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Letter from the Editorial Board

U.S. combat forces are out of Iraq and transitioning out of Afghanistan. Defense budgets are increasingly constrained, both at home and abroad, forcing a reallocation of resources and priorities. Given this backdrop, many are grappling with the question of what warfare will look like in the future. How the nature of battle will change, how institutions will adapt to the economic environment, how future causes of conflict might be forecast—all these questions hold significant implications for policymaking. In this edition of *New Perspectives in Foreign Policy*, young professionals address and analyze some of the key forces driving these changes, providing a glimpse of what the coming era of warfare may look like.

A strong defense architecture requires a grand strategy. To this end, Raj Pattani offers a holistic overview of the kind of strategic approaches the United States might adapt to counter its adversaries across the many different domains and forms of conflict it is likely to encounter.

Two articles in this issue address how best to prepare the United States for complex, irregular warfare against rogue states and non-state actors. Charles Demmer argues that the United States must further develop the capability to rapidly aggregate and disaggregate its forces in order to address the many different threats it will face across the globe. By making forces lighter and more self-sufficient, the United States will ultimately be able to increase its offensive combat power. Jack Miller picks up on this debate, analyzing how making Special Operations Forces the centerpiece of the U.S. force structure is the most effective and efficient way to counter both of these major threats.

Innovative technologies can change the strategic balance of power in war. But are we investing in the best technology? Kelley Saylor argues that while disruptive technologies are becoming increasingly complex, the United States is investing in overly expensive acquisition programs and unnecessary weapons systems, thereby limiting our ability to develop more dynamic, adaptable technologies better suited for future warfare. Focusing on the Korean peninsula, Sang Jun Lee looks at how laser defense technology could significantly impact the balance of power between South Korea and North Korea.

Rapidly advancing technology, evolving battlefields, and constrained resources will define the near-term future of warfare. In the following pages, we are pleased to present the views and opinions of leading young professionals on these challenging subjects shaping that future.

SINCERELY,

New Perspectives Editorial Board

We Are Not in Control: Managing Adversary Responses to U.S. Conventional Military Superiority

*Raj Pattani*¹

EXPLORING THE NATURE of warfare in the early nineteenth century, Carl von Clausewitz wrote, “I am not in control: [my adversary] dictates to me as much as I dictate to him.”² Almost two centuries later, this insight proves prescient as we consider the ways in which the United States will meet threats to its security in the years ahead. By studying the interaction between decisions made by U.S. defense planners and those made by U.S. adversaries, the United States can better position itself to meet the next generation of national security challenges. The evolving strategies and tactics of U.S. adversaries will require the United States to apply old approaches in new, creative ways.

Facing a U.S. military that can dominate in virtually any conventional conflict, an adversary would be foolish to meet those forces in a field of battle characterized by tank warfare, aerial bombardment, or other traditional forms of fighting. Instead, the most effective adversaries will seek to gain relative advantages

by pursuing one of the following strategies: 1) lowering the intensity of conflict; 2) heightening the intensity of conflict; or 3) shifting conflicts into new domains where U.S. conventional superiority is less valuable.³

In order to reduce the relevance of traditional advantages enjoyed by the U.S. military, some adversaries have lowered the intensity of conflict so that American conventional capabilities cannot be used to decisive effect.⁴ In low-intensity conflict, adversaries seek to disrupt government control of contested territory, often using small arms and “crude” weapons to create instability and reduce the legitimacy of state institutions—an approach to armed conflict not easily countered with submarine-launched cruise missiles.⁵ Recent armed conflicts in Iraq and Afghanistan have shown how insurgent tactics can frustrate American military operations. Here, a \$30 improvised explosive device can threaten forces traveling in \$220,000 Humvees.⁶

At the same time, some potential adversaries—whether peer competitors, such as China, or non-peer competitors, such as North Korea—have established force postures that threaten to heighten the intensity of a possible conflict with the United States. Here, nuclear weapons would serve to obviate American conventional advantages: a use of force by the United States could trigger escalation to the nuclear realm of conflict, where conventional weapons would no longer be decisive for achieving victory.

In recent years, some potential adversaries have sought to bypass American conventional superiority by opening new domains of competition where the United States has not yet established a decisive advantage.⁷ By moving into the cyber and space domains, for example, an adversary could attack infrastructure that supports conventional elements of the U.S. military, or it could exploit vulnerabilities of society at large.

