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AIRPOWER FOR HYBRID WARFARE

Michael W. Isherwood

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Brig. Gen. Billy Mitchell

On September 12, 1918 at St. Mihiel in France, Col. William Mitchell became the first person ever to command a major force of allied aircraft in a combined-arms operation. This battle was the debut of the US Army fighting under a single American commander on European soil. Under Mitchell's control, more than 1,100 allied aircraft worked in unison with ground forces in a broad offensive—one encompassing not only the advance of ground troops but also direct air attacks on enemy strategic targets, aircraft, communications, logistics, and forces beyond the front lines.



Mitchell was promoted to Brigadier General by order of Gen. John J. Pershing, commander of the American Expeditionary Force, in recognition of his command accomplishments during the St. Mihiel offensive and the subsequent Meuse-Argonne offensive.

After World War I, General Mitchell served in Washington and then became Commander, First Provisional Air Brigade, in 1921. That summer, he led joint Army and Navy demonstration attacks as bombs delivered from aircraft sank several captured German vessels, including the SS *Ostfriesland*.

His determination to speak the truth about airpower and its importance to America led to a court-martial trial in 1925. Mitchell was convicted, and resigned from the service in February 1926.

Mitchell, through personal example and through his writing, inspired and encouraged a cadre of younger airmen. These included future General of the Air Force Henry H. Arnold, who led the two million-man Army Air Forces in World War II; Gen. Ira Eaker, who commanded the first bomber forces in Europe in 1942; and Gen. Carl Spaatz, who became the first Chief of Staff of the United States Air Force upon its charter of independence in 1947.

Mitchell died in 1936. One of the pallbearers at his funeral in Wisconsin was George Catlett Marshall, who was the chief ground-force planner for the St. Mihiel offensive.

ABOUT THE MITCHELL INSTITUTE: The General Billy Mitchell Institute for Airpower Studies, founded by the Air Force Association, seeks to honor the leadership of Brig. Gen. William Mitchell through timely and high-quality research and writing on airpower and its role in the security of this nation.

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A NEW CHALLENGE

The first [and] most far-reaching ... judgment that the statesman and commander have to make is to ... [determine] the kind of war they are embarking on, neither mistaking it for nor trying to turn it into something that is alien to its nature.¹ —Clausewitz, On War

In these early decades of the new century, huge force-on-force clashes and low-level irregular warfare aren't the only threats faced by US military forces. Relatively small hostile groups either have or could acquire in the next few years access to sophisticated and lethal weaponry. With modest training, modern communications, and strong command and control, these forces can employ such advanced weapons in concert with established guerrilla tactics and gain lethal effects once unavailable to such fighters.

Analysts are calling this type of conflict “hybrid warfare”—blending elements of different forms of combat. Participants in hybrid contests will comprise both nation-states and nonstate actors—sometimes with both on the same side, sometimes opposing one another. This distinctly new type of military challenge requires national security strategists and force planners to understand new realities and prepare America's armed forces to meet them.

HYBRID WAR AND AIRPOWER

Hybrid warfare blurs the distinction between pure conventional and pure irregular warfare. At present, it is also a term with at least three applications. Hybrid can refer, first, to the battlespace environment and conditions; second, to enemy strategy and tactics; and third, to the type of force the US should build and maintain. Early examinations of this phenomenon have often used the term to apply to all these possibilities. In February 2009, Marine Corps Gen. James Mattis referred to both hybrid enemies and a hybrid force the US might design to counter them.²

In hybrid contests of the future, US forces could confront state and nonstate adversaries that employ a range of what could be considered “conventional” weapons—from guided mortars to cruise missiles to cyber weapons—in a manner merging lethal and nonlethal effects. The adversaries may employ ambush tactics one day while engaging in fixed formation, conventional attacks the next.

The weapons and tactics of hybrid warfare thus will reflect a merging of conventional and unconventional fights. When it comes to political objectives, hybrid warriors will most likely adopt those of irregular warfare, where the practitioner seeks to undermine the legitimacy and authority of a ruling regime. This will require US military forces to help strengthen the government's ability to provide social, economic, and political needs of its people.

Hybrid warfare is conceptually distinct in that it envisions low-tempo but

nevertheless lethal action at different points along the spectrum of conflict at the same time. The American military experience in Kosovo, Afghanistan, and Iraq led the Joint Staff to reformulate its phases of war. Commanders now plan for operations from Phase Zero shaping through dominant operations and into stability and reconstruction. This formula was an important extension of the core phases of preparation and major combat. However, the additional phases still pictured a sequential set of operations progressing from shaping and deterring to seizing the initiative, major combat, and stability. Hybrid warfare is different in that it allows for an adversary to engage at multiple phases at the same time and puts a different set of demands on military forces.

The rise of hybrid warfare does not mean that the US must abandon central tenets of its strategy. The past decade suggests that the asymmetric advantages of US military forces can adapt well to the task of defeating enemies who present hybrid war offensive operations. A bigger danger lies in relying too much on a manpower-intensive strategy that has applications in counterinsurgency operations but may be less versatile and less effective when measured against the demands of hybrid war scenarios.

Nor should the prospect of hybrid war replace planning for high-intensity conventional scenarios. For one thing, regional powers are capable of mounting serious challenges with high-end capabilities. For another, hybrid war can, in most circumstances, easily escalate from that state into full-scale conventional combat. Hybrid war planning is not a substitute for maintaining US military superiority in depth.

Despite the fact that the definition is not entirely set, the US has had plenty of time to examine the likely course of hybrid war. As a result, military planners are reasonably certain about the nature of hybrid warfare and the strategy that the US must adopt to succeed in it. What is also clear is that US air and space forces (hereinafter, simply “airpower”) can provide the foundation for the nation’s response. Airpower offers the warfighting components resources that can cover great distances, survive, persist, and gain desired lethal and nonlethal effects with great precision. Other components of US power will be strengthened by the contributions of intelligence-surveillance-reconnaissance (ISR) systems, rapid mobility forces, precision-strike capability, and power to integrate networks in a unified command and control (C²) network. In this manner, airpower can underpin the nation’s course of action in hybrid war.

As this paper maintains, airpower can simultaneously contend with the spectrum of conflict—from simple low-intensity attacks to high-intensity, sophisticated uses of force against a major adversary. Within the hybrid battlespace, for example, an F-35 providing overwatch for a ground convoy could use its advanced electronically scanned array (AESA) radar as an offensive cyber weapon, direct its advanced air-to-ground surveillance radar’s ability to track insurgents moving on foot, or simultaneously detect a cruise missile. These capabilities reflect the relevance of airpower to the new warfare style. This versatile and adaptable airborne ISR force is essential to any hybrid

campaign. As the defining element of hybrid warfare is the belligerents' ability to employ a wide range of weaponry—from simple to complex—with sophisticated and complex tactics, airborne ISR forces must have the agility and technical breadth to detect and track a wide range of threats or activities in exquisite detail. Beyond this, air forces will make major supporting and supported contributions in mobility and precision firepower in the hybrid battlespace. A full understanding of hybrid warfare and US responses to it requires more thinking on how best to use airpower.

This study examines the emerging capabilities of conventional forces and threats, and then reviews how the new technologies can be applied to meeting other types of contingencies. After defining the nature of hybrid warfare and elements required to meet it, the study examines airpower's unique and critical contributions to the conduct of hybrid warfare with its ISR, mobility, strike, and C² forces.

