules preclude use of the GFM system to task foreign military sales/foreign military financing missions executed under the State Department's Title 22 authority. SAF/IA established the Air Force Security Assistance Training office to find volunteers to fill missions that might last several days to years. This methodology creates difficulties when one tries to define command relationships and transfer operational control while managing deployment dwell times, readiness levels of air and space expeditionary forces, multiple resource-prioritization processes, and management of manning levels for career fields. GFM system shortfalls can often place undue scheduling turbulence and chain-of-command confusion on deploying Airmen and expose home-station commanders to inordinate responsibility risks. We recommend that senior leaders engage with the Joint Staff to establish a streamlined GFM process that will encompass all funding authorities and remain reactive enough to meet the short timelines often associated with SC.

Train

The effective execution of SC events requires various levels of advising and expeditionary skills, as well as relevant expertise in the language, region, and culture. The level of training depends on the complexity and duration of the SC activity or operation.[44] SC events of longer duration (greater than 30 days) in unknown or hostile environments and/or involving rigorous activities tend to require more training.[45]

The Air Force funds various programs to help train GPF Airmen to support SC.[46] The Air Advisor Academy prepares air-minded professionals to assess, train, educate, advise, assist, and equip partner nations in the development and application of their aviation resources in the

native environment where they are expected to operate.[47] The Air Force Expeditionary Center readies Airmen to operate "outside the wire" when they are overseas and offers courses in language, region, and culture. Air University's Air Force Culture and Language Center, responsible for training and education in culture and language across the entire service, features the Language Enabled Airman Program, which trains selected Airmen to perform their regular duties in another language and culture. The International Affairs Specialist Program develops select officers into regional affairs strategists and political military affairs strategists.[48] The Air Force's Military Personnel Exchange Program allows Airmen fluent in foreign languages to swap jobs with a member of an allied nation's air force to improve interoperability and understanding. The Overseas Developmental Education program permits officers and senior noncommissioned officers to attend professional military education schools and universities in partner and allied nations.

Oftentimes, however, despite these programs, Airmen assigned to SC-related tasks (1) lack adequate and relevant language proficiency, regional expertise, and cultural training; (2) do not provide effective expertise on advising foreign militaries; (3) fail to conduct effective information operations; (4) lack planning experience regarding strategic (as opposed to operational) effects; (5) lack the skills to interact effectively with other government and nongovernment organizations; and/or (6) are not informing key decision makers and planners about available irregular warfare capabilities.[49]

Of the anticipated Air Force SC events for FY 2016 and through the Future Years Defense Program, 19 percent require minimal to no training; 75 percent, some basic advisor training; and 6 percent, advanced advisor training.[50] Therefore, the subject-matter experts from the same Air Force–integrated process teams mentioned earlier recommended that the service do four things. The first is to baseline-fund one GPF air advisor school, such as the Air Advisor Academy or its equivalent after Operation Enduring Freedom concludes.

The second is to develop two skill-based training tracks ("basic" and "advanced"), regardless of assignment to expeditionary or designated unit/team. Both tracks need a tailorable syllabus that meets the DOD's SFA training guidelines and provides flexible options responsible to mission requirements, threat, region, culture, and language. The recommended basic training track would call for one week of training in residence or in garrison via a mobile training team with the goal of ensuring that air advisors can conduct SC/SFA missions with limited scope and complexity in a permissive environment. The recommended advanced training track would require about five weeks of academics and training in residence with the goal of ensuring that air advisors can conduct missions involving complex tasks in permissive, uncertain, and, in rare instances, hostile environments.

The third is to baseline-fund Section 1203 training for those air advisor units that report readiness.[51] This new authority for GPF allows air advisors to accomplish required readiness training with an advisor team conducting an "advising mission" with military/other security forces of a friendly foreign country. Doing so can provide excellent training opportunities as well as potentially reduce training costs and gain efficiencies in travel by combining readiness training for air advisors with actual missions.

Additionally, the service should incorporate SC planner training into educational venues for AFFOR staff officers. Airmen need additional training in legal authorities, Air Force advising capabilities, and funding mechanisms to plan and execute SC activities more effectively inside their theater of operations. Furthermore, AFFOR planners should have training in GPF/SOF integration, developing campaign support plans, developing aviation enterprise, and assessing them all during and after execution.

Baseline-funding one GPF air advisor school would cost approximately $3–5 million annually in additional Air Force O&M funding and require 12 billets.[52] Baseline-funding Section 1203 training for air

advisor units would cost another $5–6 million annually in Air Force O&M funding.

Equip

In terms of aircraft, the Air Force's GPF does not currently devote any platforms specifically to the SC mission outside Afghanistan.[53] In 2009 the service began exploring options to quickly acquire a light attack / armed reconnaissance aircraft and a light mobility aircraft that could operate inexpensively in remote, permissive environments and help train and augment emerging air forces. Although the service confirmed the requirement for these aircraft, it decided in 2012 that it could not afford them, given the increasing fiscal constraints.[54]

This lack of relevant aircraft creates a problem. The aviation needs and resources of emerging air forces are often different from those of fully developed air forces. Their members may need to learn only basic airmanship and gain experience with maintenance and operations. Many of these air forces need transferable, affordable, modular, and sustainable aircraft that more closely resemble what the United States uses for customs, border protection, and law enforcement as opposed to advanced combat. The fact that the Air Force does not fly these light aircraft limits its ability to work effectively with a wider range of partner nations.[55] Thus, potential partners must approach other suppliers, and the United States thereby misses significant shaping opportunities that could lead to important future access and other strategic benefits previously discussed.[56] Moreover, compelling reasons exist for the Air Force itself to fly these aircraft as part of direct operations in certain regions of the world that cannot be covered by the fleet's existing aircraft.[57]

We agree with the direction of the *United States Air Force Irregular Warfare Strategy 2013* for the service to establish a creative, effective, and affordable way to enhance its ability to develop partner nation air forces that use light aircraft. The document suggests several options if the Air Force still believes it cannot afford to procure light mobility air-

craft and light attack / armed reconnaissance platforms: (1) use the existing foreign military sales and SC infrastructure as a conduit for force structure employed by the Air Force Auxiliary, Air Reserve Component, civilian agencies, and law enforcement already performing comparable internal security missions with more applicable and affordable equipment; (2) purchase a handful of very basic, inexpensive "off-the-shelf" light aircraft to be attached to existing advisory units; (3) establish novel partnerships with contract service providers or civilian agencies to allow Airmen to gain and maintain proficiency in light aircraft in an internal security role; and/or (4) use current and future US trainer aircraft for this purpose where appropriate.[58]

Summary

I did not disagree with [the services] on the need to prepare for large-scale, state-to-state conflict, but I was not talking about moving significant resources away from future conventional capabilities. I just wanted the defense budget and the services formally to acknowledge the need to provide for nontraditional capabilities and ensure that the resources necessary for the conflicts we were most likely to fight were also included in our budgeting, planning, training, and procurement.

—Robert Gates, Former Secretary of Defense

Toward this end, the Air Force, at a minimum, should establish an effective standing operational SC capability in the GPF. The service must shift its mind-set from providing "just-in-time" or inadequately trained Airmen to support SC on a largely ad hoc basis to using an institutionalized process and funding to organize and train Airmen to support SC effectively. When one combines our recommendations to improve how the Air Force both organizes and trains to support SC, such a shift would require an extra Air Force O&M investment of only $13 million annually and 92 billets in the short term—a minor investment that would pay huge dividends. Doing so would not only meet

the needs of the combatant commander at a time when the nation is depending more than ever on allies and partner nations for its national security but also bolster the Air Force's ability to realize its vision of global vigilance, global reach, and global power.

Notes

1. The Department of Defense's force-planning construct instructs the US military to be "capable of simultaneously defending the homeland; conducting sustained, distributed counterterrorist operations; and in multiple regions, deterring aggression and assuring allies through forward presence and engagement. If deterrence fails at any given time, U.S. forces will be capable of defeating a regional adversary in a large-scale multi-phased campaign, and deny the objectives of—or imposing unacceptable costs on—a second aggressor in another region." It must produce these results in conflicts "rang[ing] from hybrid contingencies against proxy groups using asymmetric approaches, to a high-end conflict against a state power armed with WMD [weapons of mass destruction] or technologically advanced anti-access and area-denial (A2/AD) capabilities." Department of Defense, *Quadrennial Defense Review 2014* (Washington, DC: Department of Defense, 2014), vii, http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf.

2. For a discussion of irregular warfare in the context of the Air Force and operations within the air, space, and cyberspace domains, see Department of the Air Force, *United States Air Force Irregular Warfare Strategy 2013: To Organize, Train, and Equip to Achieve Strategic Guidance* (Washington, DC: Headquarters US Air Force, 2013), http://fas.org/irp/doddir/usaf/iw-strategy.pdf; and Curtis E. LeMay Center for Doctrine Development and Education, "Annex 3-2, Irregular Warfare," 15 March 2013, https://doctrine.af.mil/download.jsp?filename=3-2-Annex-IRREGULAR-WARFARE.pdf. In addition, joint doctrine succinctly notes that "in identifying COGs [centers of gravity] it is important to remember that irregular warfare focuses on legitimacy and influence over a population, unlike traditional warfare, which employs direct military confrontation to defeat an adversary's armed forces, destroy an adversary's war-making capacity, or seize or retain territory to force a change in an adversary's government or policies." Joint Publication (JP) 5-0, *Joint Operation Planning*, 11 August 2011, III-22, http://www.dtic.mil/doctrine/new_pubs/jp5_0.pdf. Robert Gates, former secretary of defense, spent an entire chapter of his recent memoir on how he "waged war on the Pentagon" to strike the right balance in defense planning and programming between developing "nontraditional" capabilities against nonstate actors (especially in Iraq and Afghanistan) and "traditional" capabilities to prepare for possible future wars against other nation-states. Although he agreed that traditional capabilities should receive the most attention, Gates believed that at least some dedicated funding should go to nontraditional capabilities to effectively conduct stability, counterterrorism, counterinsurgency, and special operations as well as help build partner nation capacity. The services, however, resisted Gates at every turn, arguing that all planning and programming should focus exclusively on traditional capabilities, which would also adequately address nonstate challenges. Robert M.