The United States, then, will need to consider strategies to respond to adversaries who wish to vary the degree of intensity of a conflict or who seek to open new domains of fighting. There are three approaches that the United States might pursue in this regard: domination, deterrence, and denial.⁸ Table 1 contains illustrative examples of how these approaches might be applied in the alternative forms of conflict discussed earlier. The inclusion of ways in this article should not be considered an endorsement for those methods. With this caveat in mind, we discuss the three approaches in turn.

First, the United States could seek to *dominate* in the alternate forms of conflict. With this approach, the United States would fight in the form of conflict set by the adversary. For example, if an adversary seeks to execute an insurgency, the United States would respond by executing a well-resourced counterinsurgency intended to defend local populations and build the legitimacy of state institutions. With time, the counterinsurgency campaign would hopefully degrade the adversary's ability to draw support from the local population.



As warfare evolves, it will be important for the United States to consider how its adversaries will leverage their own capabilities to shift conflicts into spaces where America is at its weakest.

Second, the United States could seek to *deter* adversaries from changing the nature of a conflict. Here, the United States could communicate that it would retaliate to attacks originating in, for example, cyberspace, by inflicting conventional destruction on its adversary. This would

force adversaries to consider that the United States might not respond to an attack in-kind.⁹

Third, the United States could seek to *deny* adversaries the ability to change the nature of a conflict.¹⁰ As an example of the denial approach in a nuclear competition, consider the work of two scholars who suggest that the United States might use low-yield nuclear weapons to deny an adversary the ability to use nuclear weapons during a conventional war.¹¹ In this way, if an adversary attempts to escalate to the nuclear realm, the United States might disable that emerging power's nuclear arsenal—arguably without risking large-scale collateral damage—and force the state to return to conventional warfighting.

As warfare evolves, it will be important for the United States to consider how its adversaries will leverage their own capabilities to shift conflicts into spaces where America is at its weakest. At the same time, the United States will need to study how it might respond. The three approaches presented here—domination, deterrence, and denial—are not new in warfare, although they will need to be applied in new ways. The merits of each approach will need to be considered in the context of the specific conflicts we fight and the specific adversaries we face. While the solutions to our strategic challenges are unclear, one timeless fact is certain: adversaries of the United States dictate to us as much as we to them. ■



TABLE 1

Illustrative Examples of Ways to Counter Adversary Attempts to Fight Nonconventional Conflicts with the United States

		Approaches to Countering Adversary Actions*		
		Dominate	Deter	Deny
Alternate Forms of Conflict	Low Intensity (e.g., Insurgency)	Execute a fully resourced “protect-the-population” counterinsurgency campaign	Continue to strengthen declaratory policy regarding consequences for adversaries executing insurgencies	Execute a counterterrorism campaign to deny adversaries safe havens around the world
	High Intensity (e.g., Nuclear Escalation)	Maintain a nuclear arsenal that is superior, in both size and quality, to that of the nearest competitor	Continue to practice classic nuclear deterrence	Develop capabilities to deny the ability of an emerging nuclear power to use nuclear weapons ¹²
	Alternative Domain (e.g., Cyber or Space)	Strengthen offensive cyber capabilities	Continue to strengthen declaratory policy to emphasize possibility of cross-domain responses to attacks in cyber and space domains	Strengthen defensive capabilities and improve the resilience of critical infrastructure ¹³
* The inclusion of these examples should not necessarily be considered endorsements.				

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1. The author wishes to thank Josiane Gabel, Mark Massey, and Carolyn Barnett for their comments during the preparation of this article. The views expressed herein are the author’s alone.

2. Carl von Clausewitz, *On War*, Peter Paret and Michael Howard, trans. and eds. (Princeton, NJ: Princeton University Press, 1976), 77.

3. Sydney J. Freedberg Jr., “No Longer Unthinkable: Should US Ready for ‘Limited’ Nuclear War?,” *Breaking Defense*, May 30, 2013, <http://breakingdefense.com/2013/05/30/no-longer-unthinkable-should-us-ready-for-limited-nuclear-war/>. The idea of adversaries varying the intensity of a conflict—higher, using nuclear weapons, and lower, by executing insurgencies—is from this May 2013 article.

