Crisis Management and the Anti-Access/Area Denial Problem

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America's political and military leaders rely on unimpeded US force movements across strategic distances to stabilize regions and deter threatening regimes. That reliance depends on assured air and naval superiority as a precondition. US leaders assume that with air and naval superiority during wartime, the United States can secure its interests and attain its objectives through robust military intelligence, logistics, maneuver, and firepower. But the rise of anti-access (A2) and area denial (AD) strategies and capabilities poses a problem for US foreign policy: A2/AD thwarts US ability to project power and force on its own terms. By using an A2/AD strategy, regional adversaries are able to contest US power projection and presence. This strategy and capability allows adversaries to oppose the United States across its operational and strategic depth.

When Pres. Barack Obama and Secretary of Defense Leon Panetta unveiled the new DoD strategic guidance, *Sustaining US Global Leadership: Priorities For The 21st Century Defense*, on 3 January 2012, Secretary Panetta wrote in his introduction, "this country is at a strategic turning point after a decade of war and, therefore, we are shaping a Joint Force for the future that will be smaller and leaner, but will be agile, flexible, ready, and technologically advanced."[1] Additionally, "it [joint force] will have cutting edge capabilities, exploiting our technological, joint, and networked advantage." The document referenced the challenges to US power projection by A2/AD and identified competitors to US power projection. Specifically, China and Iran were cited as "[pursuing] asymmetric means to counter our power projection capabilities, while the proliferation of sophisticated weapons and technology will extend to nonstate actors as well."[2] The A2/AD verbiage in the document indicates what must be done: the United States must have

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assured methods of projecting military force where presence of that force will be contested.[3] The DoD strategic guidance document also discussed the recently completed Joint Operational Access Concept (JOAC).[4] While the JOAC addresses how US forces must be able to enter highly contested places, it is not a conceptual design that promotes strategic theories for shaping and deterring A2/AD adversaries.[5]

Without a better understanding of the A2/AD problem and new ideas to assure its power and force projection, the United States will gradually lose its ability to shape regions and deter A2/AD adversaries. The A2/AD challenge demands an offsetting strategy, a retooling of US power and force projection concepts, and an examination of the ways US power projection can shape A2/AD crisis management. This article presents the concept of A2/AD, including the nature of the problem, and amplifies the A2/AD strategy. It then offers a new crisis management design framework, followed by planning considerations for the future of A2/AD.

The terms in figure 1 make the case for an applied design concept to better manage crises in A2/AD settings. They imply the notion of the "A2/AD portfolio"—an adversary's all-of-their-government method of undermining regional stabilization that also blunts US projection of power and force. The US "offsetting strategy" refers to a multilinear whole-of-government method geared to overcome the resistance and effects of a rival's A2/AD strategy.

* **Anti-Access (A2):** adversary capabilities, actions which impede (preclude, prevent, mitigate) the movement of US forces to their desired locations (war-fighting positions, staging locations, etc.).

* **Area Denial (AD):** adversary capabilities which impeded the free movement of US forces within the employment envelopes of maximum effectiveness, efficiency, or advantage to US forces.

† **Linear Strategy:** conduct of operations with identified forward line of troops; rear area security implied from logistics areas and fighting forces; useful when outnumbered or forces lack the information needed for nonlinear operations.

† **Nonlinear Strategy:** a focus on objectives without geographic references to adjacent forces; emphasis is on delivering effects on multiple decisive points. Requires high situational awareness and use of precision fires.

‡ **Multilinear Strategy:** an amagamated linear/nonlinear approach across all five war-fighting domains; assumes ability to integrate all kinetic/nonkinetic forces in a cross-domain operations approach to create more effects paths, options.

* Undefined in JP1–02; see JOAC for related definitions.
† Undefined in JP 1–02; see operational discussion, JP 3–0, pgs V–51 to V–53.
‡ Based on theoretical discussion initiated by LTC Christopher Paparone, US Army ALOG, Nov–Dec 1996.

Figure 1. A2/AD definitions and concepts

The primary benefit of this design concept for crisis management is to ensure the United States can continue to use assured military presence and whole-of-government synchronized effort to strengthen its influence in key regions. Other benefits include improved understanding and specified design that allow the United States to better shape a crisis with an A2/AD adversary; or alternatively, better position its entry into conflict against an A2/AD threat. There are three premises which underlie this concept for crisis management: (1) the nature of war does not change, but the character of war does change from era to era,[6] (2) the United States will need fresh theories and concepts of shaping, deterring, and war fighting less tethered to its traditions of annihilation warfare, and (3) A2/AD will multiply US force attrition, erode its conventional deterrence, and undercut its ability to manage escalation and deescalation.

A2 and AD: The Problem and Its Nature

Understanding of anti-access and area denial is not common across the US military establishment. Within the armed forces are generations of war fighters who know only warfare in permissive operations where the United States has the initiative—not the conditions caused by A2/AD. Moreover, to the extent A2/AD appears in US defense writings, there is a frantic focus on systems versus systems rather than strategies for success. At the tactical level, the impact of these and other A2/AD capabilities is and will remain important. However, at the strategic and operational levels of war, the mural which depicts how A2/AD jeopardizes US projection of power and force is incomplete.

The A2/AD concept describes but does not explain the training, organizing, and equipping activities observed in four potential adversaries: the People's Republic of China (PRC), Iran, Russia, and North Korea. A2/AD consists of a regional strategy with tactical-to-strategic effects designed to preclude the United States from reinforcing its conventional power—its over-the-horizon mobilized forces. How far away from a given region an A2/AD adversary will oppose US forces and what form that opposition takes will depend on adversary capabilities and will. However, the diffusion of defense technologies is enabling A2/AD adversaries to develop weapon systems of greater reach, immediacy, and accuracy, such as cyberspace global reach at the speed of light, offensive counterspace technologies, and long-range surface-to-air missiles. To a force that intends to

deter, counter, or defeat an adversary's defenses, A2/AD can be thought of as a grand military porcupine.

Therefore, to US policymakers, military leaders, and campaign planners, A2/AD is a *wicked* problem.[7] A2/AD strategies are not self-referential; their character is not fully explained by their existence. It is a nonlinear opposing strategy that leverages diplomatic, information, military, and economic (DIME) activities. A2/AD unfolds in peace, crisis, and war to gradually erode confidence in the perceived ability of US forces to *project* strategic strength and stability. It is an expression of the uniqueness or difficulty in attaining comprehension of the underlying nature, structure, and organization of a given military problem.[8] While each of the four potential A2/AD adversarial regimes has substantive ideological differences, those differences take a backseat to the commonality of A2/AD military effects. At the micro level, an advanced missile is still a missile to be defeated. At the macro threshold, their similarity is, they seek to carve out their respective regional spheres of influence by bringing to bear military capabilities across all operating domains to control strategically valuable places and spaces.

Interestingly, A2/AD is not explicitly mentioned as a doctrinal term in known PRC military literature; however, the intent of preclusion and preemption can be found in the PRC's "three warfares" concept.[9] This concept refers to an ongoing effort by the PRC to use the media, psychological messaging, and illegal actions to promote the expansion of Chinese authority.[10] It is not known if Russia's contemporary organizing doctrine is explicitly built on A2/AD, but indications in recent years suggest it has a good grasp of A2/AD. First are the alleged links between the massive cyberspace denial of service attacks in Estonia during 2007 that originated from within Russia without apparent strenuous objection or intervention by the Russian government.[11] Second, during Russia's 2009 military incursion into Georgia, Russian cyber effects were used to degrade the functions of the Georgian government and posture of its armed forces.[12] Meanwhile, the PRC and Iran are building vast ballistic and cruise missile inventories that are significantly out of proportion to the scale of any postulated regional threat.[13]

The strategic effects of A2/AD produce challenges to the United States in three broad areas: inadequate access, curtailed freedom of action, and eroded influence. Inadequate access may result from choices US allies and friends feel compelled to make to avoid facing retribution or retaliation

from a regional hegemon. Feeling compelled to choose between a future with a belligerent neighborhood threat and a United States whose interest might wane, current friends may see no choice but to appease the A2/AD rival. Appeasement could take the form of curtailing air and naval port access or prohibiting overflight, thus weakening the deterrent abilities of US forces in peacetime. It could also stymie US ability to effectively manage a crisis or prosecute a conflict over great distance.