Gates, *Duty: Memoirs of a Secretary at War* (New York: Alfred A. Knopf, 2014), 142–46. Within the Air Force, several factors have likely led to that position. First, fiscal constraints have driven the service to minimize the number of different platforms it operates, favoring fewer types that can perform multiple missions adequately rather than more types of specialized aircraft that can conduct their mission perfectly. For example, the Air Force officially told Congress that "as the Air Force becomes smaller, we must retain multi-role aircraft that provide greater flexibility and more options for the joint force commander." Department of the Air Force, *USAF Posture Statement 2014* (Washington, DC: Department of the Air Force, 14 March 2014), 10, http://www.defenseinnovationmarketplace.mil/resources/2014_POSTURE_STATEMENT_INTERACTIVEversion.pdf. Second, A2/AD strategies and capabilities of future state adversaries are widely expected to seriously challenge how the Air Force (and the Navy) conducts operations today. For excellent open-source discussions of the A2/AD issue, see Andrew F. Krepinevich, *7 Deadly Scenarios: A Military Futurist Explores War in the 21st Century* (New York: Bantam Dell, 2009), 167–209; Mark Gunzinger with Christopher Dougherty, *Outside-In: Operating from Range to Defeat Iran's Anti-Access and Area-Denial Threats* (Washington, DC: Center for Strategic and Budgetary Assessments, 2011); and Andrew F. Krepinevich, *Why Air Sea Battle?* (Washington, DC: Center for Strategic and Budgetary Assessments, 2010). Third, Air Force culture and tradition tend to concentrate on advanced technology, offensive operations, and the future—despite the fact that addressing most nontraditional challenges does not require those three approaches. For example, see D. Robert Worley, *Shaping U.S. Military Forces: Revolution or Relevance in a Post–Cold War World (*Westport, CT: Praeger Security International, 2006), 95–125; and Daniel L. Magruder Jr., "The US Air Force and Irregular Warfare: Success as a Hurdle," *Small Wars Journal*, 2009, 1–11, http://smallwarsjournal.com/blog/journal/docs-temp/272-magruder.pdf. Gen Mark Welsh, chief of staff of the Air Force, also recently noted that the service "prides itself on being fueled by innovations, was born of technology and must stay ahead of the technological curve to be successful." Aaron Mehta, "US Air Force Faces Shortage of Engineers," *DefenseNews,* 26 March 2014, http://www.defensenews.com/article/20140326/DEFREG02/303260029/USAF-Faces-Shortage-Engineers. Finally, American forces have withdrawn from Iraq and are in the process of leaving Afghanistan. US strategic guidance clearly directs that America will no longer plan to engage in those types of long-term, large-scale counterinsurgency operations. See Department of Defense, *Quadrennial Defense Review 2014,* 19.

3. One example from an open source: "As they have been for the past few years, USAF's top priorities remain the F-35 fighter, the KC-46 tanker, and the Long-Range Strike Bomber. Other programs, readiness, force structure, and compensation will all be considered legitimate trade-offs to preserve these three keystone projects." John A. Tirpak, "Low Budgets, High Technology," *Air Force Magazine* 97, no. 4 (April 2014): 29.

4. It is important to emphasize that the primary role of the services in Title 10 of the *US Code* is to organize, train, and equip forces to support combatant commanders, who plan and conduct operations to carry out the strategic guidance and direction from the president. Therefore, the recommendations of this article address what the Air Force can control (i.e., how it organizes, trains, and equips) related to SC. JP 1, *Doctrine for the Armed Forces of the United States*, 25 March 2013, II-7, http://www.dtic.mil/doctrine/new_pubs/jp1.pdf.

5. For a useful discussion of these terms and their relation to each other, refer to Taylor P. White, "Security Cooperation: How It All Fits," *Joint Force Quarterly* 72 (1st Quarter, Janu-

ary 2014): 106–8. Forthcoming joint doctrine on SC intends to clarify these terms and their relationships to each other.

6. JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 8 November 2010 (as amended through 15 June 2014), 235, http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf. Examples of specific Title 10 SC programs include the Warsaw Initiative Fund, Combating Terrorism Fellowship Program, Ministry of Defense Advisors, Defense Institution Reform Initiative, National Guard Bureau State Partnership Program, Combatant Commander Initiative Fund, Joint Combined Exchange Training, Humanitarian Assistance/Foreign Disaster Relief/Humanitarian Demining Assistance, Personnel Exchange Program, Joint Combined Exchange Training, and Partnership for Peace.

7. The DOD defines "security assistance" as a "group of programs authorized by the Foreign Assistance Act of 1961, as amended, and the Arms Export Control Act of 1976, as amended, or other related statutes by which the United States provides defense articles, military training, and other defense-related services by grant, loan, credit, or cash sales in furtherance of national policies and objectives. Security assistance is an element of security cooperation funded and authorized by Department of State to be administered by Department of Defense/Defense Security Cooperation Agency." Ibid., 228. Examples include foreign military sales, foreign military financing, international military education and training, excess defense articles, and the Global Peace Operations Initiative. The DOD defines "foreign internal defense" as "participation by civilian and military agencies of a government in any of the action programs taken by another government or other designated organization to free and protect its society from subversion, lawlessness, insurgency, terrorism, and other threats to its security." Ibid., 103. International armaments cooperation "refers to a broad range of international activities in which the DOD and a foreign government(s) jointly manage efforts to satisfy common military requirements through cooperation in research, development, test, evaluation, acquisition, production and support of air, space, and cyberspace technology and systems." Air Force Instruction 16-110, *U.S. Air Force Participation in International Armaments Cooperation (IAC) Programs*, 13 May 2013, 4, http://static.e-publishing.af.mil/production/1/saf_ia/publication/afi16-110/afi16-110.pdf. The DOD defines "security force assistance" as "the Department of Defense activities that contribute to unified action by the US Government to support the development of the capacity and capability of foreign security forces and their supporting institutions." JP 1-02, *Department of Defense Dictionary*, 235.

8. The Air Force lists its core missions as air and space superiority; intelligence, surveillance, and reconnaissance; rapid global mobility; global strike; and command and control. Department of the Air Force, *Global Vigilance, Global Reach, Global Power for America* (Washington, DC: Department of the Air Force, 2013), 4, http://www.af.mil/Portals/1/images/airpower/GV_GR_GP_300DPI.pdf.

9. Ibid., 4–12.

10. Department of the Air Force, *America's Air Force: A Call to the Future* (Washington, DC: Department of the Air Force, 2014), 13, http://airman.dodlive.mil/files/2014/07/AF_30_Year_Strategy_2.pdf.

11. "U.S. experience since World War II confirms that it is extremely difficult to accomplish reassurance, deterrence, and regional stability missions with forces based exclusively in the United States." Even with tankers, Air Force aircraft that will be in the force structure for the next 20 or 30 years also lack the range and speed to sustain operational effects outside the western hemisphere from US territory alone; rather, they rely on forward operating

locations. Finally, sustaining global military activities requires forward presence to host critical support links such as en route airfields, ports, logistics facilities, communications, and early warning sites. Stacie L. Pettyjohn and Alan J. Vick, *The Posture Triangle: A New Framework for U.S. Air Force Global Presence*, RAND Project Air Force Research Report RR-402-AF (Santa Monica, CA: RAND, 2013), 9, 14, 75–76.

12. RAND's report considers the following nations dependable "strategic anchors" for the United States: the United Kingdom, Germany, Italy, Spain, Japan, Korea, Australia, Kuwait, Bahrain, Qatar, the United Arab Emirates, and Singapore. Ibid., 17–35, 80.

13. The tie between SC and achieving success is frequently cited in the Air Force's global partnership strategy. Department of the Air Force, *US Air Force Global Partnership Strategy 2011* (Washington, DC: Department of the Air Force, 2011), 6, 10, 13, 24, 27, http://www.safia.hq.af.mil/shared/media/document/AFD-111228-013.pdf. There are real-world examples of this connection involving the Air Force at the "for official use only" and classified levels.

14. Department of Defense, Air-Sea Battle Office, *Air-Sea Battle: Service Collaboration to Address Anti-Access and Area Denial Challenges* (Washington, DC: Department of Defense, Air-Sea Battle Office, May 2013), 10, 13, http://www.defense.gov/pubs/ASB-ConceptImplementation-Summary-May-2013.pdf.

15. John Grady, "USMC Commandant: 'You Can't Surge Trust,' " *USNI News*, 10 April 2013, http://news.usni.org/2013/04/10/usmc-commandant-you-cant-surge-trust.

16. Within SOF, the 6th Special Operations Squadron is mostly paid for by US Special Operations Command but accounts for approximately 100 Air Force billets. According to a detailed analysis of Air Force SC spending by Office of the Deputy Undersecretary of the Air Force for International Affairs–Strategy and Plans Division (SAF/IAGS) and the Air Force Irregular Warfare Directorate (AF/A3O-Q), the Air Force spends approximately $220 million in O&M funds on SC-related activities a year but only about $68 million is discretionary. (The rest is nondiscretionary spending required by the secretary of defense and/or international agreements such as North Atlantic Treaty Organization [NATO] Airborne Warning and Control System aircraft, NATO strategic airlift capability C-17s, the Polish Aviation Detachment, arms control implementation, the Defense Language Institute / English Language Center, and air attaché training.) Of that $68 million in discretionary spending, about $35 million goes to OT&E Airmen to support SC activities as discussed in this article; $13 million funds international cooperative research and development; $10 million funds Air Force forces (AFFOR) SC engagements; $9 million funds partner nation training and education; and less than $2 million funds Air Force engagements such as the International Armaments Cooperation Forum, the International Health Specialist Program, senior leader engagements, and Operator Engagement Talks. Of the $35 million or so that the Air Force spends annually on OT&E for SC, the two mobility support advisory squadrons (MSAS) and the building-partner cells of the two contingency response groups (CRG) combined cost about $2 million annually in O&M funding and almost 200 billets. In terms of SC-related training expenses specific to Airmen, the programs described in this article cost roughly $27 million annually and about 100–200 billets. In addition, Pacific Air Forces spends about $5 million of its own O&M for SC-related exercises. The Office of the Deputy Undersecretary of the Air Force for International Affairs maintains another 100 billets in support of arms-sales implementation as well as regional and political affairs specialists. In terms of equipment, the Air Force GPF does not pay for any aircraft used in SC efforts. If one also considers Air Force and AFFOR engagements as part of Airmen undergoing OT&E for SC, the total SC

OT&E costs to the service would rise to only $47 million a year. These figures do not include what the Air Force executes related to US government SC activities funded by non–Air Force sources (such as joint and/or combined exercises, international military education and training events, or foreign military sales implementation and management).

17. Department of the Air Force, "Under Secretary of the Air Force for International Affairs Mission Brief," March 2014.

18. Ibid.

19. Nina M. Serafino, *Security Assistance Reform: "Section 1206" Background and Issues for Congress*, CRS Report RS22855 (Washington, DC: Congressional Research Service, 4 April 2014), 2, http://fas.org/sgp/crs/natsec/RS22855.pdf.

20. John A. Tirpak, "Washington Watch," *Air Force Magazine* 96, no. 8 (August 2013): 10.

21. An "event" was used as the metric to determine overall demand and the need for specific air advisor skill levels to carry out the mission. "Contact days" were used as the metric to determine mission costs, effects on the air and space expeditionary forces construct, and level of effort. AF/A3O-Q recently surveyed AFFORs that support the combatant commanders on the projected SC events that the Air Force will be tasked to support in FY 2016. These figures do not include partner nation participation in professional military education in the continental United States, formal training and exercises, Air Force regional affairs strategists or political / military affairs strategists, combat air advising by SOF, overseas developmental education, demonstration teams, and events funded by overseas contingency operations funding or joint events.