4. Frank G. Hoffman, "Hybrid Warfare and Challenges," *Joint Forces Quarterly* 52 (2009): 34, <http://www.ndu.edu/press/lib/pdf/jfq-52/JFQ-52.pdf>. Lieutenant Colonel Hoffman discusses the "convergence" of "modes of war" and how the United States will face adversaries that operate across the spectrum of conflict.
5. Robin Geib, "Armed Violence in Fragile States: Low-intensity Conflicts, Spillover Conflicts, and Sporadic Law Enforcement Operations by Third Parties," *International Review of the Red Cross* 91, no. 873 (2009): 134–37. In low-intensity conflict, the level of violence is usually lower than in conventional conflict.
6. Rachel Martin, "The IED: The \$30-Bombs That Cost the U.S. Billions," NPR, December 17, 2011, <http://www.npr.org/2011/12/18/143902421/in-iraq-fighting-an-improvised-war>; Charles Keyes, "Steep Cost of Military Vehicles Outlined in Army Report," CNN, January 27, 2011, <http://www.cnn.com/2011/US/01/27/army.vehicle.costs/index.html>.
7. Vincent Manzo, "Deterrence and Escalation in Cross-domain Operations: Where Do Space and Cyberspace Fit?" *Strategic Forum* 272 (December 2011): 1, http://csis.org/files/media/isis/pubs/111201_manzo_sf272.pdf.
8. In the past, the Department of Defense has framed the domination and denial approaches as part of a defense policy goal of "defeating" adversaries. See, for example, U.S. Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: U.S. Department of Defense, 2001), 11, <http://www.defense.gov/pubs/qdr2001.pdf>.
9. See Manzo, "Deterrence and Escalation in Cross-domain Operations," 5–6. Manzo notes that states lack a "shared framework" to assess whether a cross-domain response is proportional or escalatory, and how resulting miscalculations could lead to unwanted escalation.
10. See also Glenn H. Snyder, "Deterrence and Power," *Journal of Conflict Resolution* 4, no. 2 (1960): 163. Snyder considers both punishment and denial capabilities to contribute to deterrence.
11. See, for example, Keir A. Lieber and Daryl G. Press, "The New Era of Nuclear Weapons, Deterrence, and Conflict," *Strategic Studies Quarterly* (Spring 2013): 3–14, http://www.au.af.mil/au/ssq/digital/pdf/spring_13/lieber.pdf; and Keir A. Lieber and Daryl G. Press, "The Nukes We Need: Preserving the American Deterrent," *Foreign Affairs* 88, no. 6 (2009): 39–51, <http://www.foreignaffairs.com/articles/65481/keir-a-lieber-and-daryl-g-press/the-nukes-we-need>.
12. Lieber and Press, "The Nukes We Need," 39–51.
13. See "Presidential Policy Directive—Critical Infrastructure Security and Resilience," The White House, February 12, 2013, <http://www.whitehouse.gov/the-press-office/2013/02/12/presidential-policy-directive-critical-infrastructure-security-and-resil>.

Strategic Disaggregation of Military Operations

Charles J. Demmer

Gentlemen, the officer who doesn't know his communications and supply as well as his tactics is totally useless.

—Gen. George S. Patton, USA

FROM THE CONCENTRATED power of the Greek phalanx to the widely distributed Mongol hordes, military commanders throughout history have sought tactical advantage through force distribution. However, as technology facilitates a more rapid redistribution of combat power, consistent allocations of forces will no longer be adequate. In response to future threats, military forces will need the ability to rapidly aggregate and disaggregate in order to best respond to varied and geographically dispersed challenges. A degree of self-sufficiency from individual units, as well as a modular and scalable command structure, will be required to maximize effectiveness across large conflict zones. Ultimately, a military task force should be able to quickly assemble when concentrated combat power is required, and then disperse to minimize vulnerability. By leveraging new technologies to achieve a lighter, modular, and more mobile

force, the United States can inoculate itself against hostile action while advancing its peacetime military interests.

A number of factors are already driving the military to adopt these principles. The asymmetry of the Global War on Terror, for instance, has demonstrated the need for flexibility when responding to decentralized conflict. Evidence of this transition can be observed across all branches of the U.S. armed forces. The Army's reorganization to Brigade Combat Teams is an early example, followed by the recent development of the Rapid Equipping Force. The Navy and Marine Corps have placed renewed emphasis on the Amphibious Ready Group / Marine Expeditionary Unit (ARG/MEU), which frequently operates in a disaggregated fashion. The Air Force has begun experimenting with

“Rapid Raptor” packages able to relocate four F-22s and a supporting C-17 in less than 24 hours. Budgetary constraints are also forcing the military to restructure and eliminate overhead in the process. The intent is to achieve a post-drawdown force capable of responding to a wide variety of challenges. However, it is critical that these changes be made in a coordinated and strategic manner, rather than at the whim of external forces, so that our military remains correctly matched to emerging threats.