THE HYBRID ARSENAL

The danger posed by an enemy that is not only skilled in the practice of guerrilla warfare but also in possession of top-notch conventional weapons is not a new phenomenon. Note, for example, that North Vietnam was perhaps the world's top practitioner of insurgency at the time that it deployed, in 1971, the SA-7 surface-to-air missile (SAM), which proved a major threat to US aircraft.

What's different about hybrid war for today and beyond is the lethality of the high-end weapons that may enter the mix. To begin with, though, there can be little doubt that the post-Cold War arms bazaar and the ongoing development activities of major powers leaves the US confronting a serious and growing challenge in conventional arms—on land, at sea, and in the air.

Mindful of US Army advances, potential adversaries are fielding improved land systems. These include the Russian T-90 tank with explosive reactive armor and advanced IR countermeasures to defeat US weapons.³ Armies worldwide are actively seeking to improve the lethality, range, and accuracy of all of their weapons. These weapons range from those employed by dismounted soldiers to sophisticated weapon systems which seek to secure superiority or, at least, to neutralize an opponent's advantage.

At sea, potential adversaries are likewise seeking to deny the United States its long-standing advantages in conventional naval power projection. Hard to locate diesel-powered submarines have begun to proliferate, with 40-plus nations putting to sea a total of some 400 quiet diesel attack boats.⁴ Moreover, the nations of the world, many of them actively or potentially hostile, have fielded an estimated 75,000 cruise missiles for anti-ship purposes.⁵

China, for example, will have between 25 and 50 diesel-powered or nuclear-powered attack submarines, in addition to a significant number of older

Romeo or Ming undersea warships.⁶ Newer submarines, such as the latest Kilo class, carry supercavitating, high-speed torpedoes capable of achieving 200 knots.⁷ While the older submarines are easy to detect and defeat, naval analysts worry that China may use the antiquated vessels as bait for the more capable US attack submarines.⁸ This would pose a dilemma: Should a US sub engage the older Chinese boat, thereby revealing its position, or let them through a screen and hope they are engaged by closer in anti-submarine assets?

The Chinese Navy also has fielded four—with a reported option for two more—advanced Sovremenny class destroyers, each armed with the sea-skimming, Mach 3 SS-N-22 anti-ship cruise missile.⁹ Capable of flying a mere 15 feet above the surface, it can range over 125 miles, giving naval forces very little time to react when it appears on the horizon. The Sovremenny ships will be complemented by anti-air warfare destroyers outfitted with a phased array air surveillance radar similar to the US Aegis capability, as well as stealthy, fast-moving, cruise missile-firing attack ships using a revolutionary catamaran hull. Cruise missiles from submarines and land-based bombers will supplement the destroyer threat.¹⁰

When it comes to airpower, the advanced Russian-designed Su-27 and Su-30 fighters pose a significant threat. These aircraft are or soon will be operational in the air forces of some 18 nations worldwide. China is fielding both.¹¹ Equipped with a passively scanned radar array, an advanced anti-radiation detection system and using a fly-by-wire system, the Flanker will have air-to-ground as well as advanced air-to-air capabilities. The Flanker offers a “bridge” capability between the fourth generation F-15C and F/A-18 fighters and fifth generation aircraft such as the F-22 and F-35.

The SA-10 and SA-20 surface-to-air missile systems threaten US air operations with a phased array radar guiding a high-speed missile capable of reaching out to a perimeter of 250 miles. With this range, the SA-20 can deny access to American ISR assets such as the RC-135 Rivet Joint, E-3 AWACS, and E-8 Joint STARS aircraft, effectively preventing them from gathering data. The SA-10 and SA-20 are in, or about to be in, the air defense forces of a dozen nations.

Potential adversaries are investing in more than traditional maritime and air defense assets. China has fielded an over-the-horizon radar that when coupled with space forces and long-range unmanned vehicles, allows them to potentially detect and track aircraft carriers at sea.¹² This surveillance and tracking capability allows China to employ ballistic missiles with maneuverable re-entry warheads to more effectively place at risk US naval forces in the western Pacific.¹³ China has more than 1,000 ballistic missiles in its inventory, while procuring 100 or more each year.¹⁴ Equipped with satellite navigation systems, re-entry vehicle guidance systems, and advanced sub munitions, ballistic missiles are more accurate and more lethal than previous versions. Newer versions of these systems will feature maneuvering warheads capable of hitting aircraft shelters or moving ships at sea.

The modernization effort is matched by fielding computer network attack and space denial capabilities.¹⁵ While China has been in the lead of developing or fielding a large extent of these advanced capabilities, a variety of other nations are deploying them, although not in the same numbers or mix. Nonetheless, these maritime, air, space, and cyberspace weapons are dramatically more lethal than the military capabilities the US forces defeated in Iraq, Afghanistan, or Kosovo.

GREAT REORIENTATION

The very existence of such advanced air, land, and sea capabilities will always make major theater war a persistent and worrisome possibility. Still, it seems beyond question that their fearsome destructiveness actually strengthens conventional deterrence—the tendency of both sides of an international argument to shy away from actual combat for fear the damage suffered would far surpass any possible gain from “winning” the war. As a result, prospects of the US engaging in direct combat with Russia or China, while far from zero, are deemed by most to be relatively small.

For that reason, the Pentagon has refocused its attention upon low-intensity, irregular warfare (IW) operations. DOD views IW as “a violent struggle among state and nonstate actors for legitimacy and influence over the relevant populations.”¹⁶ Thus, the nature of the combatants and focus are different in IW. Furthermore, in its IW Joint Operations Concept, DOD segregates IW into distinct activities—ranging from counterinsurgency and counterterrorism to stability operations, civil-military operations, and the defeat of organized criminal activity.¹⁷

This bifurcated approach has been shown to be susceptible to a “this-war” vs. “next-war” debate, with scholars, military officers, and others staking out positions on which one is more important than the other. This creates a false premise for force planning, strategy, and doctrine development. Gates himself has played a role in this debate, having criticized what he saw as an overemphasis on preparation for “conventional” combat at the expense of preparing for IW.¹⁸

In recent months, however, Gates has begun to shift his rhetoric. In a much-quoted scholarly article, he observed, “The categories of warfare are blurring and no longer fit into neat, tidy boxes. One can expect to see more tools and tactics of destruction—from the sophisticated to the simple—being employed simultaneously.”¹⁹

In an April 6 briefing, Gates noted: “I think that this debate between conventional and irregular [warfare] is quite artificial. Most of the people that I talk to are now increasingly talking about, instead of one or the other, a spectrum of conflict in which you may face at the same time an insurgent with an AK47 and his supporting element with a highly sophisticated ballistic missile, where you have what we have been calling in the last year or so complex hybrid warfare.”²⁰

Everyone seems to agree on the basics of hybrid warfare: nonstate combatants, employing or having access to advanced conventional capabilities of a nation-state, functioning as belligerents either independently or with the cooperation of actual nation-states.

Such adversaries are likely to employ advanced weapons and systems in novel, nontraditional ways. While a nation-state may employ them in order to rapidly defeat an adversary, the hybrid warrior may use them to extend the length of the conflict by executing a dramatic, highly lethal event in order to demonstrate his vitality and staying power in the fight. When delivered in sufficient numbers against sufficiently important targets, conventional capabilities employed in this manner can frustrate a nation-state's conventional forces with an adverse effect on its strategic end state.