Curtailed freedom of action is another important A2/AD strategic effect. It is important that US forward-based forces operate throughout and across vital regions to effectively shape conditions and deter hostile actors. AD measures such as hostile diplomacy, contrary media operations, and numerous offensive and defensive systems can inhibit US effectiveness. To one degree or another, all four A2/AD rivals develop and deploy large missile forces for asymmetric advantage. Indeed, the Chinese are going one step farther by expanding their air force and coupling it with immense army missile forces to create a formidable regional air defense.[14] Chinese international territorial disputes in the South China Sea and elsewhere have provoked naval force buildups by governments along Asia's southern and eastern periphery so that these states can better protect their sovereign interests.[15]

Russia's reinforcement of military capabilities adjacent to its European near abroad, force modernization, and military reorganization all suggest an adversary reinventing its approach to asserting itself.[16] Though a much smaller military since the Cold War, Russia's advanced surface-to-air missile systems, advanced fighter aircraft programs, extensive cyberspace capabilities, and WMD inventory make it a formidable A2/AD adversary. Meanwhile, Iran's ongoing missile force buildup and aggressive posture holds at risk a growing number of Persian Gulf states. Iran is able to disrupt international shipping that can jeopardize the transit of petroleum through the Strait of Hormuz and northern Arabian Sea.[17] If it succeeds in developing a nuclear weapon, the region's security and stability contours will be significantly altered, producing yet more complexity and volatility. In this sense, Iran's A2/AD strategy could be used both as a tool to erode US regional power and a shield behind which to continue a domestic nuclear weapons program with little concern for accountability to the international community.

Weakened US influence and assured defense are concerns for allies in areas with an A2/AD adversary. If they perceive US regional influence is waning or fragile, they may decide to create different alliances or continue

their US partnership on different terms. If the United States does not oppose A2/AD with an offsetting strategy composed of coherent regional approaches, it risks sending the wrong signal for regional stability. Additionally, weakened US overseas influence presents more difficulties in defending its vital interests in areas with an A2/AD adversary. If the United States cannot protect its vital interests against an A2/AD competitor, it risks ceding control of these interests to opposing, illiberal ideologies.

A2/AD strategies undercut the US preferred union of power and force projection by preempting or precluding force options. Suffering blunted or attenuated projection of forces decreases the relevance of US power. Further, the defense logistics enterprise—the engine of force projection—will most assuredly be the focus of extensive cyber attack. Not only do cyber attacks on its logistics enterprise mean US forces deploy forward at decreased rates of movement, but once forward, their range of operations will be diminished and restricted.

Whether the United States would be deterred by the prospects of war against an A2/AD adversary with the ability to eliminate theater safe areas, interdict US marshaling areas, disrupt US information networks, or promote fear of extreme cost is an absorbing topic for war-game inquiry. However, if A2/AD rivals can effectively use their multilinear strategies as templates of coercion, the result will be destabilized regions where control is tilted away from the United States and its allies. The resultant instability could enhance the likelihood of strategic miscalculation while inflating and emboldening the rival's sense of strength. If the United States cannot preserve a sufficient range of force options against an A2/AD threat, it cannot adequately mitigate the rival's actions. In essence, an adversary's strategic goals become foregone conclusions and its military campaigns a fait accompli. While crisis and war take on many forms, a crisis against a multilinear A2/AD threat essentially gives rise to two probable warfare scenarios.

The first scenario is a rival's use of force that wantonly restricts access to the commons (air, maritime, etc.). Such a scenario could pose an imminent, destabilizing threat to the sovereignty of the targeted nation.[18] If the target nation perceives that only resorting to armed force will lead to restoration of its lost access, then the goal must be cessation of the rival's effects. For example, globalization has increased the importance of global maritime trade. It follows that actions which interrupt that trade will produce political-military clashes.[19] In such a scenario, the United States, leading an effort to restore the target nation's commons access,

will be faced with the task of sufficiently mitigating the A2/AD effects to bring about conditions for a satisfactory peace. Such a campaign would raise questions of its ability to limit the scope of the campaign to avert a widening of hostilities.

Under the second scenario, an adversary's aggression involves conquest or occupation. Thus, if a belligerent A2/AD rival chose to unilaterally occupy contested territory, the resulting military assignment could be to dislodge the newly entrenched forces. An ensuing effort for restoration of proper sovereign control may call for a sizeable US or coalition counter–A2/AD campaign.

For either of these scenarios, the time before an adversary commences hostile action presents the best opportunity to manage the crisis through deterrence and shaping actions.

In looking at these and other scenarios of A2/AD crisis and conflict, readers may ask if the United States has previously confronted similar actors and circumstances. Earlier twentieth-century wars demonstrate that in some ways A2 and AD are not entirely novel. Studying illustrative examples of A2 and AD can help inform US understanding of their consequences in future war. To be clear, this is not to say the United States has been here before and need only reprise previous counter–A2/AD solutions; invariably, this proves to be yesterday's solutions to yesterday's problems. A helpful place to begin is three interesting chapters of enemy A2 and AD in three theaters of World War II. Germany's *Kriegsmarine* campaign to isolate England from Allied maritime support lasted from 1939 to 1945. Its A2 strategy in the Atlantic presented a clear and present danger to the Allies. The German U-boat threat was eventually overcome through improved Allied tactical integration, fledgling military operations research lessons, new technology, and the exploitation of German signals.[20] In particular, this battle offers a persuasive case for the effectiveness of a marriage of land-based air, maritime, and electromagnetic spectrum capabilities.[21]

At least two other WWII chapters are worthy of note relevant to A2 and AD. Nazi Germany's extensive V-1 and V-2 missile programs rained destruction on England. The Allied counter to these missile raids was Operation Crossbow, the bombing of German missile staging and launch sites in Europe's Low Countries.[22] Among Crossbow's insights was that, lacking rapidly acquired and widely disseminated accurate missile location data, preplanned or real-time redirected aerial attacks would be of incremental success at best.[23]

The final illustrative chapter was the application of Japanese airpower against US surface combatants in the US Pacific island-hopping campaign.[24] At its height, kamikazes were more than a WWII phenomenon; they demonstrated the founding principles of guided, long-range antiship attack. As demonstrated since WWII, ship attack technologies will hold navies at increasing risk of catastrophic attack across littorals and push them farther into oceanic areas.

Any treatment of A2/AD must be balanced with a discussion of how the attributes of US forces accentuate their vulnerabilities to attack. In the name of economies and efficiencies, the Pentagon reorganized its forces and support architectures in ways that, paradoxically, made them more vulnerable to the effects of A2/AD information disruption and network attack. Two prominent examples of this paradox come to mind: first, connectivity is critical to US intelligence-surveillance-reconnaissance (ISR) constellations. Its dependence on reach-back/push-forward data architectures, while conferring great strength, represents a range of vulnerabilities too tempting for hegemons to overlook.[25] The implication is that disruption and degradation of the ability to both see and sense will mean US forces not being able to rapidly attack the full range of time-sensitive, high-value targets of an A2/AD regime.

A second prominent example is the civil-military enterprise of just-in-time logistics services and the US approach to the use of globally dispersed lift and supporting service providers. The vulnerability of the US military's logistics enterprise to larger global information grid disruptions caused by cyber attack has been documented in related analytic work stretching back years.[26] Attacks on US military logistics forces and infrastructure are more serious than corrupting information network data, although that is significant. Impeding US sealift freedom of action by under/above sea attack, striking US airfields to disrupt strategic airlift, interdicting overseas US petroleum storage-handling sites, and conducting cyberspace counter-logistics attacks in US home zip codes are but a handful of actions A2/AD adversaries can undertake to degrade US forces.

Some of the A2/AD measures described thus far straddle peace, crisis, and conflict, while others may not be unfurled until the onset of hostilities. Yet, if any of these events are viewed as simply liabilities of war, the costs of mitigating them will be seen as costs of doing business during war. They will remain remote and apart from a peacetime investment strategy to counter A2/AD effects before war. That mindset will weaken the US

ability to stair-step into crisis and beyond. But peacetime costs are only a slice of the pie for how the United States must effectively shape and deter A2/AD adversaries. Another significant aspect is the improved employment of US assets in ways that can either lessen tension or demonstrate resolve in a crisis when deterrence fades.