Disaggregating forces decreases the utility adversaries derive from developing expensive long-range strike platforms.

As nations enhance their long-range strike capability, the geographic scale of U.S. vulnerabilities is increasing proportionally. Assets previously outside the range of potential adversaries could become exposed to hostile action, especially

due to the ongoing proliferation of cruise missile and cyber-warfare capabilities.¹ Large concentrations of military assets will be the most attractive targets for such long-range strikes. Static installations will be particularly vulnerable, as their known positions make them easy to target. Current technology is limited in its ability to defend against such attacks, especially in large volume.²

Disaggregating forces decreases the utility adversaries derive from developing expensive long-range strike platforms. Any individual strike has limited damage potential when target units are not tightly grouped or dependent on central installations. Rather than concentrating fire on a single high-value target, an enemy facing a disaggregated force has to prioritize among a multitude of lower-value targets whose exact location is difficult to determine. This complicates the hostile targeting process, and reduces cumulative damage to the total force, improving their ability to respond.

While dispersion protects forces from the effects of concentrated enemy fire, it also creates new vulnerabilities. Specifically, dispersed operations require more channels for command and control, as well

as expanded logistical support. Internalizing these functions within individual units would mitigate these vulnerabilities. By allotting more command authority to lower levels and increasing logistic capabilities for isolated units, these forces would be able to function more effectively and for longer periods without reliance on the broader force. Placing emphasis on achieving the commander's intent rather than strict adherence to orders is one such mechanism to disperse command authority.

New technologies that are in development will help enable this independence. Advances in material sciences help make new equipment lighter, stronger, and more reliable than ever before. Innovations such as portable solar charging stations and dialysis-based water filtration systems help free the war fighter from dependency on conventional supply lines. Advances in 3D printing and other rapid prototyping machines could potentially eliminate the need for stockpiling maintenance parts.³ Ideally, this technology would allow disaggregated units to produce routine supplies internally, alleviating the need for frequent resupply. This capability would decrease transportation costs during peacetime, and allow units to continue operations should logistic support be suppressed by enemy action.

The advantages of a lighter, more self-sufficient force extend beyond military operations. In addition to the financial cost borne by the United States, global military presence necessitates complex diplomatic relationships with other nations. Constructing large military installations to support U.S. forces represents a major commitment to a long-term presence. Should U.S. forces be relocated, these facilities become irrecoverable sunk costs, such as an unused \$34 million facility recently abandoned in Afghanistan.⁴ They also generate safety concerns and unease among local populations, such as those surrounding Marine facilities in Japan where locals are apprehensive of aircraft crashes, troop interaction, and possible hostile action. While these factors deter foreign leaders from supporting a long-term U.S. troop presence, those leaders may be more amenable to short rotations responding to tension or disaster. Such transactional military relationships can be witnessed in both the Middle East and Southeast

Asia, where small contingencies of U.S. forces frequently conduct joint training exercises with foreign militaries. Such exercises are made possible in large part by the minimal impact a temporary U.S. presence has on the host nation.

The reduced footprint of a more self-sufficient force would open up a range of options for advancing U.S. diplomatic interests. The United States would be able to more rapidly re-posture itself to respond to emerging threats, disasters, or other unforeseen contingencies. Modularity would allow for the specific tailoring of a response for the unique situation at hand. An increased emphasis on self-sufficiency and scalability would decrease the cost of such transitions, ultimately making U.S. global presence more sustainable. In order to realize these military and diplomatic advantages, the United States should make a coordinated effort to ensure its military has the ability to aggregate and disaggregate as situations demand. ■

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1. Dennis M. Gormley, "Winning on Ballistic Missiles but Losing on Cruise: The Missile Proliferation Battle," *Arms Control Today*, December 2009, http://www.armscontrol.org/act/2009_12/Gormley.

2. Ibid.

3. See Rapid Equipping Force, U.S. Army, <http://www.ref.army.mil>. See also Kyle Chayka, "Why Is the Pentagon Dragging Its Feet on 3D Printing," *Defense One*, August 19, 2013, <http://www.defenseone.com/ideas/2013/08/Why-Is-Pentagon-Dragging-Feet-3D-Printing/68936/>.