HEZBOLLAH'S HYBRID WAR

The classic and much-cited case study of hybrid warfare is the summer 2006 conflict between Israel's national military forces and the forces of Hezbollah (the "Party of God") operating in southern Lebanon. Hezbollah agents kidnapped two Israeli soldiers, prompting Israel to launch large-scale air, naval, and ground operations into Lebanon. The Israeli Air Force, which went into action immediately, destroyed a huge number of Hezbollah's long range rockets in its initial attacks.

However, Hezbollah was not disarmed. It chose to respond to Israel's offensive with a steady campaign of short-range rocket attacks, firing more than 4,000 at population centers in Israel over the course of the war. The majority of the rockets were 122 mm Katyushas deployed and launched within 15 miles of the Lebanon-Israeli border.²¹ The Hezbollah rocket offensive caught the attention of international media and defense analysts. They focused on how the barrages disrupted Israeli communities and shaped international perceptions out of proportion to the scale of actual losses.

To fully appreciate the developments in this style of war, one must examine the weapons, tactics, and organizational structure used by Hezbollah.

Hezbollah took a number of steps to influence Israel at the strategic level. While the Katyushas were fired in the greatest quantity, Hezbollah had six long-range unguided weapons, all capable of reaching beyond 15 miles. Just as important, Hezbollah employed these weapons in a variety of ways. Often, they relied upon fixed sites, which concealed the weapons and offered a minimum signature. Such tactics put great stress on Israeli ISR forces tasked to find and fix them. In addition, Hezbollah fired rockets from highly mobile vehicles, such as Mercedes Benz 6 x 6 trucks equipped with launchers.²² By mixing civilian vehicles with military hardware, Hezbollah placed multiple demands on ISR resources, requiring a high-fidelity sensor and processing capacity to discriminate combatant from noncombatant vehicles.

Hezbollah also employed more sophisticated weapons, such as the C-802 anti-ship cruise missile that struck the Israeli warship *Hanit (Spear)* on July 14. The missile has an effective range of 75 miles and comes with a 300-pound warhead. It requires a transporter-erector-launcher, radar, and fire control—reflecting a degree of weapon system knowledge not normally associated with IW forces. In this instance, Hezbollah fired two C-802 missiles, with the first flying high over the ship as a decoy and the second missile skimming the water at 15 feet to impact with the hull.²³

Hezbollah also has employed yet another advanced “strategic” system; it has operated Mohajer unmanned aerial vehicles (UAV) over northern Israel to gather intelligence and conduct other missions. This UAV can fly at speeds of 80 knots and operate at 5,000 feet above ground level. While used in the past for reconnaissance only, reportedly it could carry about 100 pounds of explosives. Hezbollah employed nonlethal signals intelligence collection systems that allowed them to monitor cell phones and Israeli radio communications.²⁴

Taken as a whole, these weapons and systems offered Hezbollah fighters a strategic arsenal that departed from what is usually available to guerrilla or irregular forces.

In the tactical fight against the Israeli Army, Hezbollah also has employed a variety of weapons not common to guerrilla fighters—among them, seven different advanced anti-tank munitions. These included the AT-13 Metis, with a one-mile range, and the AT-14 Kornet, which relies on a thermal site to guide the missile to a target three miles away. These weapons damaged or destroyed 18 Israeli tanks and caused 40 percent of Israeli casualties.²⁵ Beyond employing these weapons effectively with anti-tank teams to trap Israeli armor, Hezbollah also used anti-tank weapons in room-to-room fighting, firing them through a wall when Israeli soldiers occupied the next room.²⁶

Beyond the variety of weapons, Hezbollah’s organization and tactics are worth noting. Hezbollah demonstrated the ability to innovate in a tactical situation. Officials estimated that the number of Hezbollah fighters ranged from 2,000 to 7,000 men.²⁷ Of those, 500 to 600 were fully trained and dedicated fighters, with the remaining troops having a lesser degree of training.²⁸ These personnel were organized into cells of seven to 10 men each. These units operated in a semi-autonomous manner in which cell leaders were given latitude to act with minimal guidance from the higher echelons. They employed a complex set of communication techniques, including elaborate call signs and a secure cellular phone system, allowing them to communicate with their leadership. Fighters within the cells often communicated with short-range, two-way radios.²⁹

The Hezbollah higher command also used a sophisticated set of command posts. From these, they gave general and specific orders, managed the deployment of units, ordered attacks and counterattacks, and directed tactical command and control functions.³⁰ Altogether, this organizational and C² network allowed Hezbollah units a degree of operational and tactical flexibility and initiative that Israeli forces had not seen in the past.

Just as noteworthy, Hezbollah fighters wore uniforms, helmets, web-gear, insignia, body armor, even dog tags in a way similar to that of a nation-state's military forces. At one point, Israeli soldiers mistook Hezbollah fighters for their own forces because Hezbollah fighters wore similar gear—until one Israeli noticed their adversaries were wearing running shoes.³¹

For all that, however, Hezbollah fighters did display traits peculiar to the traditional guerrilla fighter. To withdraw from combat, the fighter simply returned home, stored his weapon in his house, and changed back into civilian clothes, melting back into noncombatant status even while continuing to be a latent threat to Israeli forces.³²

Hezbollah's tactics differed from those of the more typical guerrilla that relies on hit-and-run attacks, roadside bombs, and sniper fire while rarely seeking to engage in a prolonged fight. In 2006, Hezbollah cells demonstrated discipline. Fighters often waited for Israeli forces to close within 50 yards before engaging. They allowed lead elements to pass in order to attack the Israeli main troop body. Hezbollah constructed tunnels between buildings, allowing them to move or reinforce positions after the start of an engagement.³³ They developed kill zones in which multiple Hezbollah firing positions simultaneously engaged the Israeli forces. They also counterattacked to regain ground, fighting for hours at a time. Finally, their bunker system was well-developed and supplied with food, water, and ammunition for weeks of combat operations.³⁴

When examined in total, the evidence makes clear that Hezbollah organized itself, prepared and outfitted its forces, and used tactics that represented a significant departure from past forms of irregular combatants. Things could have turned out far worse. The speed, range, survivability, and power of the IAF disabled many of Hezbollah's weapons and, in other cases, prevented them from being used.

IRAQ AND AFGHANISTAN

New forms of conflict have emerged in places other than in Lebanon. US experiences in Iraq and Afghanistan also are cases in point. They, too, offer insights into this type of conflict and how force planners and military officials should prepare organizations, weapon systems, and doctrine.

US forces in Iraq have encountered conditions where combatants present a mixed adversary in terms of organizations, weapons, and tactics. As the US forces invaded, they confronted not only Saddam's armor and infantry forces but also paramilitary units, the so-called "Saddam Fedayeen." In fact, the first US marine killed in action was shot by a member of the Fedayeen.³⁵

Following major combat operations, the conflict transitioned to what US forces know as a counterinsurgency fight. Many of the weapons and tactics mirror those used by irregular forces, with roughly 90 percent of the attacks

composed of small arms, rocket propelled grenades, or mortars in a direct or indirect fire role. The other 10 percent, however, used complex weapons, multiple attack axes, and unusual modes and forces such as remotely detonated improvised explosive devices (IEDs) in conjunction with direct and indirect fire. The more-complex attacks used maneuver, target reconnaissance, and tactical deception.³⁶

So, while the Hezbollah had years to prepare, train, organize, and plan for their operations against Israel, belligerents in Iraq demonstrated the ability to learn, adjust, and develop more sophisticated operations as time progressed.

