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DOOMED TO REPEAT IT? HOW THE UNITED STATES AIR
FORCE CAN APPLY HISTORY VIA COUNTERINSURGENCY
LESSONS LEARNED TO MEET ANTI-ACCESS/AREA DENIAL
CHALLENGES



by

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ABSTRACT

The United States Air Force (USAF) has expended considerable effort over the past eleven years to conduct counterinsurgency (COIN) warfare during Overseas Contingency Operations, and in the process has become a combat-experienced force. Unfortunately, eleven years of COIN have caused certain key skill sets to atrophy within the USAF. Future military operations will demand a force capable of delivering decisive effects against anti-access and area denial (A2/AD) warfare techniques; however, the current USAF force posture is fundamentally misaligned for the emerging threat situation. The tactical problems that define the A2/AD threat are difficult; it is essential the USAF internalize the lessons learned in air, space, and cyberspace and develop tactics, techniques, and procedures (TTP) to maximize our effectiveness for future military operations. Additionally, budget constraints may make modernization efforts to mitigate A2/AD threats problematic as well. The USAF is expected to execute effectively on “night one” of any conflict with the weapons systems available; failure to adapt tactics quickly will cost operators heavily. This research follows a problem/solution methodology to determine the applicable lessons learned from past conflicts to adapt to future battlefields. Collection and dissemination of lessons learned from past and current operations adapted to the realities of emerging threats is the key to maximizing the effectiveness of air, space, and cyberspace power in future military operations.

Introduction

The USAF finds itself challenged to adapt to emerging warfare concepts and threats, such as AirSea Battle (ASB) and A2/AD warfare. The demands of multiple, extended COIN campaigns and the global economic crisis have required individual services to place COIN capabilities above inter-service interoperability and service core competencies given the reality of budget and manning cuts. A2/AD warfare involves prospective adversaries developing and fielding, or having ready access to, military capabilities that will place U.S. forces operating from large, fixed forward bases and in the littoral regions at increasing risk, which is vastly different from the COIN operations to which the USAF has become accustomed to.¹

Ten years of COIN in Iraq and Afghanistan has made the USAF the most combat-experienced force since its inception and the unique demands of COIN warfare have grown a generation of highly skilled personnel and distinctive capabilities. While USAF personnel are more prepared for war than ever, some of the skills and technology used in the COIN fight are not readily transferable to conflicts against enemies using A2/AD tactics, such as heavy electromagnetic attack (EA) and advanced surface-to-air defenses. The ability for the USAF to be successful in other than COIN operations is in jeopardy due to the increased emphasis on niche capabilities and skill sets, such as Unmanned Aerial Systems (UAS) and light fixed wing surveillance aircraft. Organizations and weapons systems failing to reach across institutional lines and find success as a value-added joint partner will be useless in A2/AD environments; particularly when matched against a technology advanced enemy. Technologies unsuitable for an opposed electromagnetic spectrum are unsurvivable given the likely threat and are not transformational joint concepts to share information rapidly among services. Without thoughtful application of applicable successes in combined and joint warfare, the USAF may not be

prepared to fight in contested, degraded, and operationally restricted environments such as A2/AD warfare.

The Goldwater Nichols Department of Defense (DoD) Reorganization Act of 1986 caused a major defense restructuring giving operational authority to the Chairman of the Joint Chiefs as opposed to the service chiefs. The act sought to increase attention to the formulation of strategy, contingency planning, and provide for more efficient use of defensive resources to enhance the effectiveness of military operations.² Additionally, the act sought to ensure the services operated more jointly in the wake of the failures during Operation EAGLE CLAW, the aborted hostage rescue in Iran that highlighted service interoperability issues. The disaster at Desert One brought to light deep seated flaws in the DoD's employment and integration competence. Goldwater-Nichols also addressed communications and training inoperability while generally encouraging the military to learn from recent mistakes and apply lessons learned to the next conflict. The USAF applied joint lessons learned to realistic training and delivered success on the next major battlefield during Operation DESERT STORM. However, recently the unanticipated length and nature of conflicts in Iraq and Afghanistan combined with the global economic recession caused the services to prioritize COIN-specific capabilities rather than interoperable joint capabilities. Today's USAF is currently highly experienced, but also highly specialized for COIN. Unfortunately, the skills and capabilities for COIN do not always translate into capabilities for other warfighting domains, such as A2/AD warfare and other so-called "high-intensity" conflicts. The USAF will need to leverage joint capabilities and concepts championed by Goldwater-Nichols to be successful on future battlefields.

At the operational and tactical level, the employment of airpower during COIN operations serves as a case study of how the services have employed jointly with varying degrees

of success. From doctrine, to acquisitions, to test, to training, the USAF and air assets were misused and mis-prioritized in the desire to prove relevance in the COIN environment. The USAF was employed as a supporting arm of the U.S. Army due to the nature of the conflicts, resulting in a loss of core competencies and reduced effectiveness for contingency operations other than COIN, such as A2/AD warfare. A good example is the insatiable demand for all things “ISR” (Intelligence, Surveillance, and Reconnaissance) because COIN target sets revolve around individual people/networks and are extremely ISR-intensive. The USAF has had to mortgage advanced capabilities to meet the ISR demand in the form of increased numbers of weapons systems such as the MQ-1, MQ-9, and MC-12. Additionally, open-ended deployments of ISR assets such as the RC-135 RIVET JOINT and E-8C JSTARS and delays in the acquisition of weapons systems to meet ASB and A2/AD warfare produced a gap in capability and lack of emphasis on missions such as suppression of enemy air defenses (SEAD) and maritime interdiction (MI).

As the wars in Iraq and Afghanistan come to an end and defense budgets shrink, the USAF must reconstitute forces while simultaneously reducing service members. It is likely the services will seek to recapitalize their own core competencies rather than pursue joint initiatives to more efficiently use resources, enhance the effectiveness of military operations, and leverage the synergies of joint operations. Goldwater-Nichols can continue to serve as a model for solutions across the span of Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF) to meet emerging security threats. To answer how to mitigate gaps in capability, the USAF must apply the correct lessons learned from over ten years of Overseas Contingency Operations and prepare to fight in an A2/AD environment.

The research employed an exploratory case study framework combined with a problem/solution framework to determine what USAF planners can do to ensure the correct lessons learned are applied to future initiatives. The main focus of the case studies is to determine what concepts and TTPs from past success and failures might be applicable to future operations. The problem/solution effort is organized by focusing on the problems of diminished military budgets and avoiding the wrong lessons, such as trying to shoehorn niche capabilities into a broader context. The recommendations section will examine recent successes in air operations, advise the reader how to determine valuable lessons learned and avoid past mistakes, and provide future air planners will guidance on future employment.