4. Ernesto Londoño, "Scrapping Equipment Key to Afghan Drawdown," *Washington Post*, June 19, 2013, http://www.washingtonpost.com/world/asia_pacific/scrapping-equipment-key-to-afghan-drawdown/2013/06/19/9d435258-d83f-11e2-b418-9dfa095e125d_story.html. See also Bill Chappell, "A \$34 Million Waste of the Taxpayers' Money in Afghanistan," *National Public Radio*, July 11, 2013, <http://www.npr.org/blogs/thetwo-way/2013/07/11/201195870/a-34-million-waste-of-the-taxpayers-money-in-afghanistan>.

The Future of the U.S. Military Is *Special*

Jack Miller

AT THE HEIGHT OF the wars in Iraq and Afghanistan, there was a debate within the defense community on finding a balance between a military structured for traditional combined-arms warfare versus one designed to engage in complex irregular warfare and counterinsurgency. In recent years the balance has swung back toward the former, but new threats and budget austerity predicate the need for an adaptive and select fighting force. Because Special Operations Forces (SOF) are able to synthesize the nonconventional lessons of the past decade while preparing to engage a wide range of future opponents, they will likely serve as the central pillar of the future U.S. military.

Over the past few years some in the defense community have advocated a return to a more traditional role for the military: fighting conventional wars rather than pursuing complex counterinsurgency operations. One of the main concerns of top

defense officials has been that years of conducting counterinsurgency operations caused American conventional capabilities to atrophy. The drive to “get back to basics” has corresponded with the rebalance toward Asia, with the focus of military operations shifting from defeating extremist networks and nonconventional opponents to countering China’s growing conventional forces. This implies emphasizing traditional combined-arms and maneuver operations while employing a new joint-force doctrine called AirSea Battle.

However, new threats to conventional force structures continue to emerge in the form of precision weaponry and asymmetric tactics. For example, a prime concern for American strategists is the anti-access/area denial strategies of potential foes seeking to prevent American force projection into vital waterways. Such strategies can be achieved using relatively cheap technologies compared to the cost

of U.S. military hardware, such as anti-ship missiles, naval mines, and attack submarines. These threats, coupled with budget austerity, predicate the need for an adaptive and select fighting force. Special Forces are the ideal instrument of U.S. military power to achieve these aims.

Since 2001, SOF have conducted continuous, large-scale counterterrorism and counterinsurgency operations against extremist networks and irregular forces. The demands of these operations caused SOF to undergo a distinct transformation. As a result, U.S. Special Operations Command is a vastly more capable organization today in dealing with nonconventional threats than it was before 9/11. The U.S. national security apparatus has come to rely on SOF to an unprecedented degree. To capitalize on this exploitation, Jim Thomas and Christopher Dougherty argue that the 2014 Quadrennial Defense Review (QDR)¹ provides an opportunity to reshape SOF by institutionalizing the lessons of the past decade.² Thomas and

Dougherty note that while the 2006 and 2010 QDRs focused on the expansion of SOF, contemporary fiscal realities demand an in-depth understanding of the operational flexibility needed from SOF.³ Getting the shape of SOF right will allow them to maintain the flexibility desperately needed by the U.S. military to engage on different levels of the spectrum of

operations. These include defeating low-end insurgents and their methods of procurement, hybrid forces like Iran's Quds force, and modern conventional forces with unconventional anti-access/area denial tactics.

To identify and neutralize terrorists and insurgents on the low end of the spectrum of operations, SOF has adopted a more horizontal organizational structure. This structure allows Special Forces to “move

To remain the most adaptive and premier force, SOF must tie future capabilities to projected irregular threats and take steps to ensure partner forces are able to identify any arising threats.



at the speed of war” through the targeting system of “find, fix, finish, exploit, analyze, and disseminate,” or directly combating threats.⁴ To complement this flatter structure, SOF will need to continue to place a greater emphasis on intelligence gathering while collaborating with foreign forces in the form of foreign security forces, intelligence services, or law-enforcement agencies to engage militant groups such as al Qaeda affiliates. This will enhance SOF’s direct approach to threats through the indirect approach of building relationships with foreign groups through advising, training, and joint operations.

