

July 26, 2011

## DEPARTMENT OF DEFENSE INVESTMENT IN TECHNOLOGY AND CAPABILITY TO MEET EMERGING THREATS

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*Testimony Before the U.S. House of Representatives, Committee on Armed Services, Subcommittee on Emerging Threats and Capabilities.*

Thank you, Mr. Chairman, for the opportunity to appear before you today, and to share my views on emerging threats facing the United States, and capability areas that may require greater investment to meet them. My testimony is intended to provide context within which one might assess the Department of Defense's research and development priorities.

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In my testimony today, I will describe some of major security challenges the United States is likely to face in the next two decades. I will then outline potential discontinuities in future warfare that should be considered when making future investment decisions. Building on those discontinuities, I will discuss their broad implications for U.S. defense planning. Finally, I will suggest capability areas that appear to be potential growth opportunities for investment given these discontinuities and their implications.

### **I. Major Security Challenges Facing the United States**

The United States faces a multitude of threats, but three principal security challenges stand out:

- Hedging against the rise of a hostile and more openly confrontational China and potential challenges posed by authoritarian capitalist states;
- Defeating violent extremism and countering radicalization and destabilization in key countries throughout the world; and
- Preparing for a world in which there are more nuclear-armed powers.

The Rise of China. Although China is not an enemy, it has the greatest military potential to challenge the interests of the United States, its allies, and friends in the coming decades. China's growing economic wealth, thirst for commodities from overseas, and unsettled territorial claims – coupled with its sustained military modernization and more confrontational approach on regional issues – are raising concerns throughout East Asia. China appears to be attempting to create a sphere of influence in East Asia and to displace the traditional role of the U.S. military as a security provider in the region. Its military has developed a sophisticated anti-access/area denial (A2/AD) battle network to hold U.S. military bases and naval ships forward-deployed in the Western Pacific at risk. This A2/AD network includes growing inventories of medium- and intermediate-range missiles; state-of-the-art integrated air defenses; submarine forces; anti-satellite systems; and computer network attack capabilities. The United States is developing new concepts like AirSea Battle to ensure military forces will continue to be able to gain and maintain sufficient freedom of action and preserve the stable regional military balance that has benefitted all countries in the region in the face of these A2/AD challenges.

Violent Extremism and Destabilization of Strategically Important States. Despite the killing of Osama bin Laden earlier this year, violent extremists, whether al Qaida or associated radical Islamist movements, are continuing their attempts to destabilize fragile strategic states such as Afghanistan, nuclear-armed Pakistan and oil-rich states such as Saudi Arabia. Some of these groups are sponsored or aided by states hostile to the United States, to include Iran and Venezuela. The lethality of violent extremists, moreover, would increase dramatically should they acquire nuclear or biological weapons. Radicalization and destabilization, however, are not limited to the greater Middle East. Within our own hemisphere, narco-cartels continue to threaten the stability of key partners such as Mexico and Colombia. The United States' preferred strategic approach is to work indirectly with local governments and regional players to counter terrorism, insurgencies and narco-cartels. Such preventive efforts, while not necessarily involving the use of force, represent an important and enduring mission for the U.S. military.

Regional Nuclear Dangers. The probability that we will see the use of nuclear weapons within our lifetime increases with the number of new nuclear powers. North Korea's acquisition of nuclear weapons has already changed the security calculus in Northeast Asia, while its eagerness to proliferate nuclear weapons technology to countries such as Iran and Syria destabilizes regions further afield. The number of nuclear powers may further expand in the coming decades, especially if Iran acquires nuclear weapons and prompts others in the region to follow suit. The United States will have to develop regionally-tailored doctrines for nuclear deterrence, WMD elimination, limited nuclear use, and war termination in a more proliferated world.

The geographic nexus of these three challenges is the Indo-Pacific region, stretching from the Persian Gulf around the Malay Peninsula and up to the Sea of Japan. Although the U.S. military does not have the luxury of focusing on a single theater, the greatest tests our armed forces will face in the coming decades are likely to emanate from this region. East Asia is likely to be the engine of the global economy. High economic growth rates are likely to fuel continued regional increases in armaments. The danger of a nuclear confrontation

between India and Pakistan remains high. Terrorist attacks similar to those perpetrated in Mumbai in 2008 and again on July 13th could destabilize governments in the region or trigger a major war between nuclear powers. And finally, intense resource competitions driven by emerging powers in the region may cause economic competitions to jump the track into the military domain.