Recent Successful Air Operations

The United States military has fought as a joint force throughout its history with varying degrees of success. Since the Goldwater-Nichols, the military has fought numerous major theater wars (Operation DESERT STORM and the initial stages of Operation IRAQI FREEDOM and Operation ENDURING FREEDOM) as well as smaller, combined efforts (Operation ODYSSEY DAWN, Operation ALLIED FORCE). As an integrated force, the U.S. capitalized on synergies and mitigated the limitations of any one service. Within the scope of this effort, specific examples of successful joint efforts as well as failures are discussed to provide the reader context and examples of lessons learned that apply to how the USAF should approach future battlefields.

Operation ODYSSEY DAWN

Most recently, the U.S. led effort against Libya in March 2011 (specifically Moammar Gaddafi's regime-led armed forces) showcased the dynamic targeting capabilities of the USAF.

On 17 March 2011, the United Nations adopted resolution 1973 authorizing Member States “acting nationally or through regional organizations or arrangements, to take all necessary measures to protect civilians under threat of attack in the country, including Benghazi, while excluding a foreign occupation force of any form on any part of Libyan territory”.³ Prior to 17 March, individual UN member states, such as France and Great Britain, conducted unilateral strikes in Libya to prevent Qaddafi’s regime forces from killing civilians and anti-regime forces. However, once UN resolution 1973 was passed, the United States (via the USAF) led a combined air campaign to destroy regime forces across the entire country of Libya. Ultimately, the USAF-led effort was very successful and generally halted regime forces in less than two weeks of strikes. On 1 Apr 2011, the United States transitioned from Operation ODYSSEY DAWN to Operation UNIFIED PROTECTOR once the North Atlantic Treaty Organization (NATO) took over the effort.

Joint Targeting Effort

The tactical problem for air planners during Operation ODYSSEY DAWN was essentially how to coordinate an air-to-ground targeting effort from multiple locations in Europe and the Mediterranean over long distances to complete the Find, Fix, Track, Target, Engage and Assess (F2T2EA) chain (often referred to as “the kill chain”). Planners had to complete the F2T2EA process against regime forces without the benefit of an allied ground force for coordination and target cueing. The senior Air Force Command and Control (C2) node for the effort was the 603rd Air Operations Center (AOC) located at Ramstein Air Force Base, Germany. It was at the 603rd AOC where planners used both joint and Air Force doctrine to plan and execute the targeting effort against Qadhafi’s regime. As implemented, Operation ODYSSEY DAWN included strikes on mechanized forces, artillery, mobile surface-to-air missile sites, and

lines of communications which supplied regime forces, as well as the C2 of any regime sustainment activities of forces attacking civilian populations and cities.⁴ The number and pace of the targeting effort was something the USAF was unaccustomed to after over 10 years of COIN operations, particularly because the primary COIN target set was individuals rather than fielded military forces. Additionally, the rapid onset of hostilities and the subsequent short buildup of forces required planners to honor airpower doctrine rather than use concepts in use at the time in U.S. Central Command (CENTCOM). With regard to the targeting effort, the Joint Forces Air Component Commander (JFACC) Major General (MGen) Margaret Woodward empowered the AOC planners to honor the airpower tenet of centralized control and decentralized execution. Centralized control maximized the flexibility and effectiveness of air and space power; and MGen Woodward's staff realized it must not become a recipe for micromanagement or to stifle the initiative subordinates need to deal with combat's inevitable uncertainties.⁵ In doing so, the OOD planners used the available ISR and intelligence sources to focus all available airpower on the Joint Force Commander's (JFC) priority areas and quickly adapt to the changing battlespace situation, such as anti-regime force gains. Additionally, decentralized execution allowed subordinates to exploit opportunities in rapidly changing, fluid situations through delegation of decision making to the lowest level.⁶ In this case, delegation of targeting authority often went to Tactical C2 platforms such as the E-8 JSTARS and E-3 AWACS or to individual aircraft crews, rather than centralizing engagement authority at the AOC. Additionally the size of the area in which regime forces were arrayed (the distance from Tripoli to Benghazi is roughly the distance from Oklahoma City to Denver) and the distance aircraft had to fly simply to get to their targets proved challenging. Air assets often had little time to assess the situation and make targeting decisions, much less inform the AOC and wait for

a decision. Aircrew applied the JFC's priorities and intent, used available ISR cueing and information fusion, applied the rules of engagement (ROE), and destroyed regime forces threatening civilians. In particular, the fusion and dissemination of available information to speed the kill chain provided a valuable lesson to apply toward future A2/AD battlefields.

Use of Information Technologies

Technological advances in warfighting systems are as old as warfare itself. Since the beginning of the so-called "information age" militaries have struggled to find the balance of how much information to capture, fuse, verify, and disseminate. Warfighters need information, not data, to make decisions. During the past ten years of COIN operations, the USAF has struggled to adapt airpower to meet the applicable target set: networks of individuals. Fortunately, innovative airman adapted legacy systems and emerging technologies to meet this challenge and the result is more data than any organization can process, much less disseminate. For example, a system known as Gorgon Stare uses a Full Motion Video (FMV) system on a MQ-9 Reaper UAS to deliver the equivalent of a "library" of information every hour, when most end users need an actionable "paragraph" of data in a usable format. Additionally the amount of data available via the expanded use of internet relay chat (IRC), which rapidly shares data among thousands of users around the globe, can compromise the ability of an AOC to command and control a large scale targeting effort. The "fog of war" is present when too much data is available and enough executable, verified, and fused information is not.

Due to the rapidly deteriorating situation in Libya, U.S. Africa Command (AFRICOM) exercised command and control over Operation ODYSSEY DAWN from the 603rd AOC, which typically focused on the European Theater. The 603rd is a modern AOC equipped with modern equipment sufficient to communicate with forces conducting operations across a huge area,

similar to the situation of the Central Command (CENTCOM) AOC. However, because of the rapid nature of the situation, the 603rd AOC did not have the number and diversity of personnel to manage the situation, such as the ten year buildup of forces and refinement of processes witnessed in CENTCOM. Thus, prior to mid-March 2011, a U.S. AOC had not executed a short notice targeting effort given the variety and access to information available to ODYSSEY DAWN planners. Two of the most successful technologies used were secure IRC (specifically airborne IRC applications) and Joint Tactical Information Distribution System (JTIDS).

Secure IRC “enhances critical C2 capabilities through exponentially improved vertical and horizontal data communications by simultaneously transmitting and receiving C2 information to all participating and monitoring organizations across all echelons thus providing greater situational awareness resulting from increased information volume and reduced latency of information exchange”.⁷ The use of IRC was prevalent during operations in Iraq and Afghanistan, but prior to ODYSSEY DAWN the network of systems using IRC (both terrestrial and airborne) was never used to conduct C2 of a major air-to-ground targeting effort. These C2 nodes included the AOC (ground), the USS Kearsarge (sea), and E-8C JSTARS (air) all using common IRC rooms to collaborate targeting efforts. Prior to operations in Libya, many C2 subject matter experts (to include the author) had expressed doubts about IRC’s effectiveness as a primary C2 tool during “high-intensity” warfare situations. Many long-established voice communication tenets such as brevity and priority were often not exercised during IRC operations when conducting COIN missions. Many believed that there would simply be too much data available to decision makers and perishable, actionable targeting information would be overlooked in the sea of text. Lessons learned at USAF Warfare Center exercises at Nellis Air Force Base such as RED FLAG and Weapons School Mission Employment Phase founded

doubts in using IRC. The author and other C2 subject matter experts were involved in a number of findings (unavailable for this research due to classification) regarding the effectiveness of IRC during these exercises and to put it simply: air, space, and cyber operators collaborating in IRC were often overwhelmed by the amount of data available.