There is a good possibility that an irregular force will acquire conventional capabilities with which to threaten American interests. Al Qaeda in the Islamic Maghreb (AQIM)’s acquiring of Libyan arms has already shown that this can occur. A possible future scenario involves Hezbollah securing advanced capabilities like anti-ship missiles from Syrian arms stockpiles. Countering hybrid threats will force SOF to engage in more conventional operations than simple counterinsurgency tasks, as demonstrated by Israel’s war against Hezbollah in 2006. These operations require joint force cooperation as well as coordination with various intelligence agencies.⁵ SOF will be more capable than other forces to effectively combine counterinsurgency lessons such as locally specific expertise and language skills with conventional operations in these types of scenarios.

Even on the other end of the spectrum, with the rebalancing of U.S. forces to Asia and the emphasis on high-end conventional operations, SOF is one of most viable and enduring power-projection options for the U.S. military. The potential role of SOF in AirSea Battle includes network penetration and disruption, interdiction of ground and sea lines of communication, unconventional warfare, and peripheral campaigns.⁶ In addition to directly participating in combat operations, the indirect role of SOF includes empowering host-nation forces, conducting civil-affairs operations, and providing appropriate assistance to humanitarian agencies, all while gaining access to and a greater understanding of local conditions and populations. These long-term efforts increase partner capabilities that are vital to countering threats to regional stability.⁷

A key challenge for the SOF community and U.S. policymakers is preventing the “conventionalization” of SOF.⁸ Since the SEAL Team Six bin Laden raid in Pakistan, many Americans have become accustomed to the triumphs of SOF and see them as a substitute for the larger-scale military operations that characterized Iraq and Afghanistan. However, SOF are a resource that should not be overused or overstated in capability. While most of the increased SOF funding has gone to buying better equipment, replacing worn-out gear, and providing better training, getting new recruits has been more difficult. It takes years to select, train, and season a fully qualified SOF operator. Thus SOF operators are a long-term investment that must be used carefully because losses take years to replace. This means carefully investing in recruits today to maintain future SOF capabilities.

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The Joint Chiefs stated in the *Joint Vision 2020* that the overall goal of future transformation is the creation of a force that is dominant across the full spectrum of military operations, persuasive in peace, decisive in war, and preeminent in any form of conflict.⁹ The new reality of future conflict is that while tensions between nation-states remain a critical threat to American national interests, irregular security situations are continuously arising. To remain the most adaptive and premier force, SOF must tie future capabilities to projected irregular threats and take steps to ensure partner forces are able to identify any arising threats. SOF and their evolving array of capabilities that make them “special” are the reason that they will be the centerpiece of U.S. military force employment. ■

Jack Miller is a former intern with both The Washington Quarterly and the Transnational Threats Project at CSIS.

1. This article was written before the release of the 2014 QDR.

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3. *Ibid.*, 83.

4. Linda Robinson, “The Future of Special Operations: Beyond Kill and Capture,” *Foreign Affairs*, 91:6 (November/December 2012): 110–22, <http://www.foreignaffairs.com/articles/138232/linda-robinson/the-future-of-special-operations>.

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7. Linda Robinson, *The Future of U.S. Special Operations Forces*, Council Special Report No. 66 (New York: Council on Foreign Relations, April 2013), 11, <http://www.cfr.org/special-operations/future-us-special-operations-forces/p30323>.

8. *Ibid.*

9. Dennis L. Via, “Sustaining the Decisive Edge for the Army and Joint Force 2020,” *United States Material Command*, (October 2012): 89-93.

Course Correction: Preparing the U.S. Military for an Uncertain Future

Kelley Saylor

THE YEARS AHEAD represent a critical juncture for the Department of Defense (DoD). As it continues to draw down from the wars in Iraq and Afghanistan, it must not only implement the deep budgetary cuts imposed by sequestration (approximately \$500 billion over 10 years) but also develop long-term plans for safeguarding the nation and ensuring that U.S. military forces remain second to none. Today, the United States faces no near-term peer competitor. But the security environment—and further, the conduct of warfare—is rapidly evolving. If the U.S. military is to protect its position of unchallenged superiority over the long term, it must rebalance its forces and adjust its investments to prepare for an uncertain future, even if this means assuming limited risk in the present.