22. Dividing 157,794 contact days by 250 man-days equals a business year.

23. Guidance from the president includes the National Security Strategy, US Counterterrorism Strategy, and Counter Transnational Organized Crime Strategy. Guidance from the secretary of defense includes the Defense Strategic Guidance, Defense Planning Guidance, Quadrennial Defense Review, and Guidance for the Employment of the Force. Secretary of Defense Chuck Hagel also summed up these points in "Realizing the Asia-Pacific Rebalance," Defense One, 1 April 2014, http://www.defenseone.com/ideas/2014/04/realizing-asia-pacific-rebalance/81730/?oref=d-topstory. Guidance from the chairman of the Joint Chiefs of Staff includes the National Military Strategy, Joint Strategic Capabilities Plan, Capstone Concept for Joint Operations, Irregular Warfare Joint Operating Concept, and Cooperative Security Joint Operating Concept. Furthermore, one finds a compelling case for (1) how the national security strategy's enduring US strategic interests have benefited from US access and use of the global air domain, and (2) the need for the US government to think once again more strategically about where (and for what purpose) it focuses its aviation-related security (and other) assistance to partner nations in the rapidly emerging developing world to continue those benefits into the future. The Air Force does not and should not drive those decisions, but it does have a big stake in the outcome. See Mort Rolleston and Lt Col Peter Garretson, "A Vision for Global Aviation Enterprise Development," *Defense Institute of Security Assistance Management (DISAM) Journal of International Security Cooperation Management*, 17 March 2014, http://www.disamjournal.org/articles/a-vision-for-global-aviation-enterprise-development-1299.

24. Department of Defense, *Quadrennial Defense Review 2014*, v, vi, 36; President of the United States, *National Strategy for Counterterrorism* (Washington, DC: White House, June 2011), 1, 4, 6, 9, http://www.whitehouse.gov/sites/default/files/counterterrorism_strategy

.pdf; President of the United States, *National Security Strategy* (Washington, DC: White House, May 2010), 19, http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf; President of the United States, *Strategy to Combat Transnational Organized Crime: Addressing Converging Threats to National Security* (Washington, DC: White House, July 2011), 24, 26–27, http://www.whitehouse.gov/sites/default/files/Strategy_to_Combat_Transnational_Organized_Crime_July_2011.pdf; and Department of Defense, Chairman of the Joint Chiefs of Staff, *Irregular Warfare: Countering Irregular Threats Joint Operating Concept*, version 2.0 (Washington, DC: Department of Defense, Chairman of the Joint Chiefs of Staff, 17 May 2010), 16–17.

25. President of the United States, *National Security Strategy*, 18, 22; and Department of Defense, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: Department of Defense, January 2012), 3, http://www.defense.gov/news/defense_strategic_guidance.pdf.

26. Presidential Policy Directive (PPD) 23, *Security Sector Assistance*, 5 April 2013, 3–4; Department of Defense, *Quadrennial Defense Review 2014*, 35–37, 63; and Joint Chiefs of Staff, *The National Military Strategy of the United States of America, 2011: Redefining America's Military Leadership* (Washington, DC: Joint Chiefs of Staff, 2011), 10, 14–15, http://www.army.mil/info/references/docs/NMS%20FEB%202011.pdf.

27. President of the United States, *National Security Strategy*, 15; PPD 23, *Security Sector Assistance*, 3; Joint Chiefs of Staff, *National Military Strategy*, 15; Department of Defense, *Quadrennial Defense Review 2014*, 18–19, 35.

28. President of the United States, *National Security Strategy*, 26, 48; PPD 23, *Security Sector Assistance*, 3; Department of Defense, *2012 Guidance for Employment of the Force* (Washington, DC: Department of Defense, 2012), 4–5.

29. President of the United States, *National Security Strategy*, 11. The administration has recently introduced the term *security sector assistance*, governed by PPD 23, *Security Sector Assistance*. According to PPD 23, security sector assistance (SSA) refers to the "policies, programs, and activities the United States uses to: engage with foreign partners and help shape their policies and actions in the security sector; help foreign partners build and sustain the capacity and effectiveness of legitimate institutions to provide security, safety, and justice for their people; and enable foreign partners to contribute to efforts that address common security challenges." SSA is broader in scope than SC insofar as it includes not only DOD assistance to partner nation militaries with specific goals as outlined in the definition for SC but also US assistance to any partner nation institution (military and civilian) used to protect the state and its citizens, manage borders, help maintain international peace, enforce the law, and provide oversight to those institutions. Such SSA can help a partner nation's security-sector reform effort. PPD 23, *Security Sector Assistance*, 3, 9.

30. Department of Defense Directive (DODD) 5100.01, *Functions of the Department of Defense and Its Major Components*, 21 December 2010, 26, 33; and Department of Defense Instruction (DODI) 5000.68, *Security Force Assistance (SFA)*, 27 October 2010, 11.

31. DODI 5000.68, *Security Force Assistance (SFA)*, 11.

32. Ibid.

33. DODD 3000.07, *Irregular Warfare (IW)*, 1 December 2008, 8.

34. See, for example, Department of the Air Force, *America's Air Force*, 13; Department of the Air Force, *Irregular Warfare Strategy 2013,* 13; Department of the Air Force, *Air Force 2023 Implementation Plan* (Washington, DC: Department of the Air Force, 11 March 2014), 13; and

Department of the Air Force, *United States Air Force Irregular Warfare Operations Roadmap FY12–FY15* (Washington, DC: Department of the Air Force, October 2012), 5.

35. Joe Pappalardo "PM Interview: Air Force Gen. Mark A. Welsh III," *Popular Mechanics*, 15 April 2014, http://www.popularmechanics.com/technology/military/news/pm-interview-air-force-gen-mark-a-welsh-iii-16698594.

36. Within Air Force Special Operations Command, the 6th Special Operations Squadron is a designated combat aviation advisor (CAA) unit that supports US Special Operations Command's SC plans across the globe. CAA personnel "assess, train, advise and assist foreign aviation forces in airpower employment, sustainment, and force integration," particularly in uncertain and hostile environments. CAAs "possess specialized capabilities for foreign internal defense . . . unconventional warfare . . . and coalition support." They are qualified to operate and maintain a variety of light aircraft and are authorized to advise on nearly any rotary- or fixed-wing mobility platform flown by partner nations. In addition, CAAs undergo extensive "training and education . . . intended to produce foreign language proficient, regionally-oriented, politically astute, and culturally aware aviation advisory experts." US Air Force, "6th Special Operations Squadron," fact sheet, accessed 7 August 2014, http://www2.afsoc.af.mil/library/factsheets/factsheet_print.asp?fsID=21050&page=1.

37. MSAS teams help develop partner nations' pilots, navigators, loadmasters, command and control, communications, airfield operations, logistics readiness officers / aerial port, aircraft maintenance, aeromedical evacuation, and support functions such as air base defense, intelligence, supply, fuels, survival-evasion resistance and escape, and civil engineering. Each MSAS is authorized 77 billets. Headquarters Air Mobility Command, briefing, subject: MSAS Deep Dive, 2013. A CRG's primary mission is to assess, open, and operate air bases, bridging the gap between initial base seizure and the arrival of permanent sustainment forces. However, each CRG contains a building-partnership cell of approximately 20 people (usually double billeted) that fills military-to-military and other building-partner-capacity tasks as specified in the combatant commander's plans. The CRG building-partner cells include the following engagement areas of expertise: airfield infrastructure development, search and rescue techniques and procedures, supply-chain management, command and control integration and improvement, network capabilities, force and installation protection, power-plant facility operation, vehicle and fleet maintenance, and noncommissioned officer development.

38. SSgt Jacob Morgan, "AFCENT Air Warfare Center Welcomes New Commander," 380th Air Expeditionary Wing Public Affairs, 19 August 2013, http://www.380aew.afcent.af.mil/news/story.asp?id=123360160.

39. The Inter-American Air Forces Academy offers subjects such as information technology, supply and logistics training, security forces training, intelligence, pilot instrument training, helicopter crew chief training, and aircraft maintenance. Michelle Tan, "U.S., Latino Airmen Build Partnerships at IAAFA," *Air Force Times*, 17 April 2011, http://www.airforcetimes.com/article/20110417/NEWS/104170315/U-S-Latino-airmen-build-partnerships-IAAFA.

40. Although most of these partnerships involve Army National Guard units, some Air National Guard units have also created partnerships with certain nations, and some partnerships are joint, involving both the Army and Air National Guards. State Partnership Program events are often subject-matter exchanges, demonstrations of capabilities, or senior leader visits, usually involving the following areas (often unique to the Guard compared to active duty): disaster management and disaster-relief activities, military education, noncommis-

sioned officer development, command and control, search and rescue, border operations, military medicine, port security, and military justice. Lawrence Kapp and Nina M. Serafino, *The National Guard State Partnership Program: Background, Issues, and Options for Congress*, CRS Report R41957 (Washington, DC: Congressional Research Service, 15 August 2011), 2–15, http://fas.org/sgp/crs/misc/R41957.pdf.

41. "Our Mission," 438th Air Expeditionary Wing, accessed 6 August 2014, http://www.438aew.afcent.af.mil/main/welcome.asp. For an open-source summary of US SC to build up the Afghan air force, see Maj Gen Michael A. Keltz, "Getting Our Partners Airborne: Training Air Advisors and Their Impact In-Theater," *Air and Space Power Journal* 28, no. 3 (May–June 2014): 5–28, http://www.airpower.maxwell.af.mil/digital/PDF/Issues/2014/ASPJ-May-Jun-2014.pdf.

42. This $2.6 million figure would cover the Air Force O&M cost of the additional MSAS unit for the Pacific AOR and enable all MSASs to conduct light aviation advising.

43. This $9 million figure would cover the additional O&M costs of adding two Pacific MSAS units and one African MSAS unit and enabling all MSASs to conduct light aviation advising.

44. The Air Force can track advisor experience, language fluency, and regional/cultural skills through special experience identifiers. Only members certified as regional affairs strategists and political military affairs strategists, however, are awarded a secondary Air Force specialty code.

45. The nature of this additional SC-related training usually involves some combination of language and culture of the partner nation, coping with unknown or hostile environments, the limits of advising capability, relevant legal authorities, assessing and advising, and fitting the mission into the global combatant commander's theater campaign plan and the embassy's country plan.

46. Within Air Force Special Operations Command, the Air Force Special Operations Air Warfare Center "organizes, trains, educates and equips forces to conduct special operations missions; leads MAJCOM [major command] Irregular Warfare activities; executes special operations test and evaluation and lessons learned programs; and develops doctrine, tactics, techniques and procedures for Air Force Special Operations Forces." "Air Force Special Operations Air Warfare Center," Air Force Special Operations Command, accessed 7 August 2014, http://www.afsoc.af.mil/afsoawc/.

47. "Air Advisor Academy," fact sheet, 37th Training Wing, US Air Force, 21 February 2013, http://www.37trw.af.mil/library/factsheets/factsheet.asp?id=20201.

48. See "International Affairs Specialist (IAS)," Air Force International Affairs, US Air Force, accessed 7 August 2014, http://www.safia.hq.af.mil/internationalaffairsspecialist/.

49. Department of the Air Force, *Irregular Warfare Strategy 2013*, 9, D-4. This document compiles shortfalls from various studies and analyses such as the Irregular Warfare Capabilities Based Assessment Campaign, the 2009 US Air Force CORONA South, the US Air Force Irregular Warfare Tiger Team report, various Air Force core-function master plans, and various studies of SC conducted by the RAND Corporation for the Air Force.