Organizationally, the conflict in Iraq has also presented hybrid challenges. American forces in Iraq have contended with a varied and complex network of adversaries and alliances based on diverse and often temporary interests. These groups range from former regime elements, foreign fighters, and criminal elements to tribal and clan fighters and religious extremists.³⁷ The belligerents' activities are often apportioned on the basis of geography or group identity—for instance, one clan in a network might have responsibility for constructing IEDs, while another would be responsible for emplacing them.

Meanwhile, US operations in Afghanistan also faced a hybrid environment. The Taliban and other hostile groups have engaged in a mixed style of warfare that requires the US and NATO partners to confront an enemy using a range of tactics and weapons. A significant part of the violence often focuses on civilians, such as when Taliban fighters intimidate by assassinating key local leaders or beheading schoolteachers. The Afghan combatants have, however, engaged in large-scale attacks, too. Taliban fighters have used a large force to overrun a US paratrooper outpost, ambushed a French patrol, killing 10 French troops, and fought from defensive trenches against a force of Canadian troops trying to expand its reach west of Kandahar.³⁸

As a result, the International Security Assistance Force (ISAF) relies on not just civic society building actions resident with the provincial reconstruction teams or isolated patrols through towns and villages, but also air, infantry, and armored forces to engage in decisive firefights mirroring the integrated air, sea, and land battle doctrine of conventional warfare.

WHEN NATIONS GO HYBRID

Terrorists and subnational ad hoc combatants are not the only ones to use unconventional means and forces blending a variety of weapons, C² tools, and tactics. Nations on occasion have developed similar forces and plans.

One is North Korea, which has developed hybrid capabilities in its special operations forces (SOF). Numbering more than 60,000 troops, the North Korean SOF would, in time of war, swiftly move to infiltrate South Korea by

air, land, and maritime routes to attack military, political, and civilian targets. They would do this to both disrupt military operations and reduce the population's confidence in the government.³⁹ This latter focus mirrors the objective associated with irregular warfare.

If the US were ever to go to war with North Korea, the American response would be led by its conventional military forces. The overall nature of that conflict would require the US to adjust its campaign modestly from its past conventional operations, such as Operations Desert Storm or Allied Force. When the nature of the conflict involves more counterinsurgency, counterterrorist, or stability operations missions and there are nonstate actors present in the battlespace, the US would have to develop a tailored hybrid campaign in response.

North Korea is not alone. Iran, also, has forged a ready force for such military actions. It has the 125,000 member-strong Iranian Revolutionary Guards, which are known to be prepared to augment conventional efforts while also supporting guerrilla activities in Iran and other countries.

Nations also are playing the biggest role in yet another major category of unconventional conflict—cyber-war. Nation-states are suspected of exploiting this domain, as when Russian was allegedly shut down Estonia's Internet capability or manipulated information flow as Russian tanks rolled into Georgia in 2008.⁴⁰ In the same manner, Chinese agencies have been frequently suspected of hacking into US computers, particularly those of the Defense Department.⁴¹

Nonstate actors are equally adept at cyber-attacks and disruption. From hackers using an Apple II computer to access government computers to the "ILOVEU" and "Code Red" viruses that caused billions of dollars in damages, individuals or groups have been serious threats to the cyber domain on which US national military forces critically depend.

US forces will face adversaries who employ a mix of traditional and nontraditional means, methods, tools, forces, and personnel. In these situations, the combatants will rely on a range of C² means—from information age technology to feudal methods of hand-delivered messages. They will occupy and exploit complex terrain, such as congested urban centers, sparse mountains, or dense jungles. They will use these environments to conceal their planning and operations by denying US sensors the ability to discriminate them against their backgrounds.

US forces will face hostile elements employing a wide range of weapons—from small arms in direct attacks to long-range systems relying on space-based precision navigation and sophisticated terminal guidance controls. US forces will confront a wide range of organizational structures and diverse, flexible tactics and assorted weaponry. Furthermore, future adversaries may seek objectives that do not fit into the conventional or irregular warfare categories. A future belligerent could shift between fielded forces to the political legitimacy of the government—or a mixture of both.⁴²

KEYS TO VICTORY

Experience has suggested that a predominantly conventional US military campaign will be insufficient in the hybrid contest due to the predominant presence of nonstate belligerents and the contest's focus on influencing the population and the legitimacy of the government.⁴³ As such, nonmilitary instruments of power must contribute in a more significant manner in the campaign with economic, social, informational, and psychological elements.⁴⁴ RAND recently articulated this necessity after it reviewed a number of counterinsurgency campaigns and identified seven factors key to success:⁴⁵

- Physical security.
- Basic services such as power, food, and water.
- Functioning medical care.
- A system of justice.
- Functioning economic processes.
- Educational opportunities.
- A fair political system.

It is clear that most of these must be provided by civil elements. Recognizing this, however, does not minimize the role of the US armed forces. On the contrary, military units are the key to the very first requirement—security. At the same time, US military forces must also build the capacity of the host nation security forces—enabling them to secure their own society. Providing medical care, a justice system, political expression, and economic opportunity may be tasks that are generally outside the expertise of military forces, but none can be provided absent the security that such forces provide.

Given the daunting challenges of hybrid warfare, what military systems, capabilities, and units should the US field? What are the qualities and attributes that will be needed if the US is to mount an effective response? A review of the writings and public presentations on the subject suggests that seven qualities will be needed in the military that enters a hybrid war.

- Lethal and nonlethal weapons.
- Kinetic and nonkinetic capabilities.
- Power to impose measured costs on adversaries.
- Tight force protection.
- Organization across all forces and components.
- Deep knowledge of a foe's anti-access strategies and capabilities.
- Technology that enhances the value of manpower.
- Persistence in effect.

Collectively, these qualities enable the joint force to be more effective and efficient in the hybrid combat environment. It is important to adopt a strategy that, although technology-focused, does not diminish the human element of hybrid warfare. Rather, a technology-focused strategy allows the US to sustain forces over time while providing discriminating assets agile enough to meet the challenge of demanding circumstances. A technology-focused approach is consistent with how the US confronted the Soviet threat during the

Cold War, when the Defense Department opted to field higher quality weapon systems rather than match the Warsaw Pact's quantitative capabilities.⁴⁶

Using a manpower-intensive strategy would carry ghastly costs—both financial and human. With 55,000 US and NATO troops deployed to Afghanistan in early 2009, the coalition has one troop for every 582 Afghans. If the US deployed an additional 100,000 troops, bringing the total force level to mirror those in Iraq, the ratio would increase to one military personnel per 200 Afghans—a level where, nonetheless, one soldier, sailor, airman, or marine would not be able to interact, protect, or have an effective presence among the population. Technology is useful only as a means to enable the human element to perform—in effect, to make the performance of soldiers, sailors, airmen, and marines more effective and efficient.