However, during operations over Libya, IRC proved to be the most effective communication tool available. In particular, the ability of airborne platforms to immediately receive and share information with the AOC and pass IRC-derived information to “shooters” (fighter, bomber, and armed UAS) sped up the kill chain and often resulted in target engagements measured in seconds rather than minutes. Additionally, IRC provides a digital log of communications, allows operators to review missed posts, and allows monitoring of more chat rooms than voice channels, all via secure means.⁸ Planners developed innovative TTPs to collaborate targeting information in an agreed-upon format (known as a “ten-line”) in preplanned IRC rooms. A ten-line for an airborne platform to transmit using line-of-sight voice radios or tactical datalinks was posted once the information was reviewed and considered actionable. By using the collective experiences of using IRC during COIN operations and then applying lessons learned at Nellis, planners avoided data-saturation by enforcing proven communications techniques, such as designating “room owners” to add oversight and priorities for the posted information in a given IRC room. IRC proved to be a powerful method of conducting a secure distributive and collaborative targeting effort for the C2 community.

Recent Challenges to Airpower Effectiveness

Although the Operation ODYSSEY DAWN air campaign was ultimately successful, other recent operations have highlighted how the USAF has been less than effective as a force for a number of reasons. Failure to follow service doctrine and tenets of airpower, service

parochialism, and failures in conducting thorough pre-mission planning have hampered airpower efforts on COIN battlefields in Iraq and Afghanistan. Rather than look at these issues as a problem with using airpower during COIN, the USAF needs to extract the lessons learned on why these efforts were unsuccessful and then avoid the same mistakes on future battlefields. While the threats, battlespace, and enemy may differ, the root cause of mistakes may point to solutions for the next fight. Air planners must avoid asking the wrong questions, making flawed observations, and ultimately assessing the wrong lessons learned for future challenges.

Operation ANACONDA

The initial phase of Operation ENDURING FREEDOM witnessed a highly successful air campaign augmented by Special Operations Forces (SOF) to conduct a dynamic targeting campaign against Al Qaeda and the Taliban in Afghanistan across vast distances in one of the world's most remote regions. Two months following the fall of the Taliban and the installation of the Karzai government, U.S. ground troops were faced with the first force-on-force engagement of Operation ENDURING FREEDOM in an initiative that came to be known as Operation ANACONDA.⁹ Operation ANACONDA was an Army operation into the high mountains of Afghanistan and was the first large-scale combat involvement by conventional U.S. ground forces. The planned mission was a three-day offensive to capture or kill any Al Qaeda and Taliban fighters who might be encountered in the area, and viewed in hindsight, those who planned and initiated the mission failed to integrate air, space, and land power available to them.¹⁰

Planning Failures

The planning effort for Operation ANACONDA was ineffective from the beginning and failed to honor joint aspects the effort would require. At the highest levels, neither the Land nor

Air component honored the Joint Operation Planning Process for Air or any integrated warfighting planning process. In fact up until just prior to execution the Army component planning for Anaconda had failed to make any direct effort to enlist the air component's involvement in their planning.¹¹ There had been no communication between senior Army and Air Force Generals (Mikolashek and Moseley) with respect to Operation ANACONDA at any time during the two-month planning effort, even though the two component commanders had routinely discussed other matters on a daily basis.¹² The lack of integrated planning was evident when the execution of the effort began. Half of the previously planned air attacks on the first day were aborted by the excessively close proximity of U.S. troops to the intended targets, and even without those complications, the air preparation was minimal at best.¹³ The plan provided for no preparatory fire against suspected Al Qaeda positions in the mountain caves, and the time allowed for the scheduled preparatory air attacks was cut back to only 20 minutes with the goal of maintaining an element of tactical surprise.¹⁴

Service Parochialism

Operation ANACONDA highlighted some of the worst aspects of service prioritization. When discussing the relationship between the Army and the Air Force, often the debate of “supported vs. supporting” services comes to mind. Pride in one’s service hinders the ability to become truly integrated and execution in the battlespace suffers. During ANACONDA, despite its designation as a “joint” combat entity, the Combined Joint Task Force assigned to execute the mission (CJTF Mountain) had no service representation other than from the Army in its organizational makeup.¹⁵ The doctrinal solution to air-to-ground integration between the Army and Air Force, the Tactical Air Control Party (TACP), was not included in the original CJTF construct.

Once included, the USAF steadily improved in effectiveness and USAF Enlisted Terminal Attack Controllers (ETAC) controlled hundreds of munitions deliveries from every type of attack platform in every U.S. and allied service involved with no fratricide and no friendly losses to enemy fire.¹⁶ The air component responded in a timely manner to more than 150 immediate requests and dropped some 200 precision-guided munitions on enemy positions in the first 24 hours of the operation with aircrews typically receiving refined target coordinates within 10 minutes or less of weapon release.¹⁷ These results and lessons learned were applied almost immediately when CAS became the mission for the air component in Iraq following the initial phase of operations and the shift to COIN.

In Iraq, the benefits of an integrated air-to-ground targeting team were evident. Air-to-ground teamwork combined with perceptive intelligence reduced average of Troops-In-Contact (TIC) responses from 20–25 minutes in the summer of 2004 to six to seven minutes throughout November, December, and January 2005.¹⁸ Once the Army and Air Force began to mission plan and execute along doctrinal lines and forgo service prejudices, joint air-to-ground targeting became increasingly effective.

ISR Prioritization

Once major combat operations in Iraq and Afghanistan ended and COIN warfare prevailed, the need for all disciplines of ISR rapidly increased due to the COIN target set: individual insurgents conducting asymmetrical warfare. COIN targets often hide among civilians in urban areas and generally refuse to engage with a superior force. When describing ISR in the context of this paper, the increase in FMV as well as traditional ISR platforms, such as the RC-135 RIVET JOINT and E-8C JSTARS, are the primary platforms referenced.

Initially, the need for increased amounts of ISR was due to its effectiveness. The ISR constellation developed to fight major theater wars when paired with increased FMV proved to be the pacing item for operations in Iraq and Afghanistan. Operation ENDURING FREEDOM was conducted under an overarching ISR umbrella that stared down constantly in search of enemy activity and the mix of mutually supporting sensors enabled greatly increased ISR input over that available during earlier conflicts.¹⁹ The reaction of service planners to this effectiveness was to develop and field anything “ISR” related and get it into the operation, often without honoring previously developed TTPs for the employment of ISR assets. Established acquisition processes were often bypassed and the term “urgent operational need” justified non-traditional ways of procuring weapons systems.