Of the concepts, weapons, and tactics the United States develops to respond to A2/AD, the human factor may represent the most formidable—and the greatest opportunity. No one currently in the US military, from its most senior four-star flag leaders to the newest recruit, has served in an era when the United States could not permissively transport its forces throughout the global commons to disparate places with names like Chosin, Pleiku, An-Nafud, Anbar, Nangarhar, and others.[27] To prevail against A2/AD, the United States must visualize itself apart from what it has been doing for the last 20 years to something different: nonpermissive warfare where everything will be intensely challenged, US superiority may not be attainable, and our resolve to enter a conflict will be powerfully tested.

Amplifying the A2/AD Strategy

If there is weakness in contemporary defense writings, it is a failure to put aside the numerous A2/AD systems of the PRC, Iran, Russia, and North Korea to answer a fundamental question: What is the "so what" of A2/AD? To arrive at some initial understanding, A2/AD aims must be overlaid along with their capabilities in the five domains (including electromagnetic spectrum) to determine the potential range of nonlinear operations.

Referring to figure 2, the first aim of A2/AD is *strategic preclusion*. Allies rely on the United States to underwrite the treaty guarantees of mutual defense. An A2/AD adversary would seek to create an environment where US allies question the US ability to defend them. Erosion of confidence in the United States could cause an ally to step back from honoring access arrangements, or it could otherwise limit freedom of action through decreased commitment to host US forces, refusal to grant overflight, unwillingness to demarche the aggressive acts of a regional hegemon, or an absence of cooperative training with US forces.

The second aim is *operational exclusion*. An adversary will plan and execute actions to set the conditions for the campaign they envision. One such preparatory effort could be to infiltrate important US cyberspace networks with intelligence-gathering and destructive malware to yield

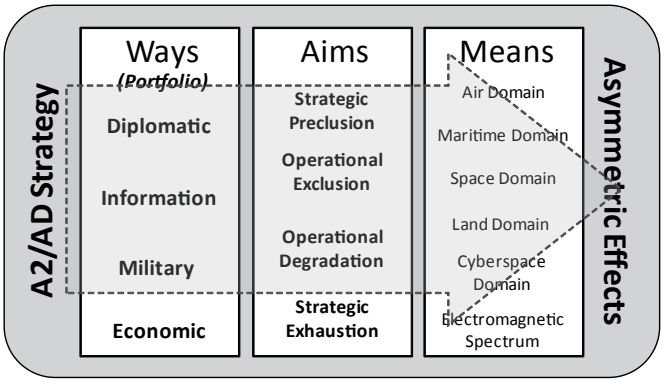

Figure 2. Breakdown of A2/AD strategy

exploitable intelligence in steady state and act as the forward offense in crisis and conflict. Other exclusionary measures would be to jeopardize key sea lanes to impede US maritime force flows, or an adversary could seek to exclude US space-based capabilities by disabling orbiting platforms, creating orbital debris bands, or using antisatellite technologies to attack certain on-orbit platforms.[28]

The third aim is *operational degradation*. Increasingly, using cyberspace to conduct unattributed attacks allows A2/AD actors to amplify their effects in other domains and reach into the US homeland. Due to the vulnerability of commercial cyberspace infrastructure, there is strategic advantage in large-scale cyber attacks executed by proxies. Another example would be extensive degradation of the electromagnetic spectrum to sever the connectivity of US fielded forces from their distant senior commanders.

Figure 3 illustrates at what point in crisis and conflict each A2/AD aim becomes relevant. As shown, a successful A2/AD strategy will create a void where US shaping is attenuated by lack of opportunity space. The center parallel shaded arrow shows the "Needed US Region Shaping Range" and depicts the approximate ideal placement of A2/AD aims in thwarting US power. The arrow, "Opposing Strategic Effect of A2/AD"—pushing against the US shaping range—illustrates how its range of options is truncated by A2/AD strategy. In steady state, A2/AD effects seek to shrink US opportunities to shape; in conflict the lack of shaping and deterring translates into preempted and precluded US force.

The fourth and final aim is *strategic exhaustion*. Key objectives within this aim include exploiting the vulnerabilities of lengthy US exterior logistics lines contrasted with an A2/AD adversary's shorter interior lines of logistics. More than ever, global military logistics is dependent upon the

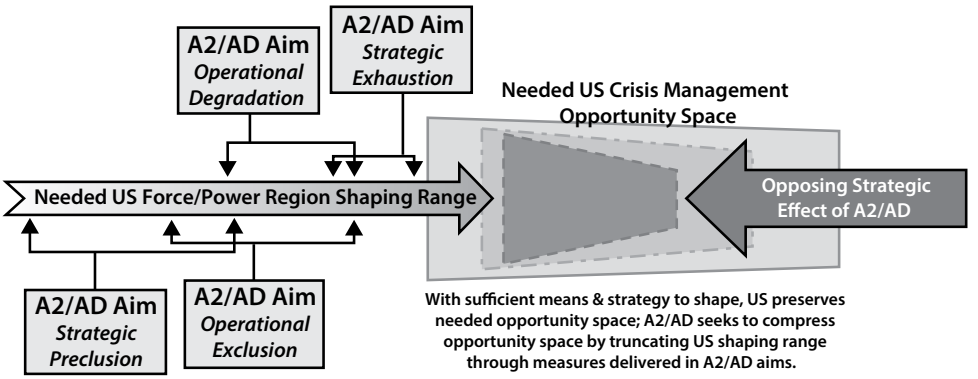

Figure 3. Employment of A2/AD aims

rapid exchange of accurate time-critical data within stable information networks. Any disruptions to timely, accurate data exchange will inevitably inject delays into US force generation, deployment, and resupply. The goal of exhaustion in an A2/AD crisis or conflict is to cause the US expeditionary offense to crumble due to the inability to sustain its effort or to defeat US resolve through fear of strategic failure.

Crisis Management Design Framework

A brief design introduction is appropriate before describing the dynamics of this concept. As shown in figure 4, design is essentially a three-step process that begins with the *system frame* and culminates in the proposed *concept design*. An important point is that design is cyclical; that is, while it seeks to achieve understanding of complex problems, design theory acknowledges that once anyone acts on a problem, this gives rise to a new problem that necessitates the third design cycle begin anew at the system frame. This crisis management concept does not propose a discreet design for every possible encounter with any A2/AD adversary; rather it advocates for a useful design framework from which to enter into A2/AD crisis management planning.

Three important ideas form an underlying latticework for this crisis management design concept. RAND defense researcher, Dr. Forrest Morgan, establishes that crisis management is

> a process by which policy makers seek to diffuse the threat of war with other powerful states without surrendering important national interests. It employs elements of deterrence, coercive diplomacy, assurance and inducement. . . .

> Crisis management is largely about strategy . . . effectively managing a crisis can be perilously difficult if the underlying structure of the geopolitical environment is unstable. Military forces comprise an important element of that structure, either contributing to stability or undermining it.[29]

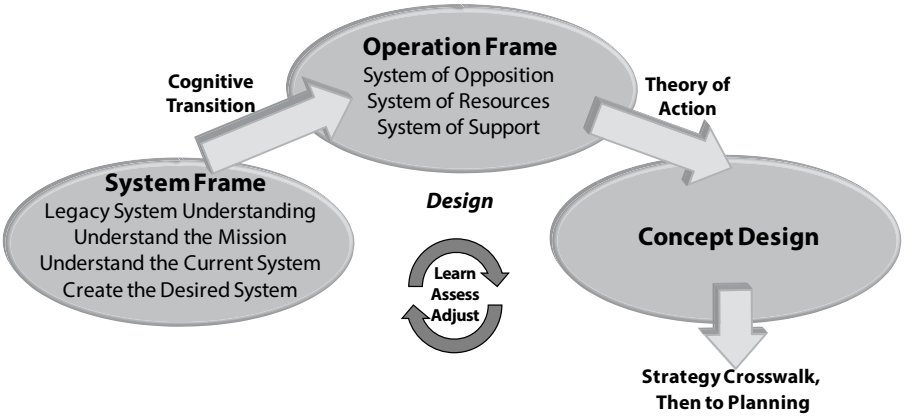

Figure 4. Operational design process

In an important sense, Morgan captures the effect of A2/AD: a nonlinear strategy and associated capabilities combined with an adversary's willingness to act as a regional destabilizer for its advantage. This point ties into the second piece of the lattice, geopolitical instability.