The current Defense Department leadership is also embracing a technology-based approach. Michael Vickers, assistant secretary of defense for special operations/low-intensity conflict and interdependent capabilities, has stated that he sees the US shifting from “manpower-intensive counterinsurgency campaigns in Iraq and Afghanistan” to what he calls “distributed operations across the world.”⁴⁷ Such an approach would rely on dozens of small teams dispatched to find, track, and kill members of transnational terror networks.

Ground commanders now are shifting operational concepts to support a technology-intensive strategy. At the theater level, the Marine Corps, for example, has articulated a concept known as “Distributed Operations.” The service expects to deploy and employ Marine Corps squads, platoons, and companies “across a large area of operations ... dispersed beyond the normal range of mutually supportive organic direct fires, but linked through a command and control network.”⁴⁸ Marine Corps forces will exert control over the expanded area by relying on robust ISR assets to “sense an expanded battlespace” and having the ability to rapidly concentrate forces at the needed time and place. Once confronting an adversary, Marine Corps commanders will employ highly accurate lethal and nonlethal fires to disrupt and defeat hostile forces.

Many capabilities and technologies will enable Distributed Operations at the tactical level (as envisioned by the Marine Corps) or theater and global level. Airpower forces, however, are in a strong position to provide the foundation for the nation's response in hybrid war. Airpower forces operating in the vertical dimension provide an impressive list of capabilities—speed, perspective, long range, potent firepower, nonkinetic effects, persistence, survivability, and flexibility.

These established airpower attributes help shape how airpower forces perform as the foundation for the nation's strategic response. The individual soldier and marine (or sailor or airman, for that matter) on the ground will always be a key element. However, ground forces must contend with the limits and obstruction of terrain in two dimensions. Operating in three dimensions, airpower forces can range across the entire battlespace and provide capabilities that all components will call upon.

The key tasks in high demand by the joint and combined force are four: persistent awareness, rapid air mobility, precision strikes, and integrated networks that pull together all force elements and coordinate execution. Clearly, the airpower component of the Joint force provides unique access to these capabilities. No other component offers similar value.

PERSISTENT AWARENESS

The complex nature of hybrid warfare demands of military commanders and civilian leaders an exquisite awareness of their operating environment or, as the Marine Corps puts it, a “sense of the battlespace.” They seek to understand the planning, force disposition, operations, and lethality of potential threats that endanger their operating environment. The information must be gained against a background of dynamic and complex human, urban, and informational terrain as well as bare mountains and dense jungles. In these environments, the hybrid adversary may be a low contrast enemy, hiding among the civilian population and exploiting an “electronic sanctuary” created by the global telecommunications market.⁴⁹ Finding and isolating this kind of adversary and discriminating such an adversary against its background will be a daunting and demanding challenge.

Airborne ISR forces can collect a broad array of information. As any US hybrid campaign must include civic organizations, civil elements need situational awareness as much as military units do. For example, the US Agency for International Development (USAID) has played a key role in Iraq and Afghanistan. USAID personnel would benefit from knowing not just who might support their projects, but who could hinder their reconstruction efforts and what activities are being planned to disrupt USAID’s operations. Compared to the military components, USAID’s requirements, however, will be political, economic, and cultural in nature. Likewise, organizations and agencies providing economic, judicial, police, educational, political, and agricultural support will have needs that are nontraditional to the military ISR force but tailored to their unique contributions.

Collectively, the response to hybrid warfare means that airpower forces will have to expand the aperture of their ISR sensors to collect data on political, social, demographic, cultural, and economic issues.

The necessity to increase ISR collection requirements in hybrid warfare scenarios is driven by a fundamental fact: When the center of gravity in a political and military contest is the population, experience has shown that “intelligence is king.”⁵⁰ Information gained from ISR operations can unmask hostile elements and other influences which undermine the US objective. Superior information enables US forces and their partners to reinforce the legitimacy of the government to the population.

How this information is gained requires a disciplined and extensive collection network. No single sensor or approach can provide all the necessary

information. Commanders value and need a “layered” ISR architecture to meet varied requirements.

Floods of Imagery. UAVs and associated full-motion video (FMV) have dominated the ISR arena in the last decade. Predator video, with its precise reconnaissance ability and persistence to stare at one location for extended periods of time, has become the high-demand asset. But Predator is not the only UAV providing electro-optical (EO) and infrared (IR) imagery. A number of UAVs have been deployed to support US forces in the Mideast, where more than a thousand systems are in operation today.⁵¹

These UAVs include more than 10 types of small, man-portable handheld systems that meet only a tactical commander’s needs in the fight. At the next level, battalion and brigade commanders have seven additional UAVs.⁵² Collectively, these assets have allowed ISR imagery and FMV capabilities to be widely available with positive effects.

Army Gen. Raymond Odierno, the US senior commander in Iraq, praises the abundance of airborne imagery assets available at the lowest levels of his command for their ability to meet his tactical commanders’ specific intelligence requirements. From his perspective, these systems have enabled a number of regular Army combat units to function with the effectiveness associated with SOF units due to the increased EO/IR FMV capabilities.

The UAV force, including USAF’s MQ-1 Predator and its larger brother, the MQ-9 Reaper, is not the sole source of imagery information. USAF operates five EO/IR sensor suite-equipped U-2 aircraft and six with optical cameras. The Navy’s P-3 has been adapted to support ground forces with EO and IR sensors while the Air Force is also deploying the MC-12W to supplement the Predator and Reaper force with EO, IR, and signals intelligence (SIGINT) sensor suites. USAF’s RQ-4 Global Hawk UAV has provided imagery support, as well, despite still being in development.

FMV and spot imagery alone will not meet all ISR needs in the US campaign in a hybrid conflict. In fact, FMV and imagery support normally is at the end of the ISR functional chain—but is the first product many request. Fortunately, commanders have more assets available than spot reconnaissance aircraft that focus narrowly at one location. The ISR architecture layers assets to build commanders’ situational awareness.

Surveillance, broad and deep. Gaining and maximizing situational awareness starts with being alerted or tipped off on an activity somewhere. Wide area surveillance (WAS), preferably with multiple sensors, is required to gain the persistent search capability to find and fix activities or persons of interest. Multiple sensors allow a blanketing of the largest area possible.

The two dominant WAS techniques are SIGINT and moving target indicator (MTI). Both techniques scan a wide area and discriminate the target or person, based on exploiting the communications, signal, or movement against

the background. Both have the ability to pinpoint an activity for further exploitation or to cross-cue another ISR sensor.

Ground forces do have organic surveillance systems. The Prophet ground system, for example, provides signals collection for brigade commanders. The sensor sits on a tall pole, extending the sensor's range. Normally, it detects signals out to seven miles, depending on the terrain. If located on higher terrain, such as a 500-foot ridge, the sensor could range to 27 miles.

In a similar manner, ground forces also have a variety of ground-based motion detectors, which tend to operate line-of-sight around a fixed location, such as a base. The Wide-Area Infrared Surveillance Thermal Imagery (WIS-TI) is one system.

While these systems maintain their surveillance as long as they are protected and have power, a ground system's range is limited, compared to airborne assets. In the SIGINT collection, USAF's RC-135 Rivet Joint operating at 30,000 feet can detect communications out to about 240 miles. A Global Hawk or U-2 with signal collection suite can find signals out to 300 miles. From a high perch, these aircraft can monitor more than 284,000 square miles—an area larger than Iraq. In addition, by operating the U-2 and Global Hawk at 60,000 feet or higher, the sensors can cover three times as much surface area over mountainous and hilly terrain than can the same sensor when flown at 30,000 feet.