Metric-based Measures of Effectiveness and Efficiency vs. Effectiveness Debates

The ISR prioritization issue was evident even in the early days of Operation ENDURING FREEDOM and began with ignorance of available ISR assets, but evolved to rivalries over “ownership” once the effectiveness of ISR platforms was realized. In 2002, the Army did not routinely avail itself of the Air Force’s massive ISR pipeline, and Army units would not communicate directly to their own Battlefield Coordination Detachment (BCD) in the AOC, but instead would often send any input of note to the land component’s forward headquarters, “where it would stay in the black hole”.²⁰ Once the nature of the COIN battlefields in Iraq and Afghanistan became evident to ISR planners, the need to develop measures of effectiveness (MOE) became necessary rather than to leave the interpretation of ISR information to whatever end user could make of it. Considerable effort was expended to field ISR systems without the ability to determine if the effort was effective. Thus, often the MOE for ISR simply defaulted to metrics in the form of persistence (hours flown), collection deck serviced (how many areas were

surveilled), and other ways of gathering statistics. Operations leadership was often presented with MOEs that were ineffective or unhelpful for making allocation and appropriation decisions. One could draw the analogy that ISR planners were tracking how long the fish finder was on, not whether any fish were being caught. The ISR MOE issue also led to the phenomenon known as ISR “peanut butter spread” for assets with limited availability. UAS such as the MQ-1 are often able to maintain a Combat Air Patrol (CAP) which equates to 24 hour coverage of an area, often portrayed as uninterrupted ISR coverage on planner’s slides or products. The DoD’s goal was to field a sufficient number of Predator-class UAS to support 50 CAPs by the end of FY 2011 and 65 CAPs by the end of FY 2013.²¹ Other assets, such as manned ISR platforms, cannot maintain 24/7 coverage, thus were often scheduled by staggering station times of different assets to show uninterrupted ISR coverage reminiscent of a CAP. However, different platforms sharing the mission of ISR may have wildly different capabilities. Scheduling ISR assets to consecutive rather than concurrent times meets the intent of ground commanders to have 24/7 ISR coverage, but fails to capitalize on the synergistic effect of using complementary systems at the same time and area. For FMV systems, particularly UAS, the overarching effort was to field as many as possible to provide any requesting ground unit FMV support. The idea of “plenty + more = enough” when it came to FMV took hold, and ground commanders began to expect their level of ISR support should be equal to their sister units; in effect a modern version of airpower penny-packeting in North Africa during World War II. Unfortunately, the processes and personnel necessary to provide processing, exploitation, and dissemination (PED) for the emerging ISR information did not increase at the same rate as the collection of information. Often the MOE for FMV was the number of units supported, rather than if the information was actually used to achieve any effect, such as finding insurgents placing Improvised Explosive Devices (IED) or

protecting convoys from ambush. The lessons learned on how to apply tenets of airpower to successfully employ aircraft for CAS, such as priority and mass, were forgotten in order to show the Air Force was all-in to support the Army.

Doctrinal issues

The USAF and other services were not fully prepared for two simultaneous, protracted COIN operations conducted on the other side of the world; yet they adapted to the challenges. Unfortunately, this adaptation was reactive rather than proactive and many agreed-upon TTPs were developed without doctrinal guidance or insight into potential second and third order effects. Operation ENDURING FREEDOM saw centralized control, but also an insidious trend toward centralized execution leading to highly undesirable and even irreversible consequences if not duly disciplined and managed in a timely way.²² The U.S.'s current global communications connectivity provides an increasingly shared operational picture at all levels but also enabled what some have called "command at a distance", which is increasingly enabling direct senior leadership involvement in the finest details of force employment.²³ The availability of FMV feeds allows commanders at all levels to monitor what their units are doing and provides a tendency towards micromanagement. A camera feed of a UAS at 5,000 feet over the battlefield cannot accurately convey the millions of variables present to those actually in the area. The availability of global communications and ISR fusion can reduce the kill chain from hours to single-digit minutes, yet an oversubscribed target-approval process can nullify the advantage by extending decision timelines and make the human factor rather than the command, control, communications, and computers (C4)/ISR system the principal rate-limiter.²⁴ Commanders have become accustomed to this level of information and involvement in tactical situation while unintentionally conditioning their subordinates to rely on being able to receive guidance.

Unfortunately, the phenomenon of direct senior leadership involvement does not take into account any enemy actions to counter friendly architecture. Most long-distance communications feeds are reliant upon satellite communications and trusted networks, both of which are considered vulnerable to peer-nation adversaries employing A2/AD principles.

Near-term Operational Challenges

As the USAF emerges into the post 9/11 era and begins to curtail operations in Afghanistan, debates center on the topic of what theater of operations and threat environment the force should prepare for. The post 9/11 era is unlike other drawdown eras after major conflicts for several reasons. After the Cold War, most Warsaw Pact countries were in decline and the Soviet Union was primarily concerned with consolidating its own borders. Additionally, the post Cold War drawdown was preceded by a period of development of highly capable systems designed to fight a peer nation but was never used in combat against the anticipated threat. The post 9/11 drawdown will see demands for modernization as well as recapitalization of systems damaged or overused during COIN operations. Budget planners and leadership are addressing these issues in any number of initiatives; but the USAF is unlikely to realize the procurement or fielding of new capabilities in the next five years. The U.S. “ends” are expanding because of ongoing COIN commitments and the need to prepare for future battlefields, while the “means” are contracting due to budget constraints. The challenge for planners is to develop more creative “ways” by determining the differences in emerging threats and adapt current capabilities with new TTPs.

Air Sea Battle

Strategists have surmised with the spread of advanced military technologies and their exploitation by other militaries, the U.S. military may be challenged to operate in vast areas of interest including the Western Pacific and Persian Gulf. The Air Force and Navy (USN) are committed to pursuing a new operational concept called ASB which appears designed to assess how U.S. power-projection capabilities can be preserved in the face of growing A2/AD challenges, to include the most formidable challenge posed by the Chinese military.²⁵ ASB concept addresses high-end military operations such as the Western Pacific Theater of Operations (WPTO) but is also applicable elsewhere against other A2/AD-capable adversaries.²⁶ The concept is similar to how the U.S. Army and Air Force planed to employ AirLand Battle principles, specifically to use air and ground integration, to disrupt a conventional Warsaw Pact invasion of Central Europe.