In a broad treatment of escalation written in 2008, a RAND group studying structural instability in the geopolitical environment determined that when an adversary has unique capabilities or can successfully challenge an opponent's capabilities where there is no counter, perceived advantages could embolden that adversary to escalate in ways it perceives its opponent cannot answer.[30] As a result, an A2/AD adversary will perceive it can act—perhaps escalate—without fear of an effective use of counterforce or credible armed response. The resulting instability creates opportunities and tipping-point incentives toward the A2/AD actor.

The third ingredient of the lattice is that a central outcome in recent US wars was regime change and/or decisive victory. A continuation of these policies could inadvertently undermine US ability to manage escalation and deescalation in crises. From their perspective, A2/AD adversaries—for example, a nuclear-armed regional adversary—could perceive little to no value in self-restraint, especially with regard to its use of WMD.[31]

Contemporary deterrence scholars such as Dr. T. V. Paul assert that for much of the past 20 years, its unipolar status has led the United States

to focus on deterring rogue states and transnational terrorists seeking WMD.[32] Paul's work holds that US deterrence of state actors appeared to come to an end with the demise of the Soviet state.[33] Indirectly, he hints at the demand signal for an effective applied deterrence construct to meet future challenges, among them, A2/AD. However, the issue is not so much about theoretical deterrence as it is countering A2/AD with applied deterrence. The ability of A2 and AD to undermine US power projection and force points to a conundrum: if the United States cannot project power and force because A2/AD contests its access and freedom of action, then in point of fact, the deterring effect of its power-force combination is precarious.

Escalation is best undertaken against an A2/AD adversary in a manner that emphasizes eliminating US "say-do" gaps. This is difficult in an A2/AD environment without an appropriately developed force, a crisis management design, and an effective counter–A2/AD theory of victory. Figure 5 is the design's cognitive transition, the conceptual answer to the challenge imposed by the problems described in the design system frame. The key design problem is that a weak joint deterring force will not ensure the United States has sufficient escalation agility to credibly move at will along the entire range of operations. This limitation opens the door for an A2/AD opponent to prevail through strategic preclusion.

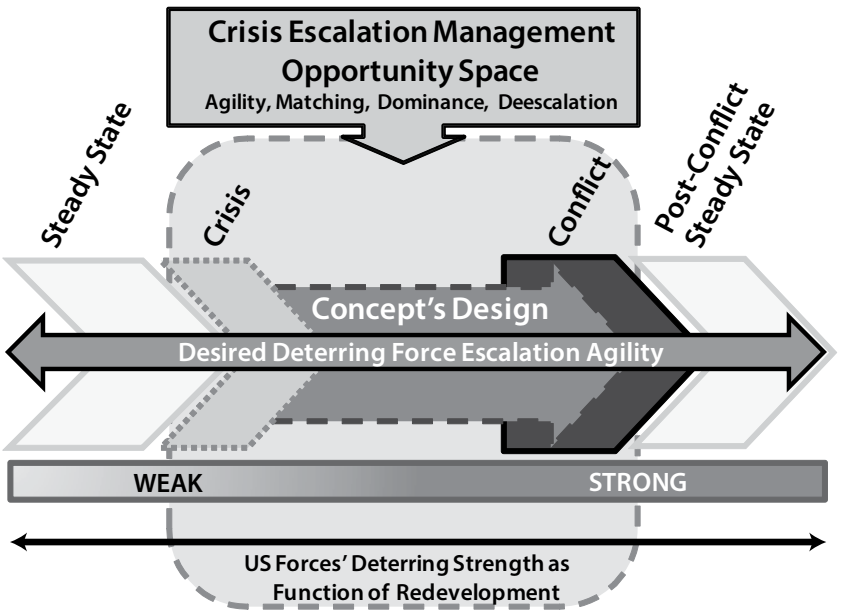

Figure 5. Crisis escalation management design

The design of this applied concept begins with its first component and lynchpin: the *deterring force*. A2/AD forces threaten to push US forces to ever farther operating ranges with increasing intelligence, logistics, firepower, and maneuver inefficiencies while decreasing the ability of the joint force to deter. US military force must be relevant, effective, and efficient within a region. Relevance rapidly diminishes if the force cannot enter important regions and operate with sufficient latitude. The idea of the deterring force is, in essence, what it takes to ensure US forces remain relevant and do not have to accept being driven to disadvantageous operating ranges to survive and operate.

Figure 6 portrays the continuum of strong-to-weak deterring forces with an associated range of attributes. Some of the key assumptions of the deterring force are that the United States possesses national political will (commitment of populous not assumed); some credible intelligence warning and indications are available; some margin of military defense technology leadership (not necessarily supremacy) exists in certain areas; and relevant allies/partners remain committed to the use of power, including force. At the far left of the range, the *weak* deterring force is a notional joint force with no redevelopment—little to no changes undertaken to counter–A2/AD effects. In contrast, the *strong* deterring force depicts a fully redeveloped force in all domains enabled by robust US access and assured freedom of action.

Against a regional A2/AD hegemon equipped with substantial political-military capability and capacity in one or two domains, a less than fully

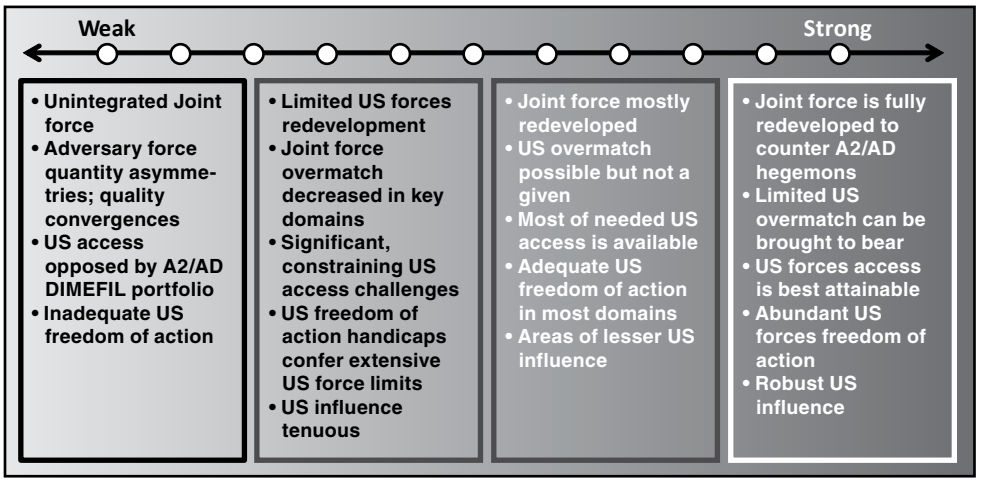

Figure 6. A2/AD deterring forces with associated range of attributes

redeveloped joint force may be able to prevail with only modest difficulty. But against a near-peer competitor, that same joint force may be unable to prevail, even with the most strenuous effort. For the purposes of this essay the most demanding crisis scenario is assumed: US power and forces perform most of the heavy lifting. The point of the continuum is that without an appropriately developed deterring force, access, freedom of action, and regional influence, a US force would be unable to satisfactorily achieve crisis management goals.

If one assumes that the joint force can overcome access and freedom-of-action barriers, one must explain what it does in steady state that assures shaping, enhances stability, and mitigates the potential for crisis and conflict. One of the key ways to foster stability is through continuous regional presence in peacetime and persistence during crisis and conflict. Persistence is the force's ability to be present in highly contested places and spaces of every domain (see fig. 5). The kind, frequency, and locales of persistent presence must be less like domination zones and more like control positions.

America's ability to pivot its escalation approach points to the second component of this concept, *escalation agility*. This component goes hand in hand with the first, because escalation agility is what the US deterring force must accomplish in all A2/AD conditions. Escalation agility informs US understanding of how much latitude it has in its crisis design in relationship to the rival's ability to preclude, exclude, preempt, and degrade (the aims of A2/AD, fig. 2) US power and force projection. Underlying the escalation pivot is the extent to which US strategy preserves needed opportunity space to act (see fig. 3). If the adversary reduced opportunity space below some minimal level, it would crowd out the US ability to execute actions that best confront the opponent's strategy.