50. AF/A3O-Q recently surveyed the AFFORs that support the combatant commanders on the projected SC events that the Air Force will be tasked to support in FY 2016. This data collection included the required level of training necessary to support these events.

51. Section 1203 of the FY 2014 National Defense Authorization Act provides an authority for GPF to train with the military forces or other security forces of a friendly foreign country if the secretary of defense determines that it is in the national security interests of the United

States to do so. That training may be conducted under this section only with the prior approval of the secretary of defense.

52. The Air Force is currently exploring several options that range from $2.5–5.3 million in O&M funding a year. The training venue costs were computed at the "Future of Expeditionary Skills" work group on 15–18 July 2014 for the FY 2016–20 Future Years Defense Program.

53. In addition, on the SOF side, Air Force combat aviation advisors have deployed the C-145A light mobility aircraft since 2011 to support their mission (summarized earlier) to assess, train, advise, and assist foreign aviation forces. US Special Operations Command is paying the costs of obtaining 16 of these aircraft by FY 2015 and operating them. "C-145A," fact sheet, US Air Force, 17 December 2013, http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/467765/c-145a.aspx.

54. Department of the Air Force, "Air Force Priorities for a New Strategy with Constrained Budgets," white paper (Washington, DC: Department of the Air Force, February 2012), 4, http://www.globalsecurity.org/military/library/budget/fy2013/usaf/afd-120201-027-fy13-priorities.pdf.

55. Similarly, America's security-related aviation sales and assistance processes are clearly geared toward other advanced militaries rather than emerging air forces. Making matters worse is the fact that existing US laws, policies, and authorities governing SC and assistance often do not position the United States to effectively and affordably address these needs of emerging air forces compared to its strategic competitors. For details, see, for example, Thomas K. Livingston, *Building the Capacity of Partner States through Security Force Assistance*, CRS Report R41817 (Washington, DC: Congressional Research Service, 5 May 2011), 51–54, http://fas.org/sgp/crs/natsec/R41817.pdf.

56. For example, "air component staffs agreed in their interviews that they need platforms that not only can be employed to conduct IW [irregular warfare] and BP [building partner] missions, but must also be transferrable, affordable, modular, and interoperable (TAMI). If there are no adequate US-made platforms for this purpose, the only alternative is that other suppliers (primarily Russia and China) will fill this role and diminish US influence." *US Air Force Irregular Warfare Tiger Team: Observations and Recommendations*, 22 May 2009, 5. Moreover, the United States accounted for only 17 percent of supersonic combat aircraft, 1 percent of subsonic combat aircraft, 11 percent of other military aircraft, and 14 percent of military helicopters delivered to the developing world between 2004 and 2011. This adds up to a total "market share" of sales in the developing world of all military aircraft types of only 13 percent during this period. In three of the emerging regions of particular concern to US national security interests, US market share of military aviation sales is mostly worse: 16 percent in Latin America, 7 percent in the Asia/Pacific region, and 0 percent in Africa during this period. By comparison, China and Russia combined have a 42 percent military aviation market share in the developing world globally during the same period, 29 percent in Latin America, 54 percent in the Asia/Pacific region, and 44 percent in Africa. This would not be as much of a concern if close US allies were filling much of the remaining market share, but they are not. Richard F. Grimmett and Paul K. Kerr, *Conventional Arms Transfers to Developing Nations, 2004–2011*, CRS Report R42678 (Washington, DC: Congressional Research Service, 24 August 2012), 64–68, http://fas.org/sgp/crs/weapons/R42678.pdf.

57. For example, see Col Michael W. Pietrucha, "The Comanche and the Albatross: About Our Neck Was Hung," *Air and Space Power Journal* 28, no. 3 (May–June 2014): 133–56, http://www.au.af.mil/au/afri/aspj/digital/PDF/Issues/2014/ASPJ-May-Jun-2014.pdf; and

Maj Jeremy L. Renken, "Airpower for Irregular Warfare: Reconciling USAF Theory and TACAIR Design with the Demands of Irregular Warfare and Special Operations" (master's thesis, National Defense Intelligence College, July 2012).

58. Department of the Air Force, *Irregular Warfare Strategy 2013*, 13.

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Theory, Implementation, and the Future of Airpower*

Prof. Mark Clodfelter

Since the dawn of civilization, people have tried to predict the future of war. Twenty-four hundred years ago, Thucydides addressed many enduring aspects of conflict in his great *History of the Peloponnesian War*, noting that "fear . . . honor and interest" will always motivate humans to fight. At the same time, the Chinese military philosopher Sun Tzu also expressed his thoughts on war's constant attributes, highlighting deception and the indirect approach as the best means for success.[1] Of course, no discussion of military theory would be complete without mentioning Carl von Clausewitz, whose "trinity" serves as a foundation for forecasting how the various elements of war's nature may relate to one another in a specific conflict.[2] Clausewitz also tried to decipher the constantly changing elements of war that comprise its character, emphasizing the degree of social involvement and downplaying the role of technological advances.

For the great airpower theorists, technological change was the essence of their ideas about the future of war. To individuals like Giulio Douhet, Hugh Trenchard, Billy Mitchell, and John Warden, aircraft have revolutionized warfare, and the theories that they developed detail how conflict will differ from its previous forms. Without a doubt, the continuing development of airpower will affect *how* future war is waged. Airpower has become part of what Clausewitz called the "grammar" of war—an element that has its own unique characteristics. Yet,

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whether its use in the years ahead plays out according to the theories' predictions depends upon many factors: *why* people use airpower—that is, the desired political and military objectives they ask it to achieve; the *perceptions* of those who apply airpower, of those on the receiving end of its application, and of those on the rest of the planet; the *type of conflict* in which it participates; and the *capabilities* that it possesses, which stem from the funding it has received. Of those factors, the first is by far the most important—the objective sought by a political leader who uses airpower to help attain it. Clausewitz observed that war's "grammar, indeed, may be its own, but not its logic."[3] When applied, airpower will behave according to the laws of physics and mathematics, but the rationale—the logic—for using it comes from the desired political goals.

Before examining the factors likely to affect future airpower, one would do well to define the term. Billy Mitchell's definition—"the ability to do something in the air"—allows considerable leeway.[4] His characterization could include a bullet, an artillery shell, a flock of geese, or even Kobe Bryant's three-point jump shot. A better definition comes from British air marshals M. J. Armitage and Tony Mason's book *Air Power in the Nuclear Age*: "the ability to project military force from a platform in the third dimension over the surface of the earth."[5] Now, that definition is not perfect. Armitage and Mason debate whether missiles should be included, and they are squishy about space platforms—both would seemingly fit their terminology. Further, they make no mention of cyber—not surprising for a work published in 1983. The US Air Force embraces that capability in its most recent definition of airpower: "the ability to project military power or influence through the control and exploitation of air, space and cyberspace to achieve strategic, operational or tactical objectives."[6] Even though cyber is such a different domain and could rightly be omitted from this definition, that fact does not detract from its importance. Cyber power will likely play an *enormous* role in future crises, but because of its unique characteristics and potential impacts, it should be thought of as a separate entity—one that will often complement airpower's effects.

Given cyber's distinctive nature, it would not be unusual if in the next few decades, many of the world's nations create separate "cyber services" that parallel the development of independent air forces during the last century. Accordingly, Armitage and Mason's definition suffices as a baseline for examining the factors likely to affect future airpower.

A key component of that definition is "the ability to project *military* force from a platform in the third dimension over the surface of the earth" (emphasis added). Although airpower can certainly be used for humanitarian relief and other nonlethal missions, its primary use is for *war*. As such, it will remain a political instrument employed to realize objectives sought by a nation-state or a nonstate actor. In the future, for a great power like the United States that will fight only limited wars, the political goals sought in those conflicts will always consist of two categories—"positive" and "negative," the former achievable only by applying military force and the latter only by limiting the amount of force used.[7] One must attain *both* the positive *and* the negative objectives to gain the elusive goal of "victory" in those future limited conflicts. For many such clashes, the negative objective of "winning hearts and minds" will restrain the amount of force used, whether the hearts and minds to be won are in a confined combat arena such as Afghanistan or in an unbounded region like the "Muslim world." In many cases, such "target audiences" will be present in multiple locations, and the impact of 24/7 news coverage—supplemented by "reporting" on social media networks like Facebook and Twitter—will make realization of the negative goal of favorable perceptions difficult indeed.

In future wars, *enemy* leaders' and civilians' perception of airpower's kinetic actions will be important determinants of whether a state—or nonstate actor—can use it in the pursuit of positive political goals. The perceptions of *allied or neutral* leaders and civilians regarding those kinetic actions will go far towards determining whether the actor can fulfill its negative objectives. For the United States, sophisticated manned and remotely piloted aerial platforms as well as smart munitions have significantly limited the amount of collateral damage from air strikes

and will likely make even more improvements in that regard. But in the final analysis, only the *perceptions* count. According to human-rights experts at Stanford's and New York University's law schools, the United States killed roughly 2,300 militants (only 2 percent of whom were "high level" targets) and 700 civilians (almost 200 of whom were children) in drone strikes in Pakistan from June 2004 to mid-September 2012.[8] As a result, 74 percent of Pakistan's populace now considers America an enemy.[9] Such a reaction would not surprise Clausewitz, who observed that the nature of war is enduring—a swirling mixture of emotion, chance, and rationality—and that emotion and chance will always combine to affect what is perceived as "rational." If killing 700 Pakistani civilians triggers more than 2,300 terrorist recruits, the United States will have a difficult time indeed reaching either its positive or negative objectives—not only in Pakistan but also in other limited wars against irregular opposition. Those who wield American airpower *must* be aware of such outcomes *before* committing it.

Of course, the *type* of war will matter greatly in terms of the application and effectiveness of airpower. Against enemies waging "conventional" war, the application may seem more straightforward, but positive and negative objectives will still be present. Even in the so-called good war against Iraq—the 42-day conflict of 1991—President George H. W. Bush faced the negative objective of preserving the coalition, a key factor that caused him to end the war without advancing to Baghdad. Yet, in such future conventional conflicts, airpower will dominate. As British military analyst and historian Colin Gray has noted, in "regular conventional warfare," the side with dominant airpower will usually win, and its air components will serve as the *supported* force while land and sea forces play a *supporting* role.[10] Accordingly, most future American enemies will shun a conventional fight and opt to use their own asymmetric advantages in a mix of regular and unconventional techniques known as "hybrid war." Those approaches may well include "a poor man's air force"—Scuds, drones, rockets, or cruise missiles. In 2006 Hezbollah launched a cruise missile to attack an Israeli ship, and Hamas has used drones against Israel to such a degree that

the Israelis attacked a "drone factory" in Gaza in November 2012.[11] As of 2012, 75 countries besides the United States possessed drones, with more nations actively seeking them. Eight years earlier, only 41 nations had remotely piloted vehicles.[12]

Against enemies that wage hybrid war, airpower's *nonkinetic* functions will likely play a role just as important as missions involving the dispensing of ordnance. The triumvirate of intelligence, surveillance, and reconnaissance (ISR) will prove essential in determining an enemy's location and likely course of action. Remotely piloted aircraft probably will form a significant part of the ISR equation, and space surveillance will be a vital component. If the military needs ground forces quickly, airlift will remain the most rapid means of moving them to the crisis location—assuming the availability of nearby bases. Unfortunately, the need for bases will continue to restrain airpower, especially its airlift and remotely piloted reconnaissance missions. For the United States—the world's only "global" airpower—such restrictions mean that aircraft carriers and amphibious assault ships will remain essential elements of its aerial arsenal in the years ahead.