U.S. Operations and A2/AD Warfare

The development and proliferation of advanced weapons over the past 20 years targeting perceived U.S. vulnerabilities have the potential to create an A2/AD environment that increasingly challenges U.S. military access to and freedom of action within potentially contested areas.²⁷ The U.S. military has enjoyed air superiority, logistics largely unaffected by enemy actions, availability of space functions, and access to trusted networks during recent conflicts. However, a trend towards advanced weapons proliferation has created a global environment in which the U.S. military will likely face more technologically capable enemies. The “American Way of Power Projection” over the last sixty years comprises these key elements:²⁸

- Rapid deployment of substantial air, ground and naval forces to forward bases/littoral seas

- Rear-area sanctuaries for U.S. forces and logistics build-ups
- The ability to track enemy activities and denying the same to the enemy
- Initiating combat operations at a time and place of U.S. choosing
- Generating and sustaining large numbers of air sorties
- Access to complex battle networks and satellite bandwidth

To counter U.S. power projection, A2/AD warfare seeks to deny these advantages by employing advanced threats to achieve:²⁹

- Loss of U.S. forward sanctuaries in physical domains
- Loss of U.S. sanctuaries in virtual domains (including space, cyberspace, the electromagnetic (EM) spectrum)
- Denial/disruption of U.S. battle networks, to include communications, command and control (C2) and ISR connectivity
- Denial of access to areas of operations; and consequently
- Loss of U.S. strategic and operational initiative

Military Budget Realities

The result of over ten years of COIN operations is a battle-hardened force, but an aging fleet of capabilities used at levels not programmed into the lifecycle of the programs.

Capabilities and weapons systems not employed in Iraq and Afghanistan were often delayed and sacrificed to field niche weapons systems that are only effective in permissive environments.

Recapitalization of weapons systems were programmed to occur after operations in Iraq and Afghanistan; but the unexpected length of the campaigns carried plans into 2007 when the global financial crisis occurred. The global financial crisis of 2007–2008 was the most severe since the Great Depression of the 1930s. More than any other financial meltdown in the postwar period,

this crisis affected major financial centers across the entire world and its effects are subsequently felt in declining military budgets.³⁰ Combined with protracted COIN operations, the financial crisis has left the USAF facing many potential conflicts without the near-term ability to build capability. Even without the wars in Iraq and Afghanistan, nearly half of the growth in defense spending over the past decade is unrelated to those conflicts.³¹ The cost of peacetime operations grew while the pace of operations declined and acquisition costs increased while the inventory of equipment grew smaller and older.³² Without the ability to build capability based on countering A2/AD threats, planners need to develop ways of using existing systems with modified tactics to counter emerging threats.

Budget Challenges and the Hollow Force

The costs of personnel, operations, and acquisitions are all on the rise, creating a “perfect storm” for defense planners in a declining budget environment.³³ Across all services, leadership will have to make difficult trades between force structure, weapon systems, and readiness since the USAF cannot continue to fund growth in all of these activities. The USAF is not alone in its challenge to meet future battlefields. The proposed plan is to reduce the size of the active Army from a post-9/11 peak of about 570,000 in 2010 to 490,000 and the active Marine Corps from a peak of about 202,000 to 182,000, reductions of 60,000 and 20,000 respectively.³⁴ The option to simply increase manpower and spending to meet A2/AD challenges is unlikely.

When faced with the realities of declining budgets and manpower, the USAF must avoid becoming a “hollow force” in respect to honoring A2/AD environments. Applied to the current military situation, a “hollow force” is only one of three different categories of risk in a tight fiscal environment, each stemming from deficiencies or imbalances in Readiness, Force Structure, or Modernization.³⁵ A hollow force is one in which unit effectiveness is systemically

degraded, resulting in authorized U.S. forces presenting the illusion of readiness; where as a strategy-force structure mismatch is a different, but related risk.³⁶ Additionally, the future viability of the force is at risk when modernization is neglected, for example, how defense budget increases since 9/11 financed wartime operations at the expense of procurement.³⁷ The USAF faces all three of these aspects with respect to preparing for A2/AD warfare. The high levels of readiness for COIN over the past ten years has come at the expense of preparedness against emerging threats, since mission sets such as CAS have been prioritized over other core USAF competencies such as SEAD and MI. Additionally, strategic force mismatches have occurred, since the size, composition, or capabilities of the force cannot keep pace with demand, especially when considering high demand/low density (HD/LD) platforms such as the E-8C JSTARS and RC-135 RIVET JOINT. HD/LD units have designed operational capability (DOC) statements requiring them to be ready to cover every anticipated contingency, yet due to their limited availability and the demands of the COIN fight, these units are often unable to become proficient at any mission other than COIN. The ability to build future capability against A2/AD threats is affected because the protracted COIN fight and fiscal hardships lead to under-resourced research, development, and test. The quick fielding of niche capabilities for COIN has diverted effort away from developing systems capable of surviving against emerging threats. Over the past decade at least a dozen major programs were terminated without any operational systems being fielded.³⁸ While the reasons for canceling program may have been justified, the effect is a significant portion of the DoD investment in modernization over the past decade did not result in force modernization. The USAF may not have the opportunity to recapitalize its inventory of equipment for a decade or longer given the fiscal constraints the nation now faces.³⁹

Mission Considerations Based on Budget Situation and Lessons Learned

Given the unlikelihood of near-term recapitalization of USAF assets or a large modernization effort, the USAF is forced to confront near-term A2/AD challenges with TTPs rather than material solutions. Fortunately organizations like the USAF Warfare Center have sponsored innovative initiatives such as “The Day without Space” working group along with units such as the 561st Joint Tactics Squadron to collect and disseminate TTPs for the current COIN fight as well as emerging threats areas. As the USAF moves away from COIN and AirLand Battle, tactical doctrine should evolve to meet ASB challenges by embracing joint concepts that worked, discarding those that did not, and internalizing the work of lessons learned organizations and initiatives. By adapting successes learned during decades of coordination with the Army, rapid integration with the USN can be realized quickly and efficiently to meet A2/AD challenges.

The ASB Concept centers on networked, integrated, attack-in-depth to disrupt, destroy, and defeat A2/AD threats.⁴⁰ This approach exploits and improves upon the advantage U.S. forces have across the air, maritime, land, space and cyberspace domains, and is essential to defeat increasingly capable intelligence gathering systems and sophisticated weapons systems used by adversaries employing A2/AD systems.⁴¹ Offensive and defensive tasks in ASB are tightly coordinated in real time by networks able to command and control air and naval forces in a contested environment.⁴² ASB concepts were unknowingly exercised during Operation ODYSSEY DAWN, but not to the level required to meet advanced threats. Offensive and Defensive Counter Air (OCA/DCA) missions are crucial for enabling targeting operations in A2/AD, yet the TTPs for these missions have not been influenced by recent operations in the same manner air-to-ground/surface missions have. The most appropriate mission areas to draw

COIN lessons learned for adaptation to A2/AD warfare are Joint SEAD and MI since air-to-ground targeting is the common mission consideration in COIN and A2/AD.