As America faces these challenges we must also confront another national security threat, but one that has its roots within our country. As the Chairman of the Joint Chiefs of Staff and others have indicated, America's current fiscal predicament is a national security threat. I wholeheartedly agree with that assessment. America's fiscal woes, and our success or failure in addressing them, will greatly influence our options for dealing with external challenges to our security and how we prioritize capability investments.

## **II. Potential Discontinuities in Warfare**

As we look ahead, we not only face a range of security challenges, but also see emerging patterns and potential changes in the character of warfare. Four major discontinuities, in particular, may influence how we think about future warfare, forces and capabilities:

First, American power projection in its familiar forms could become prohibitively costly in the future as A2/AD battle networks proliferate. The U.S. military has longed enjoyed the luxury of being able to dispatch its forces at intercontinental distances to theater bases around the world that afforded a high degree of sanctuary, and to conduct naval patrols very close off the coasts of potential aggressors with impunity. But as countries such as China and Iran acquire extended-range precision-guided weapons, advanced sensors, and the means to attack opposing electronic systems, they are creating contested zones in which the risks associated with current patterns of U.S. power-projection and forward-presence operations could become prohibitively high. With such capabilities, they can hold at risk theater air bases from which many of our strike aircraft traditionally operate. They can attack large surface combatants within range of their anti-ship systems. High-signature ground and amphibious forces can be targeted as they land on foreign shores. And U.S. logistical systems and satellite communications – critical elements of America's global military network – could be corrupted or destroyed. The continued proliferation of weapons of mass destruction only compounds the challenges of gaining access and operating in distant theaters.

Second, the proliferation of guided weaponry and nuclear weapons makes the prospect of large armies invading other countries far less likely. For much of the past several decades, the U.S. military has honed its warfighting skills based on a narrow set of scenarios that envisaged them either repelling or conducting large-scale land invasions. The epitome of this was the Cold War battle that never occurred at the Fulda Gap, where NATO forces were deployed to repel a Warsaw Pact invasion of West Germany. Even after the Cold War, the U.S. military continued to focus on two canonical warfighting scenarios that both involved repelling large ground invasions of allies or friendly countries. Over-optimizing forces for repelling invasions and conducting counter-offensive, large-scale land invasions in kind, however, has left forces less prepared for irregular warfare; coercive wars waged with missiles, submarines, and cyber attacks; nuclear exchanges between regional nuclear powers; and more ambiguous forms of limited, creeping aggression to assert sovereignty

over contested offshore oil and gas fields. Such contingencies may represent more realistic and more taxing scenarios than the canonical invasion/counter-invasion/regime change scenarios of the past.

Third, in an era of globalization, conflicts are unlikely to be geographically limited in scope, but will instead extend into the global commons of the high seas, air, space, and cyberspace. Wars are likely to be preceded by massive cyber attacks to disrupt opposing sensors, command and control, logistics, communications or air defenses. Such attacks could be used to “jump over” opposing forces to attack the civilian society of the enemy directly, non-kinetically performing functions that were previously accomplished by strategic bombardments. Attacks against space assets could affect global civilian communications, banking, and other non-military functions. Military conflict will also expand below the waves as more countries develop the means to wage undersea war and covet the unguarded wealth that lies upon the seabed – submarine communications cables, oil and gas reserves, and concentrated fields of precious metals.

Fourth, the United States is in danger of losing its lead in critical military-technology competitions. While the United States remains the premiere cyber power given enormous investments over many decades in its cryptologic complex, its ability to sustain that lead is in jeopardy as a number of states, terrorist groups, and criminal organizations develop sophisticated means of conducting cyber attacks. Similarly, the United States is losing its near-monopoly on precision-guided weaponry as those capabilities proliferate rapidly around the world. In space, decades of investment in orbiting systems for reconnaissance, communications, and navigation can now be held at risk with relatively less expensive anti-satellite systems. And in research and development, the United States appears to be at risk of falling behind other powers such as China and even Russia in critical areas such as directed energy technologies.

Together, these four potential discontinuities could negate many of the precepts of defense planning since the end of the Cold War. Accounting for them may require a better understanding their implications and the adoption of new force and capability designs.