Other factors will limit all nations' future airpower capabilities, chief among them funding—a major concern in an era of fiscal uncertainty. With the possibility of sequestration again looming and the likelihood of additional military spending cuts, even if the services dodge 2014's sequestration axe, a significant restructuring of America's air forces is a distinct possibility. The US Air Force has begun purchasing far more remotely piloted than manned aircraft, and the prospect that it will buy 1,763 F-35s—which now have flyaway costs of roughly $185 million each—is remote.[13] Similarly, the Navy and Marine Corps are unlikely to purchase their projected complement of almost 700 fighters, which have price tags in excess of $200 million each. According to some estimates, the Marines' short takeoff and vertical landing variant—the F-35B—approaches $300 million.[14] If the costs of those aircraft are to stay at those estimated figures, not only must the US military purchase its full complement of aircraft but also F-35 partner countries

have to purchase 660—and foreign military sales to other nations must reach 750 platforms.[15]

Yet, the trend is not promising. The original F-35 program called for 409 more aircraft than currently planned, and the Pentagon's proposed budget for fiscal year 2015, publicized early this year, decreased the number of F-35s that it plans to purchase in the year ahead from 42 to 34.[16] The Navy announced in March 2014 that "budgetary pressures" will cause the service to obtain only 36 F-35Cs during the next five years instead of the original 69 programmed.[17] The F-35 program is already seven years behind schedule and $163 billion over budget, causing its chief—Lt Gen Christopher Bogdan, USAF—to comment that "basically the program ran itself off the rails."[18] The enormous costs required to produce the latest and greatest aircraft designs and the difficulty of constraining that needed funding will significantly limit the number of nations that can acquire such technological marvels—and likely cause many states to concentrate on acquiring "quantity" over "quality."

Despite the exorbitant price tags for fifth-generation aircraft (the Air Force's 187 F-22s cost $422 million each), manned flight will persist as a cornerstone of America's military air components.[19] The 2012 national defense strategy addresses the Asia-Pacific region, where both China and Russia are perfecting their own fifth-generation fighters.[20] Although a conflict with either is improbable, they could sell their designs to potential US adversaries that possess the necessary financial resources. The stealth features of the F-35 and F-22 would prove invaluable against an enemy having Russia's sophisticated "double digit" surface-to-air missiles. Americans cannot consider air superiority a given in future conflicts, as has been the case over Iraq and Afghanistan. The national defense strategy further sanctions the Air Force's plans to have a new stealth bomber built in the coming decades to support the concept of "Air-Sea Battle," but funding for such an aircraft remains uncertain.[21]

In the near term, though, the Air Force desperately needs a new tanker if the United States wishes to retain its status as an airpower nation with global reach. The first of four KC-46 tanker test models rolled out of Boeing's plant in Everett, Washington, this past January after a 12-year ordeal to reach that milestone. By 2027 the Air Force plans to build 179 new tankers that can deliver triple the fuel, three times as many cargo pallets, and twice the passengers as the Eisenhower-era KC-135s that they will replace.[22] Obtaining that capability, however, will not come cheaply: the estimated flyaway cost per KC-46 is $194 million.[23] As with the F-35 and the proposed stealth bomber, funding issues will doubtless be a concern as tanker production intensifies, and such issues could limit the inherent strategic capability that the US Air Force retains in the decades ahead. Bernard Brodie's 1959 observation that "strategy wears a dollar sign" remains an airpower truism a half century later.[24]

America's political and military leaders face abundant challenges when it comes to developing airpower that will serve the nation's future needs. They must skillfully allocate funds to assure that they have the best technology and the best-trained personnel to fight different kinds of enemies who will wage different types of war. They must be capable of orchestrating the various components of airpower to help achieve the positive and negative objectives that will comprise the war aims in those disparate conflicts. For the United States, airpower is—and will continue to be—a *vital* element of its ability to wage war, *regardless* of the type of war it fights.

Airpower can also be a seductive force, especially for America's political leaders. As Colin Gray writes,

> When politicians want to "do something," most especially when they need to be perceived as doing something, and when other nonmilitary and military options either are not available or could only work slowly and uncertainly, it is a great temptation to reach for one's airpower "gun." Airpower will usually be the first preference for US policy makers who feel the need to make a bold, hopefully decisive, statement through action. Alas, too often, it is highly expedient to resort to kinetic airpower as the default op-

> tion; it is the expedient tool for those who are impatient or desperate. . . . Because American airpower, necessarily and advantageously, is all but ubiquitously available to lead or support military action, it cannot help but invite and produce addiction.[25]

The "airpower option" will continue to be available for American leaders in the future, and they will have to fight the urge that it can provide them with a quick, efficient, and bloodless solution to any national security crisis. In that regard, it would serve them well to turn first to their Clausewitz before they reach for a Reaper or an F-22. ✪

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US Military Innovation

Fostering Creativity in a Culture of Compliance

Col John F. Price Jr., USAF

Innovative Spark

Almost 2,400 years ago, Plato wrote, "Yet a true creator is necessity, which is the mother of our invention."[1] These words have resonated through the centuries and have transformed to a maxim describing how challenging conditions are often needed to spark innovation, especially in environments reluctant to change. As the wars of this century begin to fade, the US military faces a daunting fiscal environment, personnel drawdowns, and continually altering threats that create ideal conditions for new ideas and change. To capitalize on this opportunity, senior leaders must promote a clear understanding of innovation and work to shape the military's culture of compliance into one of disciplined creativity.

Understanding Innovation

The landscape of American military dialogue on innovation has become cluttered over the last two decades with sensationalized language of transformation and revolutions. Somewhere along the way, our infatuation with technological change led us to view innovation as a point instead of a process—a dangerous error because it creates an unrealistic expectation for future innovation. As Michael Siegl points out, "innovation is a complex process that is neither linear nor always apparent. The interactions among intellectual, institutional,

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and political-economic forces are intricate and obscure. The historical and strategic context within which militaries transform compounds this complexity."[2] Innovation in the military, as in other sectors, seems an isolated event only when we intentionally separate the culminating breakthrough from the sequence of preceding events. If we view history with this restricted view, then Edison's light bulb and the Wright brothers' aircraft appear as dynamic manifestations of inspiration. Conversely, if we view these innovations as products in their full context, then we begin to see innovation as the consequence of creativity and effort applied over time.

In the course of the American military experience, the dialogue on innovation has slowly transitioned from the assumption of individual genius as its primary source to technological breakthrough and adaptive tactical application as recognized drivers. However, the increased emphasis on technology undermines the important role of individual advocacy and organizational culture in the innovative process. In his article "Understanding Innovation," Col Thomas Williams argues that "true innovation is not a discrete event or individual action, but a process. As a process, it demands that leaders understand multiple complex systems. Innovation thus includes building consensus and preventing interference or sabotage from risk-averse or hostile players. It also requires an understanding of differing frames of reference, intricate structures, and diverse control and boundary systems."[3] Sometimes this understanding is connected with preexisting conditions rather than revelations associated with new breakthroughs. It seems that "the people who appear as great innovative thinkers are often only pointing out what has become true, but not yet commonly known and accepted."[4] The lesson for military leaders is that the next great breakthrough does not have to come from their organization, their service, or even the military. Since truly new ideas are rare, it is likely that the next innovation is already here and just awaiting recognition.

Embracing Innovation

This concept of receptivity to innovation is another recurring theme in US military history. Whether contemplating the transition to maneuver warfare or the gradual acceptance of aircraft as something beyond observation platforms aloft, the military establishment has consistently demonstrated a reluctance to embrace innovative methods. Although the aspects of individual and organizational resistance to change have been well documented, the hierarchical nature of the military makes it especially reluctant to embrace major shifts. As Gary Hamel notes, "the worshipful observance of precedent is a very good thing for those who sit at the top of organizations, because precedent protects their prerogatives. It rewards the skills they've perfected and the knowledge they've acquired in running the old thing. But precedent . . . is a very bad thing for anyone who wants to create a new future."[5] To combat this dynamic, senior leaders must openly embrace creativity and informed risk taking. Gen Mark Welsh, the Air Force chief of staff, gladly accepts these concepts by including the phrase "Powered by Airmen, Fueled by Innovation" in the service's new vision statement and thus takes the right first step in shaping the culture.[6]

During periods of open conflict, the military establishment has demonstrated increased receptivity to technological innovations—witness the stealth aircraft and bunker-busting munitions in Operation Desert Storm or remotely piloted aircraft in Afghanistan and Iraq. Clearly, political-military circumstances affect our receptivity to risk and, hence, innovation. According to Michael Horowitz, nations respond differently to potential innovations because of what he terms adoption-capacity theory: "The combination of financial intensity and organizational capital possessed by a state, influences the way states respond to major military innovations and how those responses affect the international security environment."[7] Establishing the right approach to innovation entails more than simply posturing to become the source of the next breakthrough. Developing a culture of creativity signals intent to

friends and adversaries that the organization intends to remain postured and relevant, even in the face of fiscal or political changes.

It is important to note from the theory that tactical or technological developments do not ensure success by the innovator. Instead, as Michael Mosser observes in his analysis of Horowitz, "innovations often benefit precisely those states who were not involved in the innovations themselves, but who were able to better implement them into their own cultures and bureaucracies."[8] This is a great reminder for military leaders to encourage their members to seek innovations from all sources—military or civilian, ally or adversary.

Innovative Risk and Reward

This theory poses an interesting quandary for American military leaders. Not only do they need to push the envelopes of tactical and technological development but also they must ensure the applicability and receptivity of those developments; otherwise, they could miss opportunities and become unintentionally innovating for others. Yet, at the same time, they are reluctant because of the cost and risk involved in pursuing innovation. As Terry Terriff points out, "military organizations thus have been and continue to be in the problematic position of needing to innovate new military concepts and technologies in order to sustain or regain their effectiveness, all the while recognizing that innovations adopted today may be less effective or even inappropriate tomorrow."[9] The looming period of fiscal austerity threatens to make the military even more reluctant at the very time it most needs creativity and innovation.

To combat this tendency, military leaders must focus on fostering a culture of creativity and intelligent risk taking. Siegl writes that "military culture is the linchpin that helps determine the ability to transform because it influences how innovation and change are dealt with." The development of receptive culture is essential because "transformation and innovation are the results of a continuous, deliberate process

of learning and adapting."[10] Additionally, from an external standpoint, Mosser argues that "a state must have the *capacity* to recognize, utilize, and inculcate within the ranks of its military and policy community innovations that arise in the international arena" (emphasis in original).[11] Therefore, it should be clear that the development and sustainment of an innovative culture in the US military requires sustained, deliberate effort by senior leadership.