Joint Suppression of Enemy Air Defenses

One of the most daunting challenges the USAF will face on A2/AD battlefields is SEAD and destruction of enemy air defenses (DEAD) mission. Increasingly capable surface-to-air systems such as the SA-20 and the HQ-9 coupled with advanced EA seek to deny the USAF of access to areas of operations. Additionally, the increased mobility and proliferation of these systems will not allow joint targeting planners to complete the F2T2EA chain in the same ways legacy SAM systems were engaged. The killchain for advanced SAMS must be accomplished outside of legacy ATO cycles and targeting will be increasingly less deliberate and more dynamic in nature. SEAD and DEAD missions need to be decentralized to the lowest execution authority possible to be as responsive as possible, similar to the OOD concept of operations, but against a more capable threat. The fleeting nature of targets coupled with denied or degraded beyond line of sight (BLOS) communications will not allow current TTPs used in COIN, specifically informing the AOC and waiting for direction, to be successful. Certain COIN TTPs for targeting should be discarded and doctrinal provisions must defend our operators' initiative against undue interference.⁴³ To be responsive to these threats, the USAF and USN must develop the detailed integration at the tactical level between the operation personnel responsible to complete the kill chain against threats rather than build TTPs to up-channel assessments to decision makers at headquarters elements. The initial SEAD effort between the USAF and USN during Operation ODYSSEY DAWN was promising but was eventually hampered by increasingly restrictive ROE once every NATO participant evoked national caveats. The SAM and EA threat Libya posed was vastly inferior to the threat Syria, Iran, or China poses; USAF

and USN aircrew conducting SEAD must be empowered to make battlefield engagement decisions quickly when fleeting targets are identified. Combatant Commanders facing A2/AD threats must provide less restrictive ROE than previously used to conducting COIN and trust those in the battlespace will make the appropriate decisions.

Joint Maritime Interdiction

The joint maritime interdiction effort needs to be decentralized just as the SEAD and DEAD mission against advanced threats for similar concerns. During COIN targeting, most decisions were centralized out of necessity since, as GEN McChrystal put it, coalition forces must avoid “winning tactical victories but suffering strategic defeats by causing civilian casualties or excessive damage”.⁴⁴ Conversely, when facing A2/AD threats the USAF risks strategic defeat if it is unable to provide sufficient damage to enemy forces, in particular enemy naval forces. Potential adversaries can counter USN forces by overloading defenses with numbers of fast attack craft/fast inshore attack craft (FAC/FIAC). The proliferation of FAC/FIAC vessels presents a number of tactical challenges to the USN since there is a definite tactical quality to quantity. The sheer number of small but lethal threats that have to be considered creates an overall high threat environment; numbers can overwhelm a technological edge.⁴⁵

To accomplish effective joint maritime interdiction, the lessons learned in effective air-to-ground integration for COIN must be transferred and adapted to build lethal maritime interdiction TTPs. The detailed integration and close proximity of air-to-ground operations perfected in Iraq and Afghanistan developed to quickly strike FAC/FIAC threats will allow USAF operations personnel to use the flexibility and responsiveness of airpower to meet the challenge.

Liaison Officers and Joint Operations

Perhaps the biggest lesson learned for success during COIN operations was the necessity for liaison officers at the tactical level. In particular, TACPs consisting of USAF Air Liaison Officers (ALO) and Joint Terminal Attack Controllers (JTAC) were absolutely essential to successful targeting during COIN operations to avoid hitting coalition ground forces while targeting insurgents. As the COIN environment changed from kinetic operations to ISR-driven operations, the concept of USAF ISR Liaison Officers (ISRLO) to provide expertise in the growing fleet of ISR assets came to fruition. Leaders in both the USAF and USA understood the need for close coordination and integration of air-to-ground teams to conduct COIN. As the priority shifts away from COIN to A2/AD warfare, the USAF and USN must develop closer ties via liaison officers and shared training venues to successfully prepare for ASB contingencies. Naval aviation continues to support USAF large force exercises such as RED FLAG and is increasingly integrated into USAF missions such as SEAD and dynamic targeting. USAF Operational Test organizations have also participated in joint tactics development and evaluations to develop TTPs to ingrate 5th generation fighters such as the F-22 into existing naval aviation tactics. However, to be truly integrated, the USAF needs to consider developing tactical liaison officers similar to ALOs, yet stationed with USN combat units. However, these new breed of ALOs will plan and execute J-SEAD and MI missions with the USN rather than CAS with the Army.

Acquisitions to Consider Based on Lessons Learned

While material solutions to counter A2/AD threats are unlikely in the near-term, the USAF can use successes realized in COIN for the procurement of technologies enabling the USAF to make the most of current weapons systems and emerging TTPs. One of the five major

tenants of the President's strategic guidance is to protect key investments in technologically advanced capabilities needed to counter A2/AD threats.⁴⁶ More than any single weapons system, COIN operations taught warfighters the necessity of interoperable information systems. For ASB concepts to be successful, procurement and fielding of advanced communications systems is crucial.

COIN operations in Iraq and Afghanistan were generally conducted in an environment without enemy interference to friendly communications. However, adversaries using A2/AD concepts will seek to deny U.S. battle networks, to include communications, command and control and ISR connectivity. To mitigate these threats, the Joint Tactical Radio System (JTRS) program was developed. The JTRS program is intended to provide a family of software-programmable, interoperable radios for use across the DoD.⁴⁷ While JTRS radios are more capable in terms of interoperability, data rates, and other factors, they cost substantially more than legacy radios, and over the past decade, the program encountered numerous technical and management challenges.⁴⁸ A low-rate initial production occurred in 2005, but due to delays and a program restructuring in 2006, production of JTRS radios has only recently begun.⁴⁹ While problematic in acquisition, a family of interoperable joint radios will allow planners to mitigate emerging threats present in A2/AD warfare.

In addition to EA attacking line-of-sight radios, USAF planners can expect the loss of sanctuaries in virtual domains (including space and cyberspace) due to advanced cyber threats. In particular, the use of trusted networks to share secure internet and IRC information is likely to be contested. The success of secure airborne IRC as a C2 tool was developed during COIN operations in Iraq and Afghanistan and validated during targeting operations in Libya. However, because these systems were developed in a benign threat environment they are likely vulnerable

to attack. To enjoy information superiority and to rapidly share information over long distances, the USAF should prioritize the development and fielding of secure, anti-jam networks capable of providing airborne IRC. By adding a flexible anti-jam capability to existing networks, USAF C2 platforms can continue to share information in hostile EA environments.

Perhaps the easiest yet most often overlooked capability needed to meet A2/AD challenges is a functional Joint Tactical Information Distribution System (JTIDS) network. JTIDS is a tactical datalink (TDL) system used by most tactical entities, such as aircraft, ships, and ground nodes, to pass tactical information about friendly and enemy entities. Fortunately, JTIDS was purpose-built as a secure, anti-jam TDL to mitigate jamming environments anticipated during the Cold War. JTIDS has proven to be a highly effective tool for warfighters across the spectrum of conflict and was adapted for use during COIN operations; even individual Airmen could use certain techniques to provide their position on the JTIDS network. However, numerous COTS-based TDL solutions were developed and fielded in a non-integrated fashion across the DoD during the past ten years of COIN and the USAF has struggled to develop gateways to translate all of the disparate networks. By developing gateways instead of focusing on a common TDL, the USAF inadvertently simplified the targeting of the network by providing key nodes (gateways) rather than ensuring the graceful degradation principle inherent with JTIDS is preserved. In the case of TDLs, the lesson learned should be to ensure standardization and fielding of a proven, capable system designed with the threat in mind.