The demands of the future security environment will bear little resemblance to those of the past. New state powers as well as empowered individuals and non-state actors—

two groups that are fundamentally difficult to deter—will generate profound strategic turmoil, which current force structure and modernization plans, optimized for high-end conventional conflict, are largely ill-prepared to manage.¹ At the same time, the development of disruptive technologies²—including cyber, autonomy, additive manufacturing (also known as 3D printing), precision-guided munitions, and bio- and nanotechnologies—and the proliferation of advanced weapons systems will expand the sources of potential conflict and alter the face of future battlefields. Even though it is aware of these trends,³ the United States remains overcapitalized in a number of costly acquisition programs and legacy weapons systems that are draining DoD of the flexibility and dynamism that will be needed to address the demands of the emerging security environment.

The deficiencies of existing force structure and modernization plans

are most apparent when assessed against the asymmetric or anti-access/area denial strategies of U.S. competitors. In the case of the latter, the pursuit of precision strike and targeting capabilities by China, Russia, and Iran could place greater constraints on the freedom of action and maneuverability of U.S. forces than ever before.⁴ Anti-ship ballistic missiles, such as China's DF-21D, will be increasingly capable of either holding U.S. aircraft carriers in the Asia Pacific at risk or forcing them to operate beyond the range of their own tactical aircraft.⁵ Despite this shift, the United States is currently investing in a new class of aircraft carriers and carrier-launched aircraft that are estimated to have per-unit costs of \$13.5 billion and

The pursuit of precision strike and targeting capabilities by China, Russia, and Iran could place greater constraints on the freedom of action and maneuverability of U.S. forces than ever before.

\$125 million, respectively. The DF-21D, in contrast, is estimated to cost between \$5 million and \$11 million.⁷

At least partially divesting of such systems now—or delaying them until applicable game-changing technologies have matured—would enable DoD to shift a greater portion of its limited resources into science and

technology accounts, thereby positioning it to exploit the disruptive technologies that will shape the future of warfare. Of these, additive manufacturing, which can now utilize titanium and aluminum alloys in addition to plastics, could enable adaptive, real-time battlefield innovation, while directed-energy weapons could provide a defense against precision-guided munitions as well as an expanded and cost-efficient magazine.⁸

Autonomous systems could provide additional advantages in a conflict, whether symmetrical or asymmetrical. Unmanned combat systems could enhance range, lethality, and survivability, thus allowing U.S. forces to operate remotely and out of harm's way.⁹ If combined with microrobotics, these systems could also employ

swarm tactics to overwhelm adversary defenses or dramatically improve situational awareness and tactical intelligence, surveillance, and reconnaissance capabilities by, for example, infiltrating adversary structures in dense urban environments.¹⁰

Such technologies—and many others—provide force multipliers that U.S. competitors will not overlook and that are therefore likely to play a central role in future conflicts. With no immediate peer competitor, the United States cannot afford to protect those acquisition programs and legacy systems that are vulnerable to the emerging capabilities of our rivals at the cost of investments in much-needed research on the technologies of the future. Now is the time to rebalance U.S. force structure and modernization plans for a period of momentous change. ■

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A Ray of Hope? Shifting the Balance of Power on the Korean Peninsula

Sang Jun Lee

NORTH KOREAN STATEMENTS often come across as bombastic, but the country's repeated threats to turn Seoul into a "sea of fire" are a sobering yet accurate depiction of Pyongyang's capabilities. Just 25 miles north of the South Korean capital lies the Military Demarcation Line, along which Pyongyang has forward-deployed its rocket, artillery, and missile (RAM) forces, boasting a combined rate of fire of over 10,000 rounds per hour.¹

While much attention has been focused on Pyongyang's nuclear and long-range ballistic missile capabilities, North Korean military doctrine suggests these RAM forces are more likely to be deployed in an attack—and Seoul is woefully unprepared. Conventional means of defense, such as force dispersion or base hardening, would be insufficient against a mass RAM salvo, and Seoul's current plan to instead scale up its kinetic interceptor arsenal is "operationally unfeasible and economically unsustainable."² Against this backdrop, the

promise of laser defense technology offers a literal ray of hope for shifting the strategic balance of power along the border.

Laser applications pass electricity through a "lasing medium"—gas, crystal, ceramic, or fiber—to release directed radiation of light energy in the form of coherent beams. These beams can precisely focus on a designated target to cause disabling damage or physical destruction.³ Already, laser weapons are rapidly advancing from the realm of science fiction into reality. In 2012, the U.S. Navy used its Laser Weapon System (LaWS) to successfully intercept unmanned aerial vehicles in several trials, while Germany has developed a high-power laser capable of disintegrating a steel ball designed to replicate a mortar round.⁴ Although these are basic functions that current kinetic defense systems are already capable of performing, there are three unique factors that make lasers a promising alternative in a range of operational contexts.