A Note of Caution

In many debates over the correct approach to innovation in the US military, the bureaucracy ends up bearing the brunt of the critique from those who advocate greater creativity. Often blamed for stifling the creative potential of military members, the bureaucratic system actually provides the control and structure needed to enable innovation. The promise of future innovation must be balanced with the organization's need for stability and continuity. Innovation is a worthy goal, but we must keep its pursuit in perspective. According to Prof. Robert Quinn, "We tend to treat innovation with reverence. We have romanticized it, and we are always chasing after it, as if it is some holy grail." Although this notion may seem counterintuitive, given all of the rampant advocacy for innovation, Quinn argues that a clear, negative side exists to having too much of a push for change: "Innovators, for example, can be creative, but if they push their inclinations too far, their behavior leads to belligerence, chaos, disastrous experimentation, and unprincipled opportunism."[12] Depending upon the circumstances, this excess can offer the aggressive spark needed to trigger a full transformation, or it can become a time-consuming distraction. Interestingly, this can be a matter of perspective, as seen in the life of Brig Gen William "Billy" Mitchell. His actions during the interwar years pushed the envelope of military aviation by demonstrating the ability to attack naval vessels from the air, but superiors deemed his advocacy sufficiently radical to warrant his court-martial. Senior leaders, therefore, must ask

how the innovative genius of mavericks like Mitchell would be received in today's military.

Charting a Future Path

At the end of his thought-provoking text *Mastering the Dynamics of Innovation*, James Utterback offers these sobering words to organizational leaders:

> In a stable and effective but conservative organizational environment the reward for improving existing technology, products and processes is greater than the incentive to turn the world on its head. Thus ground breaking changes are viewed as difficult, disruptive, unpredictable, and risky, while incremental innovations are seen as reliably producing predictable results more quickly. It is a great irony that wisdom for many firms that derive current good fortune from radical innovations of the past lies in erecting barriers to these same types of innovations today.[13]

The future of the US military and, consequently, the US position in the international system hinges on how current leaders approach innovation over the next several years. If they work to sustain the innovative spark by fostering a culture of responsible risk taking, then the United States will probably ride the waves of innovation and sustain its prominent position on the global stage. Conversely, if fiscal and political pressures drive the emphasis to stability, compliance, and continuity, the spark of innovation likely will be limited to incremental changes or extinguished altogether. Acknowledging the risks, we must move forward with confidence that the creativity and drive inherent in our military and corporate partners are sufficient to warrant the risks and that aggressive innovation is the only truly sustainable path ahead. ✪

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The Soviet Biological Weapons Program: A History by Milton Leitenberg and Raymond A. Zilinskas. Harvard University Press (http://www.hup.harvard.edu/), 79 Garden Street, Cambridge, Massachusetts 02138, 2012, 960 pages, $55.00 (hardcover), ISBN 9780674047709.

In *The Soviet Biological Weapons Program*, Dr. Milton Leitenberg of the University of Maryland and Dr. Raymond A. Zilinskas of the Monterey Institute of International Studies provide a comprehensive account of the Soviet Union's 65-year biological weapons program. The authors reach the pinnacle of scholarly achievement by documenting the Soviets' program as the longest and largest of its kind, involving 65,000 scientists, engineers, and support staff spread across a dizzying array of civilian research centers, ministries, and agencies—all involving a level of secrecy exclusive to the Kremlin.

The authors explore every part of the program, including technical aspects, what the United States and British intelligence knew, the role of the Warsaw Pact allies, and the risk of proliferation. Yet, as Leitenberg and Zilinskas stress throughout, much remains unanswered and will likely stay that way because the Russian Ministry of Defense's doors remain sealed—especially to Western scholars. The high level of secrecy has kept the offensive portion of the program hidden from us, so most of the book refers to the defensive component. Understanding the Russian facade is of the utmost importance since "both institutes [the State Research Center for Applied Microbiology (SRCAM) and Vector] have vast culture collections of pathogens, equipment, and supplies that could be valuable to nations or terrorist groups intent on acquiring biological weapons. Corruption that could lead to the international proliferation of biological weapons is of global concern" (p. 246).

Furthermore, the authors offer an ongoing analysis about why the Soviet Union committed to a biological weapons program even though

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the United States proclaimed in 1969 to have ended its own program. The most promising explanation dates back to the Russian Civil War (1917–22), during which the Russians learned the power of disease as it reached pandemic proportions, killing more people than did combat. Fighting sickness became a priority that easily transitioned into weapons research. Moreover, by offering lucrative incentives, Soviet politicians convinced graduating PhDs in the fields of biology, chemistry, and genetics that weapons research was crucial to Soviet security. The program has remained active to this day despite a number of political missteps such as the 1979 anthrax epidemic in the city of Sverdlovsk, blamed on contaminated meat, and Gen Valentin Yevstigneev's accusation in 1999 that the United States used Colorado beetles as a military tactic to destroy crops.

All things considered, *The Soviet Biological Weapons Program* is relevant and worthwhile to the Air Force community. However, at 712 pages of text and another 209 pages dedicated to four appendixes (acronyms and Russian terms, a glossary, and two sets of official historical documents) together with notes and an index, the book presents a formidable challenge to the reader. However, it is an invaluable source for the individual or organization that seeks an undiluted account of the Soviet Union's obsession with biological weapons. Lastly, given the fact that the Chemical and Biological Weapons Nonproliferation Program remains an issue among foreign policy analysts, Leitenberg and Zilinskas chillingly declare that the Russian Ministry of Defense preserves the "residual ability to protect and maintain, to an unknown extent, the offensive BW [biological weapons] program" (p. 711).

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NASA Historical Data Book, vol. 7, **NASA Launch Systems, Space Transportation / Human Spaceflight, and Space Science, 1989–1998**, NASA SP-2009-4012, by Judy A. Rumerman. US Government Printing Office (http://bookstore.gpo.gov), P. O. Box 979050, St. Louis, Missouri 63197-9000, 2009, 1,050 pages, $59.00 (hardcover), ISBN 978-0-16-080501-1.

Because space power includes all of a nation's space capabilities, the National Aeronautics and Space Administration (NASA) and its activities are key components of American space power. Judy Rumerman's seventh entry in the series of *NASA Historical Data Books*—reference guides and compendiums of information that cover the civil space program's activities immediately following the end of the Cold War—is a very useful tool for space power historians and scholars. Between 1989 and 1998, NASA enjoyed tremendous successes and suffered devastating defeats. It launched 215 expendable launch vehicles, conducted 66 space shuttle missions, flew to the Russian *Mir* space station, began construction of the International Space Station, and initiated 30 space science missions (successfully exploring the Jupiter system but failing in every Mars mission). Rumerman ably catalogs a great deal of information about each of these space activities, and her efforts will make future research into all of these missions much easier.

She makes extensive use of annual budget estimates, press kits and releases, mission operations reports, various books and government reports, and website information to compile details on NASA programs and projects that range from technical diagrams and mission data to detailed budgets. Relatively brief but impressive introductory essays for each chapter offer much-needed context to the various heaps of data that Rumerman provides. The result is a thorough guide to every NASA mission accomplished within the time frame.

The first chapter explains NASA organization, appropriations, and management procedures during the selected decade. Other chapters include information on launch and space transportation (roughly 20 percent of the book), human spaceflight (35 percent), and space sci-

ence (40 percent). Summary text comprises one-third to one-half of each chapter, the rest filled with graphics, figures, and tables of data. The author's presentation format is remarkably useful, allowing interested readers to look up a particular mission in the comprehensive index, read a brief summary, and then scour the pages of pertinent tables, figures, and pictures. The book contains a great deal of information on every NASA mission active during this period and is comprehensively documented so that scholars who need additional data know where to find it.

Of course, as a reference book, it is not meant to be read cover-to-cover. The written sections of each chapter are capable, easily readable summaries, but Rumerman's volume belongs on a library's shelf—not on a professional reading list. It has relevance to the Air Force community as an indispensable guide to NASA activities for educational and research institutions, but even Airmen attempting to build comprehensive personal libraries need not purchase this volume. However, anyone needing information on NASA activities from 1989 to 1998 should consult volume 7 of Rumerman's *Historical Data Book*. It's a great place to start—and perhaps even finish—collecting the required material.

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The U.S. Nuclear Arsenal: A History of Weapons and Delivery Systems since 1945 by Norman Polmar and Robert S. Norris. Naval Institute Press (http://www.usni.org/navalinstitutepress), 291 Wood Road, Annapolis, Maryland 21402, 2009, 240 pages, $49.95 (hardcover), ISBN 978-1-55750-681-8.

Modern-day nuclear warriors who have served after the Cold War and do not know much about their heritage should read *The U.S. Nuclear Arsenal*. This well-written text offers an in-depth view of a different time when nuclear weapons were used for any and every occasion. Regardless of the reader's knowledge of these weapons, their

delivery vehicles, or their strategic use, he or she not only will learn about the different types and their functions but also will discover how we continue to field a nuclear arsenal much smaller than the one we possessed during the "glory days."

This reference guide begins with a strategic view of nuclear devices, their development and fielding for operational deterrence, and the reduction of the inventory following the Cold War. The discussion provides an impressive overview of why certain weapons platforms were developed rather than others, reminding readers that strategic planning during the Cold War guaranteed "mutually assured destruction."

Having established the importance of nuclear weapons to US military strategy, the authors then shift to a *Jane's*-like narrative. That is, the remaining chapters examine the entire nuclear arsenal and its delivery vehicles, including all of the different warheads and bombs, and then proceed to strategic and tactical aircraft and missiles as well as artillery. The authors cover any designed nuclear weapon that affected any airframe, missile or artillery system, or naval asset, offering a brief overview of the weapon or delivery system and explaining its role in the nuclear war plan, including yields and operational limitations.

For example, present-day Air Force nuclear warriors can look up the B-61 bomb's yields and weights, different weapon modifications, operational deployment, and the aircraft slated to carry it (pp. 61–62). The book also includes such interesting historical items as the Davy Crockett M28/M29, developed as a 0.25 KT warhead on a recoilless rifle used at the battalion level against Soviet armored forces (pp. 245–46).

The U.S. Nuclear Arsenal will only increase the reader's appreciation for our nuclear inventory and spark interest in the nuclear enterprise of yesterday and today. Further, the accessible writing style will foster critical thinking about the current state of the nuclear arsenal and the weapons perspective of planners, operators, and leaders.

Weapons equipped with the Global Positioning System have modernized the fighting of war. Instead of using inaccurate "dumb" bombs

or missiles with large yields, we can produce "shock and awe" from much more accurate conventional weapons with a fraction of the yield—weapons that can possibly meet the same operational requirements on the battlefield. Indeed, Air Force Global Strike Command's mission calls for "develop[ing] and provid[ing] combat-ready forces for nuclear deterrence and *global strike operations*." The command gives almost equal importance to conventional operations and their effect on the enemy.

Changes in technology and the defeat of superpowers have reduced our current nuclear arsenal to only a shadow of its original state. The authors hint at the future of the arsenal, but any critical reader will ask about what lies ahead and where we go from here. Smaller budgets, aging weapon systems with no replacements, and an overextended military have led us to this critical juncture, and, as yet, we have no satisfactory answers for such questions.