Conclusion

The USAF has enjoyed varying degrees of success in recent operations. Planners preparing for the next conflict are saturated with data from the past ten years of COIN operations; yet do not have the context and perspective present with forthcoming time, distance,

and in-depth analysis. To avoid preparing for the next war by planning to fight the last one, leaders should take an objective look at what worked and what failed on battlefields in Iraq, Afghanistan, and Libya.

ODYSSEY DAWN: An example of things to come or an anomaly?

The highly successful dynamic targeting operation during Operation ODYSSEY DAWN proved the USAF has the ability to project airpower over vast distances with little to no notice. Even monetarily, the effort over the skies of Libya cost one one-hundredth of U.S. spending in Afghanistan.⁵⁰ However, the lessons learned from ODYSSEY DAWN should be viewed with a degree of skepticism when attempting to apply them directly to A2/AD and ASB. The defining factors of future conflicts were not present over the skies of Libya: a robust surface-to-air threat, integrated advanced electronic attack, and an adversary committed to denying joint/coalition access to forward basing. The USAF enjoyed the ability to mass forces in the Mediterranean, launch aircraft unopposed by cyber or asymmetrical attacks, position ISR assets to find and fix the enemy, and then complete the kill chain against forces arrayed in a desert environment. In some ways, ODYSSEY DAWN allowed the USAF to play to its strengths and it was conducted using NATO bases once prepared to fight the Warsaw Pact. Indeed many of the bases were used during Operation ALLIED FORCE in the late 1990s, but now against a military opponent crippled by 30 years of arms embargos. Most of the Libyan regime's surface-to-air systems were 30+ years old. In contrast, the USAF was a battle-hardened force prepared during air-to-ground targeting operations in multiple theaters for over 10 years. It should come to no surprise the USAF did so well in Libya, one could speculate that had the U.S. continued as the lead actor instead of transitioning to NATO the conflict would have ended in weeks, not months.

In contrast, the lessons learned during the long war of COIN in Afghanistan and Iraq should not be dismissed because of the differences between COIN and A2/AD warfare. The USAF must be prepared to conduct operations across the spectrum of conflict, recent operations have focused on COIN but some of the necessary functions, such as strategic and theater airlift, are enduring and will be crucial to ASB.

ISR Operations Developed for COIN: How Does The USAF Adapt New Capabilities to A2/AD?

The emphasis on ISR for COIN cannot be overlooked. The USAF has adapted legacy systems and rapidly fielded other systems to develop information on the COIN targets of networks and individuals. The finding and fixing of individual people hiding amongst civilians in urban areas and inhospitable mountain areas is arguably the most difficult target set a military can envision. The USAF has mission planned, adapted, and executed against individual COIN targets for 10 years and continues to this day. While some of the newer systems fielded for COIN are niche capabilities unlikely to be effective or survivable in A2/AD environments (particularly light fixed wing ISR aircraft, such as the MC-12W), ISR operations personnel have developed skill sets and processes to find/fix individual people and analyze/exploit intelligence faster. When those skill sets and processes are adapted back to traditional targets such as aircraft, SAMs, and ships it is conceivable the USAF will be very effective. The F2T2EA process against military targets will be easier for those operations personnel who have experienced the difficulty of finding the right person at the right time. However, the downside to the COIN ISR experience is not the people; it is the technology and priority. Many databases and target folders for potential adversaries, such as electronic notations and parameters of threat systems, have gone uncollected due to the emphasis on COIN targets. For these databases to be relevant and accurate for A2/AD fights they must be prioritized appropriately according to the

capability of the threat to hinder USAF operations rather than apportioning them to appease all requesting agencies (penny-packeting).

Recommendations

For the USAF to be successful in A2/AD and ASB environments in the near term, leadership will have to prioritize the non-material lessons learned and TTPs developed over the past ten years. In the long term and if economic situations allow, material solutions requiring long-lead time and development should be prioritized to meet anticipated battlefields rather than developing systems for the past fight.

Honor Airpower Doctrine to Enable Warfighters

In the next five years, planners will continue to seek ways to counter adversaries using A2/AD techniques. While the threat and battlespace situation may vary; honoring airpower principles and certain doctrinal concepts will allow the USAF to mitigate losses in capability for advanced fights. For commanders charged with conducting operations, the most important concept to grasp will be decentralized execution. When facing long distances and advanced threats, commanders are unlikely to influence the battlespace from distant AOCs. When facing denied satellite communications, compromised trusted networks, and highly defended target areas, USAF aircrew and operations personnel must be empowered to make decisions and provide effects without further consultation from higher headquarters. The option to inform the AOC and wait for direction is unlikely to be viable based on the threat. Commanders can ensure decentralized execution by providing clear priorities and intent in the Air Operations Directive (AOD), Rules of Engagement (ROE) and Special Instructions (SPINs). Rather than publishing documents to cover any eventuality, commanders should focus on conveying what effect or

objective is important in the next ATO cycle. Aircrews will know what the intent is, apply ROE, and make decisions to ensure commander's intent is achieved. By enabling decentralized execution, commanders will empower every member in the battlespace to become problem solvers; each person taking a piece of the tactical or operational puzzle and reducing the size of the problem. Without decentralized execution, the amount of data available during modern warfare coupled with an active enemy seeking to deny or disrupt communication systems will quickly overwhelm an AOC staff and hamper the ability of a JFACC to conduct air operations.

Develop, Train, and Execute Joint Solutions for A2/AD Mission Areas

For the USAF to be successful in A2/AD environments the lessons learned about the efficiency and effectiveness of joint operations must be applied. During COIN operations, most air operations were in direct support to ground forces by conducting ISR, CAS, and airlift. In A2/AD scenarios, air operations are likely to be conducted in support of or in partnership with naval forces in the form of SEAD and MI. SEAD and MI are two mission sets not prioritized during the past ten years, but by prioritizing joint training and TTP development with the USN the skill sets necessary can be learned. Given the nature of A2/AD, the USAF and USN must plan, train, and execute as a joint force to maximize the strengths of each service and mitigate the weakness. Naval aviation assets do not have the range and anti-access capabilities the USAF has developed in stealth aircraft and long range precision strike capabilities; concurrently the USAF does not have the ability to secure shipping lanes and occupy areas necessary for air operations. Principles in joint warfare learned as long ago as the Pacific campaign during World War II still apply, but must be adapted to meet the threat.