Again, figure 5 demonstrates that the stronger deterring force will ensure the joint force has enough agility to overcome a range of A2/AD threats, from regional powers such as Iran or North Korea to near-peers such as the PRC or Russia. So long as the United States can escalate with confidence versus an A2/AD rival, escalation-matching moves and countermoves could be viewed as a chessboard with different levels corresponding to diplomatic, information, military, economic, finance, intelligence, and legal (DIMEFIL). As such, US crisis objectives on any of these separate but interrelated levels need not be "checkmate." The whole-of-government moves, rooted in a single design, must be about protecting and preserving

key matching board space as opposed to the outright commanding position game style of escalation dominance.

The United States cannot count on a cooperative and predictable escalation rival, so respective sides will likely continue matching until actor patience is exhausted or matching is no longer viewed as a rewarding approach. When or if crisis participants seek another approach, the United States must be confident it can pivot to a new design and the associated strategy to meet the dynamic demands of the crisis.

In US defense literature, the phrase "escalation control" is prominent both as an approach and an implied mind-set. However, the limits of US ability to control any situation is really about its ability to form a union of its means and ends despite an A2/AD adversary's ways and means to deny that opportunity. Because of the nature and severity of adversary counteractions, this concept advocates for a new way to think of and operationalize escalation: *escalation management*. A2/AD's goal is to keep US forces at bay and, in so doing, attenuate their relevance and combat power. Any proposition of US crisis response against an A2/AD strategy that is based on a US theory of escalation control is inherently misaligned to a situation where the United States cannot control escalation because it cannot get its forces into a region to establish control. This may compel US leaders to forego escalation matching and instead opt for a leap to escalation dominance that will bring its own kind of A2/AD crisis destabilization risks.

The fourth component of this concept for design is *escalation matching*. Because of US military overmatch, its leaders have taken on something akin to disdain for matching adversary escalation moves within a political-military crisis. An explanation could be that military leaders more readily identify with dominance in a crisis because they perceive the leap to dominance is the shortest path with the least jeopardy toward victory, preservation of things, and protection of US vital interests. While that simplified view of escalation in crisis seems sensible, its common sense does not reflect the uncommon twists and turns inherent to disruptive A2/AD strategy. The present mind-set of escalation dominance trains leaders to dominate the adversary; however, in an A2/AD crisis, dominating could aggravate the crisis or make it acute by ineffectively responding with force that is blunted by the opponent's strategy.

The notion of matching an adversary's escalation measures is not about US capitulation or passivity; it is about pacing. The advantage of pacing is it sets a tempo that provides opportunities to build in actions such as

pauses to encourage leader assessment on both sides. Additionally, escalation matching is not built on a leader-follower paradigm; rather, it is an intuitive actor approach. Other key points in escalation matching are determining what actions to undertake and how to accomplish those actions. What to do can be concisely stated as a series of interrelated US moves and countermoves that minimize adversary upside while simultaneously minimizing (minimize/minimize) the US downside in the crisis.

That minimal up/minimal down approach inherently emphasizes the US advantage in terms of mitigating adversary actions that would seek to accelerate the crisis or jeopardize US interests. Another way of thinking of matching is to visualize it as opportunity space with the attributes of a physical maneuver space where actions and counteractions are not linear. Escalation matching is the space between actor-on-actor engagement where, at one end, the parties lapse into a mutually agreeable postcrisis settlement. In contrast, at its upper limit, escalation matching space gives way to another larger, diverse space: the area of escalation dominance. Discerning the upper bounds of the matching space is where adversary intent and the strength of its responses produce risk to the United States that must be mitigated rapidly through escalation dominance.

Escalation matching requires that US estimates of the adversary be grounded in an accurate understanding of the rival's appraisal of the situation. The conceptual structure of escalation matching ought to eliminate the perception that it cedes crisis opportunity, advantage, or initiative to an opponent. Against an A2/AD rival using a rheostat approach, a controlled escalation framework could provide both the utility of incremental methods within a pacing construct and a tempo that provides the opportunity for reassessment to minimize miscommunication and miscalculation.

Escalation dominance is the fifth component in this design concept. Simply stated, domination ensures the United States can escalate in ways that allow it to gain and maintain the upper hand in a crisis. Unlike the minimize/minimize of matching, dominance seeks to maximize US upside while simultaneously minimizing (maximize/minimize) the adversary's upside potential. Looking through the prism of A2/AD, escalation dominance could be metaphorically described as the sum weight of all US national instruments exerting more downward pressure than the opponent's counteracting upward pressure that seeks to expand the crisis or initiate conflict.

A2/AD seeks to diminish US ability to dominate escalation by deploying numerous active defense layers up to hundreds of miles in depth to

make penetrating and ultimately closing with the opponent both difficult and costly. Consequently, a weak deterring force must operate from disadvantaged distances that decrease its deterring potential and combat power. The only US options may be either to cede the object of the crisis or inherit a menu of least-preferable options that further destabilize or accelerate the crisis.

Completing the Concept: Deescalation

During the ramp-up to an A2/AD crisis, this concept for design calls attention to continuous deescalation opportunities. In contrast, the lack of thorough deescalation discussion in US military doctrine produces incompletely formed understanding of the ramp-down phase of any crisis. The belief could arise that ramp-down is not worthy of US attention because of the perception that deescalation resembles capitulation. This lack of understanding sends a message to the military that bringing any crisis to a conclusion is, at bottom, a situation for which the prescription is more overwhelming military force. The danger of such a one-dimensional mind-set is reigniting of the crisis, displacement of the crisis elsewhere, failure to recognize a ramp-down opportunity, or failure to remain committed to a deescalation plan. Any of these could prolong the crisis or cause preventable conflict. The need for a deescalation framework can be understood as: once high in the branches of a tree of crisis, a nation's leadership may not be able to determine acceptable ramp-down methods that can help it descend from those limbs. Without more precepts to guide deescalation, the United States risks inculcating a perception in the minds of its competitors that it does not back away from crisis nor can it. To its allies and partners, it risks the perception of a lack of nuance below the threshold of war.

There are three components of deescalation. The first, *appropriateness*, requires assessment at some relevant point that identifies the most useful deescalation measure in a given context. War gaming deescalation measures in the crisis can be useful; however, the time to identify and war game responses may cede initiative and momentum to an opponent. Any deescalation measure offered must involve things held mutually important by the United States and its rival. While understanding can never be perfect, an important consideration is the avoidance of ambiguous US measures that can take a crisis down unintended paths. If in its crisis design (fig. 4) the United States cannot make an adversary traverse a specific path of crisis

actions, perhaps the adversary can be herded to an intersection and presented with courses of action.

The next deescalation facet is *demonstrability*. This idea holds that whatever deescalation measures are used, they must be verifiably observable by the adversary. This raises the question of the accuracy of US understanding with regard to what it believes an A2/AD opponent can observe and the probable immediacy of the opponent's observation.

The third deescalation component is *credibility*, something US leaders must bear in mind throughout a crisis. Namely, that deception, obfuscation, and subterfuge, while of some utility in attaining escalation advantage, are the very things that could undermine opposing leader confidence in attempted deescalation measures, by either side. If at the signal of bona fide deescalation, sufficient interregime mutual trust cannot be established, deescalation could paradoxically produce the opposite outcome.

Priming the Design Pump

During the Cold War, Dr. Alexander L. George developed seven principles of geopolitical instability.[34] While his principles (fig. 7) are somewhat dated, they have relevance to the challenges of A2/AD strategy. George's advocacy for political-military synchronization, continuous control of fielded forces, and a rheostat employment approach of military forces speaks to the need and benefit of design. It helps guide further development of this concept to better manage crises against an A2/AD opponent. In a larger sense, George's position is that initiating a crisis or entering a war ought to be choices of last resort. Additionally, his work commissions leaders to maintain cognizance of the crisis exit or, as a minimum, crisis ramp-down opportunities. Those ideas speak to the utility of design in defining a given A2/AD problem and the most effective escalation and deescalation actions against it. Unfortunately, his principles are not the vital elements of a campaign plan against an A2/AD adversary whose strategy and capabilities are purposely built to mitigate US steady state shaping, blunt US access, mitigate its influence, suppress freedom of action, and, ultimately, crowd out operational latitude. In these ways, George's precepts are not the theory of action (fig. 4) but valid foundational ingredients in this concept for design.