The authors' discussion of nuclear testing suffers by omitting a chronological list that summarizes all of the Department of Defense's tests, including weapons and locations. Such an account would have added clarity to the confusing mass of operations with different names. Inclusion of a timeline would provide a useful link for all the weapons comprising the nuclear enterprise.

A thought-provoking book written by well-educated and respected authors, *The U.S. Nuclear Arsenal* is an exceptional work rich in history, strategy, and operations. It is a must-read for any nuclear warrior or anyone who wishes to become more knowledgeable about the most important enterprise in the Department of Defense.

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Black Ops, Vietnam: The Operational History of MACVSOG by Robert M. Gillespie. Naval Institute Press (http://www.usni.org/navalinstitutepress), 291 Wood Road, Annapolis, Maryland 21402, 2011, 320 pages, $41.95 (hardcover), ISBN 978-1-59114-321-5.

If you are expecting a first-rate thriller that takes you through exciting, pulse-pounding missions carried out by studies and operations group (SOG) operators during the Vietnam War, then keep looking. As you peruse the cover, do not be fooled by the prominently displayed Military Assistance Command, Vietnam, Studies and Observations Group (MACVSOG) insignia and the stirring title *Black Ops Vietnam*. Pay attention to the fine print—in this case, *The Operational History of MACVSOG*, the key word being "history." Even though not best described as a page-turner, *Black Ops Vietnam* is an extremely well written and organized history book that documents MACVSOG from its inception to its withdrawal from Vietnam. Author Robert M. Gillespie is a "one-hit wonder" of sorts who had not published any major works prior to *Black Ops Vietnam* nor any since. This fact does not diminish what is so far Gillespie's masterpiece since he certainly qualifies as a reputable source of historical information, having earned BA and MA degrees in history combined with an extended tour of US military service. This is not the type of book that a casual reader will pick up for an entertaining read, but it will certainly grab the attention of strategists and military history buffs, especially those interested in Vietnam and SOG history.

Black Ops Vietnam details the MACSOG, commissioned to covertly conduct "black" operations in Vietnam, including reconnaissance, psychological operations, and sabotage. As a comprehensive analysis, it covers a wide range of themes, from the makeup and training of reconnaissance teams themselves to the logistical idiosyncrasies of insertion, extraction, and support of the entire operation. The book is organized in a predictable manner, starting with antecedents and then chronicling MACVSOG's involvement in the Vietnam conflict year by year, including biographical information about each commander. Since

it is a history book, some sections are mutually exclusive and only minimally interdependent. Each chapter contains logical, standardized subsections that allow for easy reference if, for example, a reader wanted to examine a certain aspect of history such as airborne or cross-border operations over the span of the conflict. This setup is advantageous because it allows readers to skip some sections either irrelevant to their study or, quite frankly, not that interesting. Granted, the occasional reader might find some value in knowing the number of helicopters the unit had on hand at a given time or the annual MACSOG budget, but some of the logistical details tend to detract from the more relevant and stimulating historical narrative. It does a terrific job recounting the relationship that MACVSOG commanders had with civilian partners at the Central Intelligence Agency and with other higher headquarters at operational and strategic levels. This insight supplies background to some of the choices made on a larger scale—those that affected not only MACSOG but also conventional units in-theater. To his credit, Gillespie does an exemplary job of scrutinizing declassified documents, memoirs, and citations in an effort to provide a look into MACVSOG that is unequalled in the current literature of the subject. Keeping conjecture and speculation to an absolute minimum, the author candidly addresses the successes and, seemingly, many failures of the MACSOG.

Although the book typically provides brief factual data on day-to-day operations, it also goes into more detail on some prominent, significant events, such as the murder of Vietnamese national Thai Khac Chuyen by Green Berets and Operation Tailwind. In a strange twist, the author chooses to address the public controversy surrounding Tailwind 18 years after it occurred but does not offer such a retrospective look for other high-profile incidents. The book also contains many inspirational accounts that examine individual heroes of the unit and their actions, effectively keeping the casual reader interested in what would otherwise be a somewhat dull history book. What *Black Ops Vietnam* lacks in compelling prose it makes up for in historically accurate, verifiable accounts of many aspects of MACVSOG generally not avail-

able to anybody other than research historians. Of note, it is refreshing to see that the author pays significant attention and gives credit to the Montagnard, Chinese Nung, Cambodian, Taiwanese, and Vietnamese personnel who fought and died alongside American MACVSOG forces.

Black Ops Vietnam is unique in that it fills a void in the market for a comprehensive and consolidated study of MACVSOG from a third-person, unbiased historical perspective. In the 1990s, Charles Reske published *Mac-V-Sog Command History*, a series of books made up of separate annexes that cover MACVSOG through different periods of the Vietnam conflict. In 2011 Jason Hardy published *MAC V SOG: Team History of a Clandestine Army*, an aesthetically pleasing series that incorporates a number of previously unpublished pictures and graphics along with personal accounts derived from the veterans themselves. Gillespie's book has an edge simply because it is a concise, objective synopsis of MACVSOG history, conveniently published in a single volume.

In light of the unprecedented focus on current special operations forces, this book should pique the interest of strategists and operators alike who wish to explore some of the finer aspects of covert warfare. *Black Ops Vietnam* is an accurate historical account of MACVSOG operations from the beginning to the end of the Vietnam conflict. It is not an edge-of-your-seat page-turner that leaves you wanting more. With an unbiased point of view, Gillespie addresses both sides of military operations, often including accounts from communist forces that faced MACVSOG on the battlefield. In the context of modern wars, *Black Ops Vietnam* is relevant and significant simply because it effectively summarizes lessons learned in utilizing covert irregular-warfare methods that can be easily applied to combating an unconventional enemy or insurgency today.

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The Influence of Airpower upon History: Statesmanship, Diplomacy, and Foreign Policy since 1903 edited by Robin Higham and Mark Parillo. University Press of Kentucky (http://www.kentuckypress.com/), 663 South Limestone Street, Lexington, Kentucky 40508-4008, 2013, 317 pages, $40.00 (hardcover), ISBN 978-0-8131-3674-5.

The Influence of Airpower upon History is an aggressive attempt to present the reader with a panoramic view of the use of airpower as an instrument of national power. Editors Robin Higham and Mark Parillo illustrate airpower's significance by examining civil, commercial, and military aviation from 1903 through the early twenty-first century. The book contains nine articles from scholars in the fields of aviation and military history as well as a foreword by retired Air Force general Richard B. Myers, former chairman of the Joint Chiefs of Staff.

Higham and Parillo, both of whom teach military history at Kansas State University, are recognized airpower scholars, and this volume will only add to their credentials. Coeditor of *Why Air Forces Fail: The Anatomy of Defeat*, Robin Higham has demonstrated that he is no airpower zealot. He and Parillo treat airpower as a subject worthy of serious study and reflection—not as a panacea that any statesman can use to solve problems on the world stage. They bring this viewpoint to *The Influence of Airpower upon History*, and General Myers lends credibility to their approach with his statement in the foreword that the book "highlights the capabilities and limitation of the air domain."

The nine authors chosen to contribute to the book present essays that could be expanded into stand-alone studies. Their chapters examine often-overlooked aspects of airpower's employment in the twentieth century—for example, French aviation in the interwar years, Stalin's use of airpower, the growth of airpower in Latin America from 1945 to the end of the last century, and a welcome look at China's development of airpower. The chapters address the impact that political personalities and different political systems have had on decisions to employ, or not to employ, airpower as an instrument of national power. Furthermore, the contributors thoroughly cover the role that

technology has played in shaping military airpower and the advantages that come with advances in airframes and weaponry. As technological development renders some aircraft obsolete, many of those platforms have gone on to play important roles in other nations' arsenals. For example, the British Sea Fury and the American F-51 were put to use in the struggle for Cuba long after their utility in the Second World War had passed and they had been replaced by more advanced weapons. Also of great interest is the chapter entitled "Gunboat Diplomacy" although these gunboats refer to US aircraft carriers and their use by different presidential administrations in pursuit of national security objectives—a topic especially worthy of consideration in our current geopolitical environment.

Although the book is ostensibly an examination of the synergistic effects of civil, commercial, and military aviation on a nation's airpower, civil aviation gets very little treatment. The various chapters discuss commercial aviation to some extent, but the introduction states that the American airline company Pan Am played a role in the successful exclusion of German interests in Colombia and Latin America in the 1930s. However, no chapter examines this very interesting historical episode—only a few sentences in the chapter on Latin America. Including an expanded account of this subject would have bolstered the editors' claim that commercial aviation has in fact played a role in diplomatic affairs and has made significant contributions to airpower in general.

Regardless of the editors' coverage of civil and commercial aviation, the contributors' treatment of the military component of a nation's airpower makes *The Influence of Airpower upon History* an invaluable reference. This sweeping survey of the age of manned flight is timely and appropriate, especially as we head deeper into the unheroic age of satellites and remotely piloted vehicles. Higham and Parillo deliver a fitting epilogue to a passing era. After reading this cautionary tale that outlines the advantages nations stand to gain through the proper employment of airpower, one hopes that current and future statesmen

will heed its advice, even as remotely piloted vehicles change the cost-risk calculus upon which the decision to employ airpower traditionally rested. This book is highly recommended to airpower enthusiasts, scholars, statesmen, and general readers alike.

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America's Space Sentinels: The History of the DSP and SBIRS Satellite Systems, 2nd ed. expanded, by Jeffrey T. Richelson. University Press of Kansas (http://www.kansaspress.ku.edu), 2502 Westbrooke Circle, Lawrence, Kansas 66045-4444, 2012, 392 pages, $39.95 (hardcover), ISBN 978-0-7006-1879-8; $24.95 (softcover), ISBN 978-0-7006-1880-4.

This edition of Dr. Jeffrey T. Richelson's *America's Space Sentinels* contains a much-welcomed update to his 1999 groundbreaking first edition of the history of the United States' infrared (IR) early warning satellite programs. The author ably attempts to corral the facts, assumptions, and mythos behind the Defense Support Program (DSP) and its follow-on, the space-based infrared system (SBIRS). A well-recognized name within academic circles for his expertise in national security and intelligence community issues, Dr. Richelson summarizes the crux of the issue, first posited by national security planners in the 1950s: "Can heat plumes from intercontinental ballistic missiles be viewed from space?" The apparent thoroughness of the text takes the original question and expands on more complex issues that appeared in later decades (e.g., funding, range of viewing, and the effectiveness of IR-based early warning technology).

Through a variety of primary and secondary sources, Dr. Richelson traces the genesis of the IR-detection satellite program. From Joseph Knopow's late-1940s conceptual design for a satellite equipped with an IR radiometer and telescope, Lockheed Missile Systems would create a subsystem to the WS-117L space-based reconnaissance effort (best

known for the extremely successful Discoverer/CORONA reconnaissance satellite effort). Follow-on programs included Program 461 and the next-phase satellite, given the purposefully obscure moniker "Defense Support Program." The operationalization of space-based IR early warning occurred in the 1970s, immediately fulfilling the requirements of strategic missile data for national security planners. As Dr. Richelson chronicles, so detailed and accurate was the data returned from DSP that other "gee-whiz" capabilities began to manifest themselves during the late 1970s and 1980s.