Develop and Cultivate New Liaison Relationships

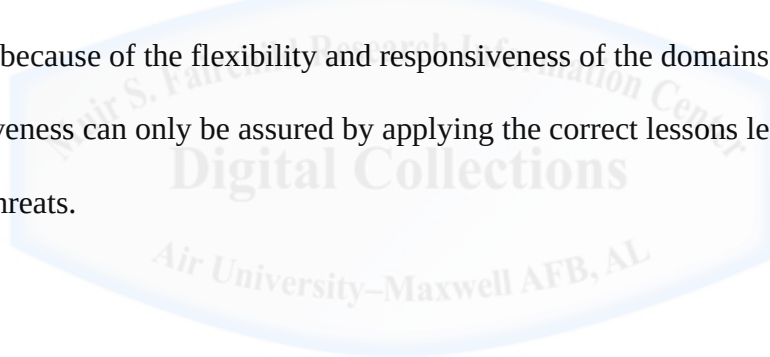
To ensure joint operations are successful, the USAF must prioritize filling liaison officer (LNO) positions with the USN. Given the budget crisis and the reduction in personnel, USAF leaders may be tempted to cut LNO positions to focus on service-specific needs. Core competencies are often prioritized during times of fiscal strain. With diminished forces, joint warfighting TTPs must be prioritized to ensure success; without the daily face-to-face interaction LNOs provide it is unlikely vital coordination needed to conduct complex combat operations will be successful.

Procure and Field Force Multiplying Technologies Independent of Service Programs

In addition to coordination amongst personnel, the USAF must prioritize procurement and fielding of systems based on interoperability among services and future requirements to meet A2/AD threats. Again, facing diminished budgets, USAF leadership may feel pressure to focus on service-specific systems and recapitalization of capabilities lost during COIN operations. However, to be successful against emerging threats, The USAF must field systems that are able to quickly and seamlessly share information across service boundaries. A2/AD techniques seek to remove the capability of USAF assets to shoot, move, and communicate effectively, something the USAF has not faced since planning for operations against the Warsaw Pact during the Cold War. Purpose-built military systems developed during that period, such as JTIDS, honored the threat and were fielded across the services. The lack of credible threat and the demand for fielding of systems quickly during COIN operations led to many commercial off the shelf (COTS) solutions unlikely to be effective in A2/AD environments. To reverse this trend and honor the threat updates to legacy systems must be prioritized and new systems purpose-built and required to mitigate threats such as sophisticated EA and cyber threats.

Honor Historical Examples and Apply Them to Future Battlefields

War is inherently a human endeavor; technology changes quickly but human nature does not. Many of the concepts necessary to be successful on future battlefields are present in past operations. In the past century, the U.S. military had the misfortune of losing the first battles of major theater wars (WWII and Korea) or failing to accurately see the warning signs of conflict (Operation DESERT STORM and the 9/11 attacks). In these conflicts, the country was able to triumph because time and the strategic situation allowed the use of technological and logistical advantages to build the forces necessary to attack at the time and place of U.S. advantage. The margin for error regarding the opening moves of an A2/AD fight is shrinking due to emerging advanced threats and diminished capability. The USAF is expected to execute on night one of the next conflict because of the flexibility and responsiveness of the domains in which it operates; effectiveness can only be assured by applying the correct lessons learned adapted to meet emerging threats.



Notes

(All notes appear in shortened form. For full details, see the appropriate entry in the bibliography)

¹ van Tol, et al, *AirSea Battle: A Point-of-Departure Operational Concept*, x.

² Public Law 99-433, *Goldwater-Nichols Department of Defense Reorganization Act of 1986*, 2.

³ United Nations Security Council, *Security Council Approves 'No-Fly Zone' over Libya*, online.

⁴ Gertler, *Operation Odyssey Dawn (Libya): Background and Issues for Congress*", online.

⁵ AFDD 1, *Air Force Basic Doctrine*, 28.

⁶ Ibid.

⁷ AFTTP 3-2.77, *Multi-Service Tactics, Techniques, and Procedures for Internet Tactical Chat in Support of Operations*, 69.

⁸ Ibid.

⁹ Lambeth, *Air Power Against Terror*, xx.

¹⁰ Ibid., xxi.

¹¹ Ibid., 169.

¹² Ibid., 174.

¹³ Ibid., 185-186.

¹⁴ Ibid., 185-186.

¹⁵ Ibid., 168.

¹⁶ Ibid., 193.

¹⁷ Ibid., 185-186

¹⁸ Belote, *Counterinsurgency Airpower*, vol. XX, no. 3.

¹⁹ Lambeth, *Air Power Against Terror*, xxiii.

²⁰ Ibid., 222.

²¹ Harrison, *Analysis of the FY 2012 Defense Budget*, 45.

²² Lambeth, *Air Power Against Terror*, page xxvii-xxviii.

²³ Ibid., xxvii-xxviii.

²⁴ Ibid., 294.

²⁵ van Tol, et al, *AirSea Battle: A Point-of-Departure Operational Concept*, 25.

²⁶ Ibid., xvi.

²⁷ Air-Sea Battle Office, *The Air-Sea Battle Concept Summary*", online.

²⁸ van Tol, et al, *AirSea Battle: A Point-of-Departure Operational Concept*, 24.

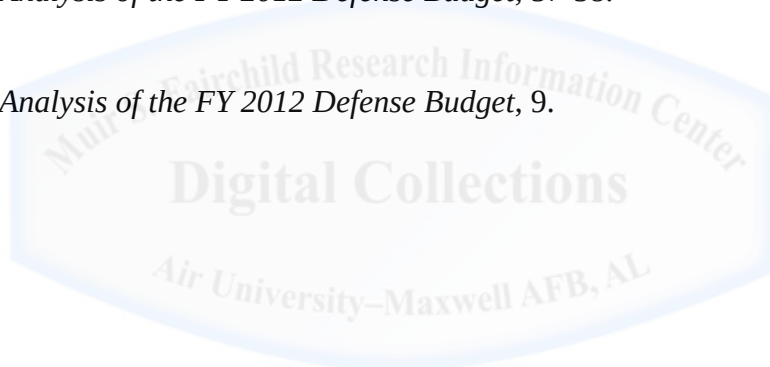
²⁹ Ibid., x.

³⁰ Helleiner, *Understanding the 2007-2008 Global Financial Crisis*, 68.

³¹ Harrison, *Analysis of the FY 2012 Defense Budget*, vi.

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- ³² Ibid., vi.
³³ Ibid., 15.
³⁴ Department of Defense. *Defense Budget Priorities and Choices 2012*, 11.
³⁵ Chief of Staff of the Air Force Strategic Studies Group, *What is a Hollow Force?*, online.
³⁶ Ibid.
³⁷ Ibid.
³⁸ Harrison, *Analysis of the FY 2012 Defense Budget*, viii.
³⁹ Ibid.
⁴⁰ Air-Sea Battle Office, *The Air-Sea Battle Concept Summary*", online.
⁴¹ Ibid.
⁴² Ibid.
⁴³ Blair, *Dodging Gaugamela*, 12.
⁴⁴ McChristal, *Tactical Directive*, online.
⁴⁵ Dohlan, *The North Korean Connection*, online.
⁴⁶ Department of Defense. *Defense Budget Priorities and Choices 2012*, 11.
⁴⁷ Harrison, *Analysis of the FY 2012 Defense Budget*, 57-58.
⁴⁸ Ibid.
⁴⁹ Ibid.
⁵⁰ Harrison, *Analysis of the FY 2012 Defense Budget*, 9.



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