A2/AD crisis management design leverages US power, but design cannot make something strong if it is inherently weak. Power and forces have their own values, which lie within a weak-to-strong continuum. As an example

George's Crisis Instability Principles

1. **Continuous Forces Control:** political leaders must retain control of the actions of their respective military forces in crisis
2. **Rheostat Forces Control:** force movements [and composition] should occur in a design that allows leaders to speed up and slow down their deployment and movement; assumes desired pauses can be built into the situation
3. **Synchronized Pol-Mil Actions:** assumes that political leaders can conceive of a construct and employ
4. **Unity of Objectives:** military force employment is right-sized to the associated diplomatic objective(s) in the crisis context
5. **Measured Use of Force:** intent is to ensure that movement and use of force is not misconstrued—when and where it is not our intent—to be a step that presages major war
6. **War is Preferred Last Resort:** signals our intent that US seeks a negotiated path one not single-mindedly culminating in armed hostilities
7. **Build in an Egress:** leaves the adversary a face-saving path out of crisis to militate the perception that war is the only path of resolution

Alexander L. George, "A Provisional Theory of Crisis Management," in Alexander George, ed., *Avoiding War: Problems of Crisis Management* (Boulder, CO: Westview Press, 1991).

Figure 7. George's principles amplified

of how interagency relationships fit into this concept, US combatant commanders continue in their key role in shaping and regional influence that supports other US agencies or are, in turn, supported by them. Without an offsetting US strategy, or at least its outline, a design for crisis management cannot perform the strategy currency conversion function between an A2/AD challenge and the planning to overcome that opponent's strategy. In a broader sense, the US offsetting strategy must aspire to crowd out the A2/AD strategies of regional and near-peer competitors.

As heightened tensions lead to crisis, cognitive transition—the key deliverable in the early stage of crisis management design (fig. 4)—leads to a campaign plan that employs salient tools of US power. With regard to military power, the deterring force's escalation agility is the measure of the joint force redevelopment and sufficiency to handle the rigors of an A2/AD challenge.

There will be barriers to implementation of this concept. For example, describing the components of the concept is not difficult, but executing them in the interagency context ahead of the speed of crisis will be daunting. That is due to A2/AD's reach, scope, immediacy, and being

grounded in years of shaping campaigns. Therefore, ready-made internal US national power and force relationships must preexist to deliver supported/supporting interagency actions to seize and, where needed, regain the information and operations initiatives.

Crisis management design cannot be an ad hoc undertaking of the moment. A given design must be informed by the steady state shaping plan lines of operation. Experimentation, development, and deployment of this concept must be undertaken in conditions where US designers and leaders have an opportunity to reflect upon situational factors, known threats to execution, desired outcomes, and likely US commander guidance. A cornerstone of this concept is not how other DIMEFIL instruments are subordinated to the "M"; rather, it is about how all US tools form an agile, integrated, interdependent design.

As the JOAC, Air-Sea Battle, and other efforts hone the tactics, techniques, and procedures of a redeveloped joint force, this concept for crisis management design must be coupled to those efforts. With this concept, US political leaders and senior war-fighting commanders will have a conceptual vehicle to counter A2/AD with conceptual design that averts conflict or puts the United States in a position to degrade a hegemonic rival while remaining strong.[35]

The Offsetting US Strategy

Formulating a national strategy to offset and overcome the competition of A2/AD should drive the development of regional steady state counter–A2/AD shaping plans that are composed of lines of operation that unfold over years. This proposal is not simply advocating for better cooperative security planning to counter A2/AD, though that would be helpful. The concept puts forward the idea of an offsetting strategy where US agencies do not work in silos but actively share common goals, priorities, processes, and a scorecard to conduct DIMEFIL shaping progress. Figure 8 illustrates a notional offsetting strategic approach of ends, ways, and means. The end states in this national strategy transcend the ends of specific campaigns. The ends in this strategy framework are rooted in enduring US policy objectives and outcomes: strong US conventional deterrence, robust extended deterrence, and protected interests to include the shared interests of partners. The arrows radiating from the ring of continuous strategization are enduring shaping actions that deliver DIMEFIL outcomes focused

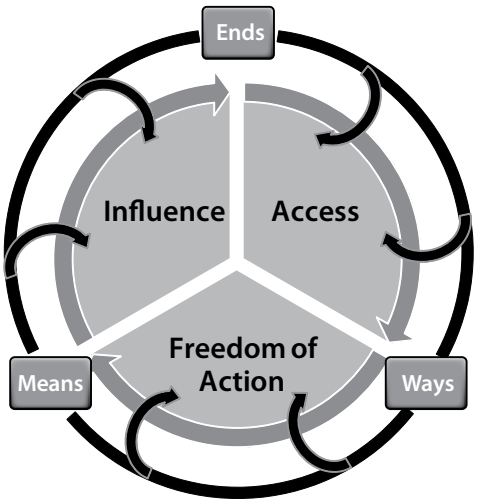

Figure 8. Counter–A2/AD strategy

on the products at the figure's center: assured access, enhanced freedom of action, and strengthened influence.

The first product of a US offsetting strategy, *access*, translates into places, bases, infrastructure, and overflight enabled by agreements that allow the United States to distribute its forces to reinforce security and stability during steady state shaping and crisis response.

The second strategy product is *freedom of action*. Often conflated with access, it is a related but separate idea. Freedom of action is an expression of US operational latitude once forces are deployed forward—wherever "forward" is. For the purposes of crisis response planning, operational latitude is a measure of ability to freely maneuver and arrange forces in all domains, including the electromagnetic spectrum. Out of this understanding flows force employment options out to the tactical edge through the combatant commander's campaign plan.

Influence is the third strategy product and flows from a national offsetting strategy. Regional US influence is the aggregation of shaping efforts in each key region over years to reassure allies and friends of its steadfastness to deliver on its regional stability and security commitments. US influence helps bring about an environment where nations with shared interests feel they can enable US access and freedom of action.

The US offsetting strategy must not be confused or conflated with either strategic planning or strategic programming; rather, it requires candid assessments. While the dynamic of multiple A2/AD actors brings a new kind of complexity and multiple threats, it is unlikely domestic politics will allow a marked increase in future defense budgets to build separate counter–A2/AD acquisition programs for the PRC, Iran, Russia, and North Korea. The offsetting strategy must be composed of coherent regional counter–A2/AD strategies whose DIMEFIL means are flexible enough to apply to all A2/AD threats. The successful long-term competitive approach used against Russia during the Cold War is an example. Figure 9 shows the relationship of steady state shaping to the entire crisis

phase. In a larger sense, it depicts the major developmental components of US offsetting strategy.

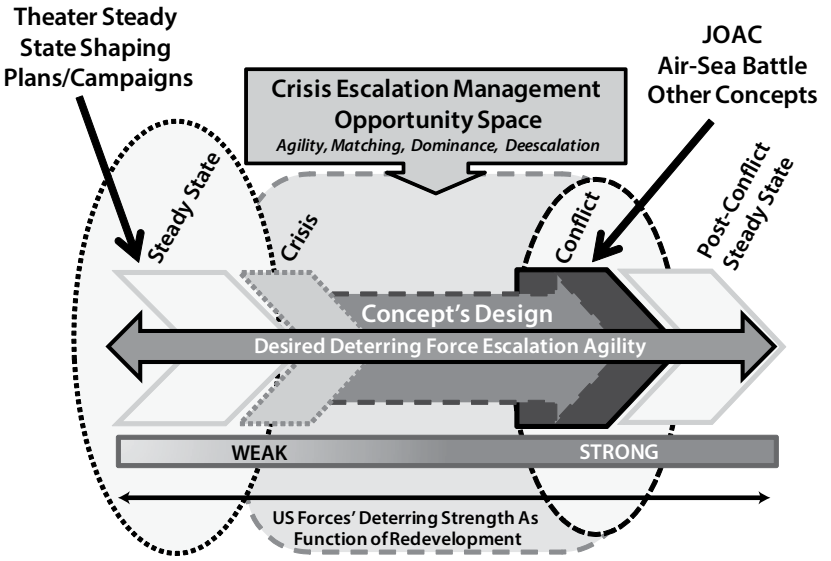

Figure 9. Components of US offsetting strategy

Planning for the Future of A2/AD

Even if US relations with the PRC, Iran, Russia, and North Korea ultimately remain nonconfrontational and the respective ideologies eventually moderate, those nations aggressively develop, deploy, and proliferate many of the A2 and AD technologies US military forces will inevitably confront. This yields something called the 10/90 Rule: there may be a 10-percent chance of a hot war between any of those nations and the United States, but there is a 90-percent chance the US military will confront the A2/AD stuff each rival proliferates. Therefore, much of US counter–A2/AD effort could be justified by identifying ways to mitigate systems, but such an approach would leave the nation bereft of strategic vision and purpose.