Once the SIGINT suite detects a suspect signal, intelligence personnel separate it as an item of interest and then zero in on the source for more precise data on the fidelity of the emission, exploit what is being transmitted, and determine more exact geo-location data of the source. With multiple sensors on different axes, intelligence personnel can pinpoint the source faster, providing another reason why layering is needed. Once fixed, the air or ground-based crew can use the data to direct another asset to track the target, expanding the commander's awareness of who it is, what they are doing, and where.

In a similar manner, the E-8C Joint STARS monitors a wide area for movement of units, vehicles, and associated traffic in the battlespace. Just as the E-3 AWACS provides air superiority fighters an in-depth awareness of all air traffic and guides the fight for air dominance, Joint STARS provides similar knowledge and direction for ground activities.

Scanning a corps' area of responsibility, the Joint STARS detects movement of forces and vehicles on the ground, transmitting the information via voice, data stream, or a free text to fighter aircraft, ground command vehicles, attack helicopters, or other ground operations centers. Its ability to transmit key data directly to a variety of locations—airborne, on the move, and command—gives Joint STARS impressive force-multiplier value.

Joint STARS' communication capabilities are good and key to its ability to add to on-going operations. Outfitted with 12 UHF radios, four VHF, two HF, three

satellite communications (SATCOM) voice, one single channel ground and air-borne radio system (SINGCARS), two joint tactical information distribution system (JTIDS) terminals, and broadcast intelligence, satellite communication (SATCOM), and surveillance and control data link (SCDL) broadcast modes, it shares the situational awareness of who is moving and where with the joint team.

Joint STARS is also valued for its radar's ability to detect and track vehicles and units in any weather, day or night. During major combat operations in Iraq, Joint STARS detected an Iraqi armor column moving against the 3rd Infantry Division, allowing commanders to destroy the Iraqi armor with air and long-range fires before it could close on US ground forces.⁵³

These capabilities make Joint STARS critical to the success of operations in hybrid warfare. In Afghanistan, Marine Corps commanders lauded the aircraft with "saving lives" by monitoring the approaches to Kandahar airfield, alerting them when Taliban approached the base.⁵⁴ Likewise, in Iraq, maneuver commanders relied on it to provide early awareness of a target area and flank security when executing an air or ground insertion into a contested area. One Marine Corps officer concluded that without Joint STARS: "We're back in the 19th century-intelligence tactics. Run into the enemy, get shot at, and report where he is. The marines always win with Joint STARS on their side and lose without it."⁵⁵

Joint STARS, RC-135, and U-2s with SIGINT capabilities are not the only WAS capabilities the Air Force has to offer. The service planned in early summer 2009 to begin deploying the new MC-12W to augment the unmanned fleet and expand ISR support to the warfighters. The MC-12 decision came out of Secretary Gates' ISR Task Force that looked at options to expand the available ISR support to current operations. The C-12 airframe provided an aircraft with a light logistical support requirement that could operate forward from austere airfields.

The MC-12 will have a SIGINT suite to provide direct support to brigade and similar units with a tailored WAS capability to cue the on-board MX-15 EO/IR FMV sensor or another EO/IR sensor. The MC-12 data will go directly to brigade operations centers and any joint terminal attack controller (JTAC) with a ROVER (remotely operated video enhanced receiver) link. The initial seven aircraft will have a laser pointer, allowing rapid coordination between the MC-12 crew and air or ground forces outfitted with night vision goggles. Follow-on aircraft will also have a laser designator for terminal guidance of laser guided weapons.⁵⁶

The Air Force will deploy additional intelligence personnel to air support operations personnel embedded with ground maneuver units, allowing the exploitation of the FMV and SIGINT data to occur as far forward as possible. In this manner, USAF is ensuring the newest airpower ISR asset meets the tactical commander's needs.

The WAS systems—Joint STARS with MTI plus the RC-135, U-2, and soon Global Hawk and MC-12 with SIGINT—serve a dual function. Not only do

they alert commanders to potential activity, the MTI or SIGINT sensors can extract detailed information as well. The fidelity of information, such as its geo-location accuracy, is improved with the layered architecture. Two SIGINT sensors viewing a signal from different axes can pinpoint a source faster and with reduced location error. Likewise, an imagery platform can visually confirm or fix an emitter when operating in concert with the SIGINT collector.

Cueing from human intelligence. Other traditional intelligence disciplines play a vital role in the hybrid campaign. Perhaps the oldest method is human intelligence (HUMINT). While the public may think of HUMINT as information from spies, it involves details obtained from debriefs of captured enemy combatants or casual conversations with civilians in the battlespace. HUMINT can provide answers to the “five questions,” but is normally narrow in scope in terms of the speed, range, and flexibility of gaining data.

As with any ISR discipline, HUMINT can provide cueing for other systems. One of the better known examples of HUMINT as part of a layered architecture was the strike against Abu Musab al-Zarqawi. Initially tipped by a HUMINT source, reinforced by a SIGINT intercept, and then tracked through more than 600 hours of airborne ISR, the collage of ISR data allowed F-16s with Litening targeting pods to zero in for the attack.⁵⁷ This multidiscipline and integrated effort demonstrates that no single entity can operate successfully in isolation. Layering of ISR assets works.

HUMINT gained from ground forces presence among the people will have value to more than just the land component. The information obtained from casual interactions, interrogations, or routine observation can inform operations for all components. Sharing this information in a secure and rapid manner throughout the battlespace, however, will be the task of the air component with its C² network.

RAPID AIR MOBILITY

Airpower’s speed, range, flexibility, and survivability are valued for their ability to deploy and sustain US forces. Foremost is the assured and rapid response to reach any part of the globe on short notice—in under a day. While surface transportation remains the efficient means to deploy large size forces globally, air mobility aircraft are the most effective when personnel or equipment are needed immediately, such as when the US moved relief supplies and personnel to Pakistan following the 2005 earthquake. Rapid air mobility is also vital when bringing injured personnel to the US for treatment.

Aeromedical evacuation often starts with rotary-wing assets and ends with a mobility aircraft landing half the world away with the injured person arriving at a world-class trauma center in the US. One case involved a Marine Corps lance corporal, injured in Iraq by an IED in September 2006. He suffered burns and a significant injury to his right eye. Brooke Army Medical Facility in Texas was the only hospital with the combined resources to maximize his

recovery chances. An Air Force C-17 deployed to the region flew to Balad Air Base to pick up the marine and a USAF critical care air transport team, making the 15-hour flight directly to Texas. More importantly, the effort saved the marine's eye.⁵⁸

Flights like these also reinforce the other partner in the air mobility mission—aerial refueling aircraft. The C-17 crew relied upon a number of air-to-air refueling efforts to prevent having to stop for fuel en route, saving time and the marine's eyesight. The Air Force's tanker inventory gives the force the speed to close global distances within a day.

Air mobility provides more than a bridge to and from the United States and the contingency operations area. Inside the theater, air mobility is critical. For example, given the size of Afghanistan, US forces are dispersed around the country, and theater air mobility provides the speedy response inside the theater of operations.