The first advantage is agility and multiple target engagements. Laser beams can reach the targets at the speed of light, making them well-suited to handle fast-moving RAM projectiles. Moreover, since the laser beams eliminate the need to calculate and fly an intercept trajectory, single laser weapons can engage multiple incoming threats in quick succession by merely redirecting their beams from one target to another.⁵ Fast engagement makes the laser systems particularly appropriate to countering mass attack, thereby undercutting the effectiveness of RAM salvos.

Laser systems could dramatically reduce the national procurement outlays and shift the cost-exchange ratio in favor of South Korea by lowering the premium Seoul must pay for security over the price Pyongyang pays to disrupt it.

Electric-powered defensive lasers provide a second key advantage over kinetic defense systems by creating favorable cost-exchange ratios. The cost-per-shot of laser weapons can be measured by the cost of generating the electricity to produce laser beams, which is estimated at around hundreds to several thousands of dollars.⁶ Conversely, the

one-time-use interceptor missiles South Korea currently favors each carries a price tag in the millions as they expend a set of costly hardware—guidance systems, avionics, airframes, and rocket motors—in each defensive engagement.⁷ Once fully deployed and operational, laser systems could dramatically reduce the national procurement outlays and shift the cost-exchange ratio in favor of South Korea by lowering the premium Seoul must pay for security over the price Pyongyang pays to disrupt it.⁸ In a time of prolonged economic malaise, the incentive to pursue such a course is particularly strong.

Finally, unlike magazine-limited kinetic systems that can engage only a limited number of targets, lasers have the capability for



repetitive engagement over protracted periods, constrained only by the supply of fuel or electricity with cooling process to dissipate waste heat. This “deep magazine depth” represents an effective countermeasure against a saturation attack and eases the need for many of the complex and expensive logistical operations—manufacturing, transporting, storing, and loading munitions—that characterize kinetic defense systems.⁹

Like many other weapon systems, however, lasers are not without their limitations. Unsurprisingly (for beams of concentrated light), lasers burn hot, meaning that cooling processes to remove waste heat are necessary for continued operation—as is a sustained supply of electricity.¹⁰ Establishing both a reliable source of electricity and cooling functions in more remote contexts, such as mountainous air-defense installations, would likely prove challenging. Lasers are also prone to beam attenuation—a decrease in light energy—when operating in the atmosphere. Airborne substances, such as water vapor, dust, smoke, and pollutants can negatively impact the ability of current lasers to focus on and interdict incoming targets.¹¹

Further research might mitigate these limitations, as would the improvement of base infrastructures. Meanwhile, it would be useful for Seoul to see the laser systems as an integral part of a broader defensive posture that ties in traditional kinetic systems as it would help compensate for the operational limitations of both systems and significantly enhance overall effectiveness across a multitude of contexts.¹² Given the challenge of North Korean RAM forces, efforts to create this multilayered, densely knit defense architecture should be prioritized and fast-tracked.

Laser systems are not the panacea for North Korean RAM threats, nor will they entirely obviate the current means of conducting war in the foreseeable future. However, innovative technologies have the potential to create a new array of tactical as well as strategic benefits for South Korea by paving the way toward heightened readiness and deterrence against North Korean provocations. Laser weapons’ unique attributes make them promising tools for the future of war-

fare that could break the operational stalemate created by the asymmetric magnitude of North Korean RAM capabilities. By negating the North's powerful bargaining chip, the South would be able to tilt the current dynamic of inter-Korean relations in its favor. ■

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1. As of April 2013, it is estimated that North Korea has deployed about 350 rocket and artillery units near the Military Demarcation Line (MDL) that can reach the Seoul metropolitan area—about 25 miles away—with a combined rate of fire over 10,000 rounds per hour. These forward-deployed forces consist of 200 M1985/M1992 240mm multiple rocket launchers and 140 to 150 M1978/M1989 170mm self-propelled artilleries. For an overview of North Korean RAM threats, see Dae Young Kim, “The North Korean Long-Range Artillery Threat to Seoul Metropolitan Area (in Korean),” *Chosun Daily*, April 17, 2013, http://bemil.chosun.com/site/data/html_dir/2013/04/17/2013041701131.html.
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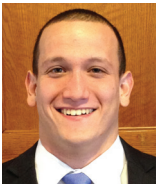
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