In the US defense establishment, some voices advocate for counter–A2/AD efforts directed at specific nations, especially the PRC. Arguably, there is some utility in such an approach for the formulation of US defense policy and force development. However, a focus on a single nation would likely overlook the advantages of an approach which spans all A2/

AD adversaries. By offsetting the commonalities across the group of A2/AD opponents, no adversary will believe the United States has ceded any regional competition.

To aid planning of present and near-term counter–A2/AD shaping, it is appropriate to examine some relevant initial ideas. While not all-inclusive, these efforts comprise important planks in any combatant commander's counter–A2/AD shaping framework. As a minimum, the following should comprise any campaign to shape a region with an A2/AD threat:

- Targeted diplomacy which strengthens alliances and cultivates friends and partners.
- Continued military-to-military engagement that broadens relationships, deepens understanding, and helps eliminate miscommunication and miscalculation.
- Multination defense technology investing and, where appropriate, risk-reducing acquisition in relevant systems, platforms, and technologies.
- Realistic counter–A2/AD combined training in the air, naval, cyber, space, and land forces domains.
- Continued growth in diverse sharing of relevant strategic and tactical A2/AD and adversary intelligence.
- Development of equipment and procedures for collaborative domain awareness to enhance security and eliminate piracy and ungoverned sovereign air, maritime, and land spaces.
- Assured uncontested access to air, maritime, and space commons to provide for the stability of commerce to ensure protection of US and shared partner interests.
- Winning the media and public opinion narratives and getting ahead of competing information operations.

Currently there are important initiatives which signal a beginning in counterweighting the regional hegemonic efforts of the PRC. On 16 November 2011, the United States and Australia announced the establishment of a US Marine Corps training location in Darwin, Australia. This demonstrates how access improves out of active international relationships that promote influence and protect shared interests.[36]

Prior to the start of a conflict with an A2/AD hegemon, the United States must shape events to either prevent a crisis or enter the conflict in the most advantageous position. However, it is important to concede that none of this concept or any other US counter–A2/AD efforts will entirely eliminate strategic miscalculation. If an A2/AD adversary miscalculates, trained US military and interagency experts using crisis management design will likely be the best hedge against uncertainty.

Warfare continues its inexorable march of change, and the meaning of that change is coming into focus. Due to advocates in the US defense establishment, counterinsurgency will remain part of the spectrum of warfare; however, such conflicts will not involve the preponderance of US vital interests. At war's high end, regional and near-peer A2/AD hegemons can jeopardize numerous US vital interests. The United States must be ready to vigorously defend its interests wherever they come under attack.

For the time being, the United States must not suffer the winner's curse: believing that because it prevailed against past challenges, future victory will happen with little additional work and no infusion of new ideas. Military planning and strategic assumptions are not exempt from breakdown. Clausewitz, Sun Tzu, and Jomini admonish America that successful theories of victory are dependent on, but are not exclusively dictated by, the advancements of war-fighting technology. US theories of victory in crisis and conflict against A2/AD nonlinear strategy depend on the soundness of a superior US offsetting strategy coupled with excellent strategic practice rooted in better ideas.

The focus here was to acquaint the reader with the effects and challenges of A2/AD on US power and force projection while presenting an innovative design to manage crisis against A2/AD rivals and suggest new ideas on the deterring force, escalation agility, escalation management, and de-escalation. The objective was to present organizing precepts for a design to effectively manage a military crisis against the PRC, Iran, Russia, or North Korea. A subsidiary objective was to link US shaping to both A2/AD and this concept's design for crisis management. If A2/AD adversaries believe their approach can successfully keep the United States out of a regional situation or impose devastating costs, then it could be faced with an inability to unite its means to ends. From a design perspective, this concept locates and sets the A2/AD problem, but it does not present campaign solutions; that is local work yet to be done. Armed with this concept for

mitigating A2/AD effects, US power and force can benefit by being more relevant throughout the range of crises brought on by any A2/AD actor.

Inasmuch as they will alter the US post–Cold War deterrence mindset and its doctrinal way of battle, the changes wrought by A2/AD must not be ignored by hubris that results in an unwillingness to recognize its strengths. A failure to fully comprehend A2/AD's implications may cause the United States to unwittingly forfeit a window of innovation and redevelopment opportunity to reinvent its power and force projection. In the decades since Pearl Harbor, history teaches that strategic shock with crippling, perhaps lasting, consequences can occur if a determined adversary believes it can attain its goals and realize its ends when the United States neglects to be a nation of foresight and action. SSQ

Notes

1. *Sustaining U.S. Global Leadership: Priorities For 21st Century Defense* (Washington: Office of the Secretary of Defense, 2012), 3.
2. Ibid., 4–5.
3. Ibid.
4. *Joint Operational Access Concept* (Washington: Joint Chiefs of Staff, 2012). The term *concept* can mean different things to different people in different places within the DoD. However, as used in this essay, a military concept identifies a military problem and a proposed range of solutions. Broadly speaking, US military thinking on the utility of a concept is that it describes how current capabilities could be better leveraged; some aspect of military operations could be improved or innovations harnessed to improve war-fighting advantage.
5. The word *locate* is not meant in the sense of position; rather, in the sense that the true essence of a problem has been revealed through reflection and analysis. Furthermore, military designers hold that once a problem is located it can be plotted in relation to all the contextual actors, forces, and relevant entities.
6. Joint Publication (JP) 3.0, *Joint Operations*, 2011, A-1–5. As discussed in this essay, the nature of war is encompassed by the 12 principles contained in appendix A of JP 3.0. The principles are formed around enduring ideas of warfare and as such are present throughout the range of military operations across all eras and locations. Also see Carl von Clausewitz, *On War* (Princeton, NJ: Princeton University Press, 1984), 89, for one of Clausewitz's immortal truisms, "War is more than a true chameleon that slightly adapts its characteristics to the given case." As more than one defense commentator has noted: although war is a chameleon, regardless it remains an animal. This truth serves as a lead-in to an oft-stated defense maxim: the nature of war does not change, only its character changes.
7. Robert Buchanan, "Wicked Problems in Design Thinking," *Journal of Design Issues* 8 (Spring 1992): 15–16. This essay is an early survey which chronicles the development of design theory since its inception. See also Horst W. J. Rittel and Melvin M. Webber, "Dilemmas in a General Theory of Planning," *Journal of Policy Sciences* 4, (1973): 155–69. The article made the case for the existence of wicked problems within a framework. The premises of that framework endure to this day.

8. *Commander's Appreciation and Campaign Design,* TRADOC Pamphlet 525-5-500 (Fort Eustis, VA: Army Training and Doctrine Command, 2008)—a high-level primer on characterizing military problems for US Army commanders. See also Ben Zweibelson, "Does Design Help or Hurt Military Planning: How NTM-A Designed a Plausible Afghan Security Force in an Uncertain Future," *Small Wars Journal* blog, 9 and 16 July 2012, http://smallwarsjournal.com/blog. Major Zweibelson's two-part blog articles depict advanced, specialized military design within a wartime campaign context. From academic articles on design theory to real-world application, design is as versatile as it need be.

9. Timothy L. Thomas, "Google Confronts China's Three Warfares," *Parameters* 40, no. 2 (Summer 2010): 101–13. A retired US Army officer and foreign area studies expert at the Army's Foreign Military Studies Office, Mr. Thomas has emerged as one of the DoD's China cyber warfare experts. See also Timothy Walton, *China's Three Warfares* (Washington: US Navy, 2012), 1–11. Walton, a civilian employee of Delex Consulting, wrote the report under contract for the Navy. The text is best when read in combination with Thomas's related work.