One manifestation of air mobility's value is its ability to reduce risk to the force. As a part of the counter-IED strategy to negate the nearly 1,200 IEDs planted in Iraq and Afghanistan each month,⁵⁹ C-130s and other tactical airlift reduce vehicle traffic, and hence, reduce personnel exposure to that threat. In 2008, airlift aircraft moved more than 1,174,000 people in, out, and around US Central Command—a 50 percent increase from a few years earlier.⁶⁰ Airlift is one tool in the counter-IED strategy that includes aggressive intelligence gathering and preventive operations plus electronic warfare techniques from the air and on vehicles.

Tactical airlift can sustain the force in the way that surface convoys have in the past. The development of the joint precision air-drop system (JPADS) has allowed airlift aircraft to employ with the same precision effects that fighter and bomber aircraft have with laser guided bombs (LGBs) and GPS guided munitions. In 2008, C-17s and C-130s air-dropped more than 16.5 million pounds of supplies to tactical fighting positions, allowing those forces to maintain their presence and readiness. This is a fourfold increase in two years.⁶¹ More importantly, precision airdrops, according to a US Army statement in 2008, "saved soldiers lives by offsetting ground convoy requirements."⁶²

In addition, air-drop operations can play a vital role in support of the overall strategy in the hybrid campaign. A significant portion of airdrops in Afghanistan have delivered relief supplies—delivering rice, water, firewood, and blankets—to isolated villagers. For instance, in February 2008, some 35 percent of one million pounds of supplies air-dropped in Afghanistan were for villagers.⁶³ More than just lifesaving provisions, the airdrops reinforced the positive image of the government to support the people.

Rapid, assured air mobility is vital to any US campaign in a hybrid warfare contingency. It places the force into the region where needed and when needed while also sustaining a critical lifeline into and out of the theater. Within the theater or country, it reduces the risk to the force while enabling

logistical operations in general. Without it, any global US campaign is difficult to imagine as possible.

PRECISION STRIKE

Hybrid warfare seems tailor-made for close air support (CAS) operations. Many Air Force operational leaders, in fact, have focused almost exclusively on CAS as the defining airpower contribution to conflicts such as these.

This perception reflects a vital role airpower plays in the hybrid environment. As a hybrid campaign often will involve warfare among a civilian population, it requires soldiers and marines to operate in, live with, and move fluidly through the populace. This fact often dictates foot patrols to provide presence and to build relationships with businessmen, village leaders, and the people on the street.

For ground forces, conducting these presence missions while operating in armored vehicles or tanks may create an adverse effect—isolating the security force from the people it must protect and reinforcing the outside nature of US forces. Operating from inside armored vehicles improves the safety of ground forces, but it does not build trust or fortify the legitimacy of the government. To avoid this perception, US forces are lightly armed as they operate in cities and villages.

Operating in this manner yields the initiative to hybrid adversaries—permitting the belligerent to mass and attack at the time and place of their choosing. Placed quickly on the defensive, US ground forces turn to CAS to neutralize the hostile force. In 2008, the air component in US Central Command flew more than 38,000 CAS missions and employed weapons more than 4,000 times.⁶⁴

Airpower's value to strike at a hostile element, however, cannot be measured only by the quantity of weapons employed. The presence of the aircraft overhead friendly forces has proved to deter hostile action. Army SSgt. Chris Summers in the 101st Airborne Division captured the importance of airpower's presence when he said: "Airpower plays a vital role in dismounted or mounted maneuvers through hostile areas. When CAS is on station, it greatly reduces the threat. If we do get hit, only a handful [of enemy troops] will be brave enough to fire, knowing [aircraft are overhead]."⁶⁵

From its vertical perch, airpower forces have a maneuver advantage not available to ground forces. Armed with 20 mm or 30 mm weapons, CAS aircraft can have pinpoint accuracy and low collateral damage effects. Likewise, the advent of the small diameter bomb, the GBU-39, allows US forces to strike within four feet or less of a target.⁶⁶ If needed, it can hit a room where the hostile forces are, from a vertical or horizontal approach, and with less risk to other occupants in the house.

Airpower's ability to locate and destroy the belligerent's forces alters the options available to opponents. In southern Lebanon, for example, the Israeli Air Force knocked out Hezbollah's medium- and long-range Fajr and Zelzal missiles on the second day of the campaign—stripping Hezbollah of its primary long-range strike tool. This left the Hezbollah with primarily Katyusha rockets, which lacked the accuracy or range to function as anything more than a psychological weapon.⁶⁷ The Hezbollah investment in the longer-range weapons was for naught due to the Israeli Air Force's precision airpower.

On a number of occasions in Afghanistan, the hostile forces have transitioned from guerrilla, hit-and-run style attacks to engage in a more conventional fight. In the summer of 2006, Taliban forces attempted to hold ground in an area known as the Pashmal pocket, 30 miles west of Kandahar. With an extensive trench system and well-developed network of supporting fires, Taliban fighters attempted to replicate the defensive strategy employed by the Hezbollah in Lebanon that same summer. They coordinated fires and tried counterattacks as they lost ground. The coalition force, with superior ISR, C² networks, mobility, and precision air attacks, defeated the Taliban.⁶⁸

Operation Medusa, as the fight in the Pashmal pocket was called, was not an isolated event. The years 2007 and 2008 would see similar pitched fights stemming from both planned and ad hoc encounters. In 2008, US forces operating in Kunar Province stumbled into a pitched battle following an insurgent ambush. The fighting lasted three days and resulted in another defeat for those opposing US and coalition forces in Afghanistan.⁶⁹

Not every event turned out favorably for US and coalition forces. In July 2008, up to 400 insurgents reportedly surprised a US outpost and killed nine Americans while wounding 15 more.⁷⁰ The following month, 10 French paratroopers died during an ambush by 150 Taliban fighters.⁷¹ Airpower's lethal and precise fires were late to the fight because a lack of surveillance coverage to detect the approaching force neutralized the US air advantage.

In addition to lethal effects, airpower's precision engagement creates a variety of nonlethal yet beneficial outcomes. One example is how CAS aircraft provide column cover or escort for ground forces as they move. As Summers mentioned, the presence of overhead attack aircraft has a powerful deterrent effect. The aircraft persistence, speed, and survivability enables that effect.

A second manifestation of precision strike's potential is how it modifies the opponent's options. In 2006, Hezbollah did not reinforce its dispersed cells out of the concern about Israeli air strikes. The reputation of CAS aircraft and precision attack denied Hezbollah the chance to employ a highly mobile defense where engaged units would have benefitted from mutual support of nearby forces.⁷² Difficult as it is to assess, this benefit may not be known until after the conflict, if at all.

Fifth generation fighters such as the F-22 and F-35 can provide additional, unique capabilities to the hybrid campaign with their nonlethal attributes. These aircraft are more than "stealth" fighters—they can potentially serve as

C², ISR, and electronic attack platforms. US airpower in the early part of the 21st century will be netted—with the F-35 and F-22 serving as a key node. When not needed for lethal firepower, the sensor suite of the F-35 and F-22 can search and track a variety of surface targets while being controlled from ground locations. Information will flow via the multi-function advanced data link (MADL), which will link all stealth assets.

Once the information is received at a C² node, such as an air operations center (AOC), it will be translated to a traditional Link 16 common data link for distribution with the rest of the force.⁷³ In addition, the fighter's AESA radar, together with AESA radars on other large body aircraft such as AWACS or Joint STARS, can map and engage a belligerent's information networks.⁷⁴ Collectively, electronic and cyber-attack may include support aircraft such as the EA-6B, EA-18G, and EC-130H platforms.⁷⁵

In short, the days of strike aircraft being fighter aircraft on station only for a strafing or bombing run are over.