As with any wholly successful program, the addition of minor secondary tasks results in divergence from the system's original purpose—a phenomenon dubbed "mission creep." The most prevalent example of this mission creep for the DSP was creation of the attack and launch early reporting to theater (ALERT) during Operation Desert Storm. The DSP's ability to pick up not only strategic missiles but also theater ballistic missiles opened a door of overwhelming possibilities for space-based IR collection. New mission requirements were codified and coalesced into SBIRS, the DSP's successor program. Immature technology and ill-defined objectives for SBIRS caused two breaches of the Nunn-McCurdy Amendment (limiting the cost of weapons procurement) in 2001 and 2005, causing Congress to consider cancelling the program. However, cessation of the DSP program (ending at flight 23), forced SBIRS into a "cannot fail" situation.

Glaring errors and omissions plague a good number of Dr. Richelson's books, mostly due to his use of secondary and tertiary sources along with heavily redacted primary sources. *America's Space Sentinels* is no exception. Because of the sensitivity of this subject matter, early reports involving DSP and its associated organizations (i.e., Aerospace Defense Command, Air Force Space Command, the 5th Defense Space Communications Squadron) remain heavily redacted. This situation creates a problem for academic researchers trying to re-create an accurate history. In 2000, R. Cargill Hall, chief historian of the National Reconnaissance Office, published his unclassified manuscript *Missile Defense*

Alarm: The Genesis of Space-Based Infrared Early Warning, which detailed the early days of the Missile Defense Alarm System (MIDAS) and Program 461. Richelson's first edition did not include Hall's research for obvious reasons; however, 12 years passed before release of the second edition, but again Richelson makes no mention of Hall's findings. Flight data in Hall's monograph does not quite match up with Dr. Richelson's although readers should approach both with honest skepticism. The dates of satellite launches, for example, are off by one day, a discrepancy attributed to the use of Universal Coordinated Time ("ZULU") versus Pacific Standard Time. Additionally, Dr. Richelson's selection of sources for the "new" epilogue is a bit troubling in that he takes many articles from industry-standard newspapers such as *Space News* and the *Washington Post*, with a scattering of governmental reports or analyses (mostly from the Government Accountability Office). The epilogue's detailing of SBIRS seems less an academic synthesis of events than an afterthought of chronological accounting from open sources.

This systemic failure to update knowledge gained in the last 14 years is expertly illuminated by entries on pages 224 and 237 of *America's Space Sentinels*. In part of the "new" epilogue, Dr. Richelson states clearly that "at the beginning of 2012, the DSP/SBIRS network consisted of . . . DSP Mobile Ground Terminals (MGTs) at Holloman Air Force Base, New Mexico" (p. 237). However earlier in the text (p. 224), he mentions that the DSP MGT mission equipment was transferred from New Mexico to the Colorado Air National Guard's 137th Space Warning Squadron (SWS) in late 1995, a full four years before the first edition and 17 years before this second edition. A rapid search of the Internet for authoritative sources, such as the 137 SWS's Air National Guard fact sheet, clearly states that the MGT trucks are no longer in New Mexico.

Regardless of sources, the information that Dr. Richelson has compiled for this book is amazing in its breadth and depth. With all of its identified errors, the text remains the *only* comprehensive book on these two critical national security satellite programs and will con-

tinue as a benchmark in the ever-increasing library of US space history books.

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In the Skies of France: A Chronicle of JG 2 "Richthofen," vol. 1, 1934–1940 by Erik Mombeeck and Jean-Louis Roba with Chris Goss. Self-published (http://www.luftwaffe.be/), ASBL La Porte d'Hoves, Esselaar 22, B-1630 Linkebeek, Belgium, 2009, 316 pages, $99.94 (hardcover).

Erik Mombeeck and Jean-Louis Roba's book *In the Skies of France* provides the first in-depth history of Jagdgeschwader 2 (JG 2), the storied World War II Luftwaffe fighter wing formed more than 70 years ago. A quick Internet search of multiple book vendors verifies that only two other books about JG 2 have been published since 2000. Mombeeck and Roba trace the origins of JG 2 from the end of World War I, through the founding of the new Luftwaffe in 1933, to the unit's creation in 1934 and its service until the end of 1940.

Early on, JG 2 appeared destined to become a significant part of the Luftwaffe. Shortly after its creation, the unit received the distinctive title "Richthofen," thus linking it to Baron Manfred von Richthofen (the "Red Baron"), Germany's top ace during World War I. Accordingly, the unit's aircraft sported a badge with red script "R" on the fuselage. Although most Luftwaffe units saw time on both the Western and Eastern Fronts, JG 2 remained primarily in the West (deploying in 1942 to Africa) throughout the war to face the Allies. Of particular note, JG 2 played a key role in the attack on England during the Battle of Britain, conducting daily attacks against the Royal Air Force in the skies over southern England.

The authors choose to begin their book at the conclusion of World War I, giving readers a valuable understanding of the formation of the

Luftwaffe and the German flight experience entering World War II. They then methodically chronicle JG 2's activities and combat action, offering a day-by-day account and highlighting individual victories in daily tables.

Mombeeck and Roba make extensive use of JG 2 veterans' photographs and their personal recounting of events (gleaned from interviews and diaries). Because the text lacks a bibliography, the exact number of veterans contacted is difficult to determine, but a casual count reveals more than 25. Indeed, 30-40 percent of the text consists of excerpts from JG 2 veterans. The remainder focuses on providing both an overview of events and stitching the personal passages into a single coherent story. In addition to the numerous personal recollections, *In the Skies of France* boasts over 400 photographs, each of which includes a detailed caption. For each photograph, the authors identify not only the people, places, events, and times but also the aircraft, their markings, and any unique variations in the paint scheme.

Mombeeck and Roba have published several earlier volumes relating the activities of other German flying units. As in those books, they intend to tell the story of JG 2 in multiple volumes, thus providing a thorough look at the unit's combat activities without sacrificing depth of coverage. As of this writing, volume 2, *1941–1945*, has not yet appeared.

Although an appendix of the cumulative totals of kills and aircraft losses would have proven beneficial, the book does include appendixes that detail every air-to-air victory and aircraft loss that JG 2 recorded from 1934 to 1940. To supplement their text and its extensive collection of black-and-white photographs, the authors supply an appendix of color artwork depicting JG 2's early aircraft and various Me 109 models and paint schemes.

Aviation buffs will find *In the Skies of France* a valuable look into the actions and combat exploits of a German fighter wing. The photos add considerable value to the book and help bring to life both the authors' and the veterans' discussions. The extensive use of original source ma-

terial in the form of diaries, personal logbooks, and interviews will interest historians and researchers; however, the lack of reference data (notes and a bibliography) reduces the text's usefulness to researchers. More detailed appendixes with detailed lists of commanders, bases, total victories, and losses (to name a few topics) would have been helpful, but their absence is not a fatal flaw. *In the Skies of France* remains a valuable contribution to the study of the Luftwaffe during World War II. Hopefully, the authors will publish volume 2 in the near future. The rest of JG 2's story waits to be told.

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Reviewing the Nuclear Nonproliferation Treaty (NPT) edited by Henry Sokolski. Strategic Studies Institute, US Army War College (http://www.strategicstudiesinstitute.army.mil/pubs/), 47 Ashburn Drive, Carlisle, Pennsylvania 17013-5244, 2010, 455 pages, ISBN 1-58487-444-9. Available free from http://www.strategicstudiesinstitute.army.mil/pubs/download.cfm?q=987.

Reviewing the Nuclear Nonproliferation Treaty (NPT), an academic compilation published by the Strategic Studies Institute, attempts to decipher the complex and relevant topic of the NPT. It analyzes the treaty's history, assesses its past effectiveness, and makes recommendations for the future. Although the book presents the entire treaty (11 articles), most of the work focuses on the following NPT articles: I (nuclear states will not transfer weapons technology to nonnuclear states); II (nonnuclear states will not take weapons technology from nuclear states); III (all states will take up safeguards and allow the International Atomic Energy Agency to inspect and review all safeguards to make sure they are in compliance); IV (all parties may fulfill their rights to nuclear energy research/use); V (all parties shall benefit from peaceful nuclear explosions/actions); VI (all parties agree to work towards halting a nuclear arms race and realizing disarmament); and X (all parties to the treaty may withdraw if they feel that certain danger-

ous conditions are developing / the treaty will undergo a 25-year review for relevancy/updates).

By emphasizing these key sections, the contributors give readers an understanding of the background of the NPT as well as highlight the more contentious areas and the treaty's various flaws (especially enforcement). They make no attempt to hide their assertion that the NPT lacks the authority or strength to enforce nonproliferation in the post–Cold War era. When the treaty was officially ratified in 1970, only five countries (United States, USSR, United Kingdom, France, and China) had nuclear weapons. Yet, many others sought to join that club. As a result, a combination of nuclear and nonnuclear states wanted to establish some type of forum for the purpose of curtailing the spread of nuclear weapons. The effectiveness of the treaty during the Cold War remains a subject for debate. Much of the diplomatic wrangling in the 1960s concerned hearing the concerns of the nonnuclear states. Yet, even within the terms of the NPT, there existed areas of ambiguity and questioning by the member states, especially when it came to sharing peaceful nuclear-energy technology.

Since 1970, three nations (India, Pakistan, and North Korea) have successfully tested nuclear weapons. Others have either attempted (Iraq and Syria) or continue to attempt (Iran) to develop them. However, other countries, such as South Africa, South Korea, Brazil, and Libya, halted their nuclear weapons programs. The role that the NPT played in the failures or successes of stopping nuclear proliferation remains disputable. *Reviewing the Nuclear Nonproliferation Treaty* does not seem to indicate that the NPT was particularly successful in halting proliferation. Even as the treaty was reratified indefinitely in 1995, questions about its effectiveness continued to surface. Text devoted to the matter of sharing the peaceful capabilities of nuclear energy, which the contributors spend considerable time analyzing, notes that although peaceful nuclear energy and its components by themselves do not mean that the creation of nuclear weapons is a certainty, the most effective nuclear energy programs tend to come from those na-

tions that have nuclear weapons. It is not easy—but not impossible—for the same components that provide nuclear energy to establish the basis for a nuclear weapons program.

Ultimately, the contributors take the position that the NPT, though developed with the best of intentions, is fundamentally flawed and too weak to serve as an effective deterrent to the proliferation of nuclear weapons. They especially bemoan the lack of an effective mechanism to punish nations that withdraw from the treaty and still develop nuclear weapons (North Korea is the prime example). Given the fact that Iran continues to press ahead with its nuclear program in spite of international condemnation, the treaty appears powerless to stop a new nuclear arms race. If it could more effectively punish violators, the treaty might still work, but at present that capability does not exist. (The authors acknowledge that relaying concerns to the UN Security Council represents a start but is not strong enough.)

Reviewing the Nuclear Nonproliferation Treaty is academically oriented and meant for the serious student who wants to delve deeper into the history and inner workings of the NPT. It is informative and well researched in many of its articles but tends to make for very dry reading. For an Airman working nuclear proliferation issues, it is a relevant study for consultation. Given the ramifications of countering nuclear proliferation, especially when it fails, Air Force professionals will find it useful to consider/review.

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