10. Walton, *China's Three Warfares*, 1–11.

11. William Ashemore, "Impact of Alleged Russian Cyber Attacks," *Baltic Security & Defense Review* 11 (2009): 4–40. In a detailed essay, Major Ashemore lays out not only the case for Russian involvement in the large-scale cyber attacks of April and May 2007 in Estonia, but also provides useful analysis as to why the precedent of the 2007 attacks is a matter of significance to NATO and America.

12. Eneken Tikk et al., *Cyber Attacks Identified against Georgia: Legal Lessons Identified* (Tallinn, Estonia: Cooperative Cyber Defence Center of Excellence, 2008), 1–45. This is one of a small group of unclassified works on Russia's cyberspace attacks and activities associated with the 2008 incursion into Georgia.

13. Michael Elleman, "Iran's Ballistic Missile Program," *Iran's Ballistic Missile Program* (blog), US Institute of Peace, 9 August 2012, http://www.iranprimer.usip.org/resources/irans-ballistic-missile-program/html; and *Annual Report To Congress: Military and Security Developments Involving the People's Republic of China 2011* (Washington: DoD, 2011), 27–32.

14. Mark Stokes and Ian Easton, "China and the Emerging Strategic Competition in Aerospace Power," in *The Next Arms Race*, ed. Henry D. Sokolski (Carlisle, PA: Strategic Studies Institute Press, 2012), 141–78.

15. Desmond Ball, "Asia's Naval Arms Race: Myth or Reality," paper presented at the Asia Pacific Roundtable, Kuala Lampur, Malaysia, May 2011. For a more lengthy treatment of the naval arms race in Southeast Asia, see Charles A. Meconis and Michael D. Wallace, *East Asia Naval Weapons Acquisition in the 1990s: Causes, Consequences, and Responses* (Westport, CT: Praeger, 2000).

16. Rod Thornton, *Military Modernization and the Russian Ground Force* (Carlisle, PA: Strategic Studies Institute Press, 2011) is a compact, well-written monograph which lays out the major components to Russia's determined efforts to professionalize, reorganize, redistribute, and reestablish the capabilities of its ground forces. There are clear implications in this monograph for all branches of the Russian armed forces.

17. William Komiss and LaVar Huntzinger, *The Economic Implications of Disruption to Maritime Oil Chokepoints* (Washington: Center for Naval Analysis, 2011). This report studies the impacts to global regions based on evaluating the disruption of oil through six of the world's major international shipping routes. Although not all regions of the world would see a disruption in imported crude oil supply, four continental regions—more so than the closure of any of the five remaining chokepoints—would experience crude oil disruption in a closure of the Strait of Hormuz.

18. *America's National Interests* (Washington: Commission on America's National Interests, 1996). Although this report was written to identify only US vital interests, its utility is the insight into international relations, hence its usefulness in identifying the interests of US allies and partners.

19. Abraham Denmark et al., "Contested Commons: The Future of American Power in a Multipolar World," Center for New American Security, 25 January 2010. This report lays out the case for the economic value of the global commons and their importance to the economies of nations and international trade.

20. David White, *Bitter Ocean: The Battle of the Atlantic, 1939–1945* (New York: Simon & Schuster, 2006). Called by some naval historians the longest-running naval war at sea, the Battle for the Atlantic began in 1939 and did not end until the conquest of the Third Reich in 1945. Of the numerous books and articles available, the following were utilized in this essay: Clay Blair Jr., *Hitler's U-Boat War: The Hunters, 1939–1942* (New York: Random House, 1996); and its companion volume, Blair, *Hitler's U-Boat War: The Hunted, 1942–1945* (New York: Random House, 1998). The following was written by a WWII RAF Coastal Command pilot: Andrew Hendrie, *The Cinderella Service: RAF Coastal Command, 1939–1945* (Barnsley, UK: Pen & Sword Aviation, 2006).

21. *Electromagnetic spectrum* (EMS) refers to the utilization of nascent radar and ASDIC technologies as well as the robust use of Allied countersignals intelligence against the Third Reich, of which ULTRA was an essential source.

22. Maj Merrick Krause, "From Theater Missile Defense to Anti-Missile Offensive Actions: A Near Term Strategic Approach for the USAF," (School of Advanced Airpower Studies thesis, 1998), 11–14, http://www.au.af.mil/au/awc/awcgate/saas/krause_me.pdf. See also, Lt Col Mark Kippihut, "Theater Missile Defense Reflections for the Future," *Airpower Journal* 10, no. 4 (1996): 35–52. A benchmark WWII reference series of texts remains *United States Strategic Bombing Survey (USSBS), V Weapon (Crossbow) Campaign* (Washington: War Department, 1945).

23. Kippihut, "Theater Missile Defense Reflections for the Future."

24. Nicolai Timenes Jr., *Defense against Kamikaze Attacks in World War 2 and Its Relevance to Anti-Ship Missile Defense*, vol. 1 (Washington: Center for Naval Analysis, 1970). Volumes 1 and 2 were likely used to undergird the analytic requirements necessary to support the nascent AEGIS program's capabilities to assist senior US Navy leaders in determining fleet design and range of capability in countering aerial ship attack.

25. Brian Krekel, *Capability of the People's Republic of China to Conduct Cyber Warfare and Computer Network Exploitation* (McLean, VA: Northrop Grumman, 2009)—a report prepared for the US-China Economic and Security Review Commission. While specific architectural studies are classified, this source is a well-written illustration of the computer network warfare challenges facing a large network which can be accessed by sophisticated cyberspace attackers.

26. Steven Noel, "Combinatorial Analysis Utilizing Logical Dependencies Residing on Networks (CAULDRON)," presentation at 9th Annual Air Force Intelligence, Surveillance, and Reconnaissance Agency and Communications Conference," San Antonio, TX, January 2010. That large portions of the global information grid are vulnerable to determined, sophisticated cyberspace attacks is not new, nor is it necessarily new knowledge that much of the computer capacity of civilian logistics providers to the DoD have computing capacity within the global information grid and thus it too is vulnerable. An interesting project that speaks to cyberspace attack and how it can be mitigated can be found in George Mason University's CAULDRON program and the work of Noel.

27. It was assumed that if the Cold War ever turned hot between the superpowers, US air, naval, and land forces would likely be confronted wherever they encountered Soviet forces. Since

the end of the Cold War, space to a greater degree and, for the first time, cyberspace, conceivably increased the number of domains where crisis and conflict may occur from three to five. Factor in the EMS as a venue for militarized effects, and the number of hostile domains could increase to six.

28. On 11 January 2007, the PRC detonated a defunct FY-1C weather satellite at an altitude of 536 miles. The resulting explosion produced more than 10,000 pieces of debris.

29. Forrest Morgan, "Escalation," unpublished RAND monograph, November 2011, 23.

30. Forrest Morgan et al., *Dangerous Thresholds: Managing Escalation in the 21st Century* (Santa Monica, CA: RAND, 2008), 168–69.

31. Ibid., 171.

32. T. V. Paul and Patrick M. Morgan, "Deterrence among Great Powers in an Era of Globalization," in *Complex Deterrence: Strategy in the Global Age*, eds. Paul, Morgan, and James J. Wirtz (New Delhi: Cambridge University Press, 2009), 265.

33. Ibid.

34. Alexander L. George, "A Provisional Theory of Crisis Management," in *Avoiding War: Problems of Crisis Management,* eds. George and Yaacov Bar-Siman-Tov (Boulder, CO: Westview Press, 1991).

35. Gen Norton Schwartz and ADM Jonathan Greenert, "Air-Sea Battle," *American Interest*, http://www.the-american-interest.com/article.cfm?piece=1212.

36. "Press Briefing by Press Secretary Jay Carney, Deptuy [*sic*] National Security Advisor for Strategic Communications Ben Rhodes and NSC Senior Director for Asia Danny Russel," Parliament House, Canberra, Australia, 16 November 2011, http://www.whitehouse.gov/the-press-office/2011/11/16/press-briefing-press-secretary-jay-carney-deptuy-national-security-advis.