Precision engagement in the cyber domain is not limited to the use of an aircraft's antenna. A new class of weapons, such as high-powered microwaves (HPM), will offer the warfighter additional options. HPMS can operate either from a fixed platform or as an air delivered weapon, much like a GPS-aided weapon. In the latter case, the Air Force has looked at an air delivered weapon that will neutralize an opponent's computer and associated networks.⁷⁶ In this manner, airpower forces may gain precise effects not through the traditional geo-location accuracy of a tritino-filled bomb case, but through the electronic transmissions that affect the desired information technology at the desired point of impact.

All forces in the battlespace offer a variety of means to gain precise lethal and nonlethal effects. Given the nature of hybrid warfare and the ground force approach to operate light and lean in this environment, airpower's ability to offer a fast, responsive, tailored, and highly accurate strike capability can change the game on the opponent. The aircraft's ability to close distances quickly and employ weapons unconstrained by the terrain and obstacles on the Earth's surface, gives it a unique position and value in the hybrid campaign.

NETWORK INTEGRATION

ISR forces teamed with rapid air mobility and precision strike capabilities are only effective if orchestrated and focused in a coherent manner. Such unity of effort is not unique to air operations but necessary for all components for all operations. The Army and Marine Corps doctrine on counterinsurgency (COIN) reinforced the importance of unity of command when it stated, "All organizations contributing to a COIN operation should strive, or be persuaded to strive, for maximum unity of effort. ... Given the primacy of political considerations, military forces often support civilian efforts."⁷⁷

The extensive collection of organizations—military and nonmilitary—involved in the hybrid campaign, demands their plans and operations be integrated. Given their disparate efforts, this synchronization and collaboration can be daunting, but its demanding nature makes it vital to focus the collective effort.

One element of the challenge is unifying these efforts over significant distance, given that the Pentagon recognizes hybrid campaigns will operate over great distance.⁷⁸

Airpower has extensive experience in linking and commanding organizations over such distances. During Operation Enduring Freedom in October 2001, the combined force air component commander (CFACC) provided planning guidance and directed execution for B-2 bombers launched from within the middle of the United States, C-17 and their fighter escorts based in Europe, and carrier-based attack aircraft. This was truly a global effort.

Space-based communications and state-of-the-art information technology and planning tools enable the unity of effort. While all warfighting components rely on these resources, airpower forces are unique in their daily use of such extended and integrated networks.

The second challenging element of integrating networks is the requirement to unify the diverse partners—air, land, naval, and civic components. Unity of effort should extend to nongovernment organizations (NGOs); after all, they seek a peaceful, functioning, and effective society that provides for the needs of the population, and their enabling efforts add to the legitimacy of the government. To see the relevancy of this idea, consider that the military and USAID has had a multitude of efforts to build roads in Afghanistan.⁷⁹

Airpower's ability to support integrated networks for information sharing and C² in the hybrid campaign stems not just from its global nature or high tech experience. Rather, when the air domain is relatively secure, as it will often be in the hybrid environment, the AOC, and its planning-execution cycle that produces the daily air tasking order, has the capacity to focus on integrating the plans, requirements, and operations of other, nonairpower components and unify the campaign.

While airpower provides a premier network to unify the joint campaign at the theater level, its resources also provide a means to extend the planning, coordination, and execution for units in the field. Ever since Lt. Gen. Pete Quesada placed pilots with Army tanks to facilitate the breakout from Normandy, air commanders have excelled at working with front-line units in austere conditions.

Today, tactical air control party (TACP) airmen continue this legacy. These airmen are now equipped with more advanced communication tools than the basic radio used in World War II. In Iraq and Afghanistan, TACPs have the ROVER—a digital C² tool that allows the ground party to see the video feed from the attacking aircraft and confirm the target. In the same manner, ground personnel can send target coordinates and other relevant attack in-

formation to aircrews using a situational awareness data link (SADL) or Link 16 data link.⁸⁰ Just as at Normandy, TACPs often move with ground units, and the highly mobile ROVER enables better situational awareness for the air-ground team.

At the same time, TACPs located in brigade operations centers have access to additional information via a variety of ground control stations. For example, the Joint STARS common ground station allows those responsible for executing the on-going operations to see units and forces moving in their area.⁸¹ This information sharing is in addition to the E-8's ability to send data directly to a number of ground elements such as attack helicopters and command vehicles via Force XXI Battle Command, Brigade and Below (FBCB2) and SINGCARS.

Given the unpredictable and uncertain nature of the hybrid battlespace, additional tools are needed to gain greater effectiveness and efficiency of US forces. Airpower's attributes allow it to enhance the campaign with its ability to cover distances and provide airborne communication nodes to unite distributed units and capabilities. One example is Objective Gateway, outfitted on a RQ-4 Global Hawk high-altitude UAV, that will extend the ground communications networks hundreds of miles and over ground obstructions such as high terrain or urban buildings. From its vertical position, Objective Gateway will connect ground forces on opposite sides of a mountain ridge or opposite sides of the country.

Airpower can soon provide ground units with access to an extensive data base of tactical information as well. The advanced information management system (AIMS) will give ground personnel immediate access to resident information created in a file library. Using a standard Panasonic ruggedized Toughbook laptop, soldiers can move a cursor over a location to access stored, tailored data on that location. Information provided could include imagery, topography, or recent security incidents. It could also provide stored political, cultural, tribal, or economic information that military and civic components require. AIMS is a one-pound device that can fit on any airborne vehicle to create this network in the sky. For "disadvantaged users" whose ground-based receivers cannot accommodate a high bandwidth, the system automatically transitions the information to a lower data rate compatible with their equipment.

In a similar manner in the future, ground entities can gain access to real-time information via heterogeneous airborne reconnaissance team (HART). Also available on a Toughbook, ground personnel can access instant information from airborne ISR platforms, such as Scan Eagle, Predator, Reaper, and Hunter UAVs and MC-12W manned aircraft, and so forth. Just as important, if a commander prioritizes subordinate units, the higher priority unit can task or request information from the airborne ISR asset to meet their on-going operations. HART gives ground personnel a real-time and seamless picture of all information—SIGINT, MTI, and imagery—of their surrounding area. It's the C² means that allows dispersed units and personnel to gain and maintain improved knowledge as they execute and integrate their missions.

SUMMING UP

Hybrid operations mark an evolution in warfare. Conventional battles and irregular ambushes will continue to occur. US forces must have the agility and technical sophistication to rapidly detect, adjust to, and deny the aggressor success with their initiatives. To be effective and efficient, military forces must provide lethal and nonlethal tools, impose a cost on potential adversaries either before or during the conflict, reduce risk to US personnel, and use technology to enable a persistent capability that endures through the length of the operation or US commitment. The military capabilities must integrate with the civic, society-building entities that reinforce the political, economic, and social institutions of the host government.

While the environment has changed and the style of warfare has changed, airpower's enduring attributes remain relevant to the hybrid fight. Airpower's speed, range, flexibility, precision, and persistence enable it to rapidly adjust and adapt to the dynamic environment we now call hybrid warfare. ■

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