### **III. Implications for the Design of U.S. Forces and Capabilities**

The potential discontinuities described above suggest several implications for U.S. military planning and future capability investments:

Future environments in which U.S. forces must deploy, and conditions under which they must operate and sustain themselves are likely to be far less permissive than in the recent past. We may be entering a post-power projection era in which many traditional modes of projecting power may no longer be viable making it harder to deploy, operate and sustain U.S. forces in the face of robust A2/AD battle networks. Over the past several years, it has become fashionable to talk about trade-offs between preparing for so-called “low-end” irregular conflicts and “high-end” conventional threats. But this is a false dichotomy. The reality is that although we will continue to face irregular threats long into the future, irregular opponents will likely adopt high-tech weaponry including guided rockets, artillery, mortars and missiles (G-RAMM) to create their own anti-access/area denial challenges, albeit on a smaller scale. This is not too far a leap from what we already see occurring in Iraq and Afghanistan, where Iran has supplied its proxies with explosively

formed projectile IEDs and other sophisticated anti-personnel weapons. At the same time, advanced military powers will continue building up their capabilities to deny the United States the ability to access and operate with impunity in their respective theaters. High signature forces that depend on theater air bases, large naval surface combatants, large ground formations, logistical supply through large ports and airfields, satellites in low-earth or geostationary orbits, and U.S. military computer networks will all be more vulnerable in the future, not less. Consequently, military systems designed with assumptions of relatively benign operating conditions may be ill-suited for the types of operations we might actually undertake in the future. Continuing to adhere to these legacy assumptions will jeopardize lives and the prospect of deterring future conflicts, or of winning them should deterrence fail. A prudent pattern of future investments might be one that maximizes investments in systems that perform under a range of non-permissive conditions, while minimizing investments in systems whose optimal performance depends on relatively benign operating conditions.

The United States, its allies and partners must improve their capabilities to counter coercion and more ambiguous forms of aggression. Around the periphery of Eurasia, the greatest military dangers may stem more from the coercive use of force by potential adversaries than the threat of large-scale land invasion: waging missile campaigns; conducting cyber attacks; imposing maritime exclusion zones; and brandishing nuclear threats intended to break the will of adversaries rather than physically subjugate them. Countries like China and Iran are building up sizable missile forces that would enable them to conduct coercive missile campaigns against their neighbors. Encouraging allies and friends around the world to field their own A2/AD systems, including active and passive defenses, as well as precision weaponry could enable them to withstand coercion by local hegemonic aspirants.

The U.S. military will need to adopt more globally integrated approaches to deterrence and the conduct of warfare. To address conflicts that will cross-cut the Regional Combatant Commands, we will need to reconsider the ways in which we have organized and partitioned the Earth into regional military theaters. Similarly, the roles and missions of the U.S. Armed Services may need to be reconsidered to address the risk of conflicts that can spread across the areas of responsibility of the Regional Combatant Commands. Command and control decisions may need to become more centralized to ensure global coordination, even while the execution of those decisions may become even more de-centralized.

U.S. research and development and intelligence efforts will need to be more closely integrated to prevent technological surprise. The United States may no longer be able to lead in all technological categories. In some, we must anticipate or identify technological breakthroughs that may occur abroad and more quickly adapt ourselves to exploit or counter them. As with Nazi Germany's development of Blitzkrieg in the 1930s, the next big military innovation may be less the result of a single technological breakthrough than the harnessing of multiple technologies that might already be available for a new military purpose. Fostering creativity and experimentation within the U.S. military will maximize the odds of discovering the "next big thing" in military innovation before our adversaries do.

#### **IV. Needed Capabilities**

In light of these implications, new criteria emerge for evaluating potential U.S. military investments: How capable are systems in non-permissive operating environments-- e.g., in the face of cyber attacks, denied communications, advanced air defenses, missile attacks on theater airbases or large naval combatants? How relevant are they to countering coercion? And how fungible are they globally and across a range of scenarios? I would suggest that eight capability areas look particularly attractive in light of these criteria:

Countering or eliminating nuclear and biological weapons. Perhaps no technical challenge is as great as improving the ability to locate, secure or neutralize uncontrolled nuclear weapons. Ground forces will need equipment and training to sustain long-duration operations in WMD-contaminated environments to find, secure or eliminate WMD. Research is also needed to develop medical countermeasures to defeat a broad range of bacteriological and viral pathogens.

Operating from range, penetrating into denied areas, and persisting in conducting surveillance and strike missions. Long-range strike and surveillance capabilities would ideally be provided by a mixture of land- and carrier-based aircraft. They should improve the ability of the future force to deny sanctuary to adversaries, while reducing some of the vulnerabilities associated with theater basing. Future long-range airborne systems, manned or unmanned, should be capable of operating in situations where satellite communications are denied.

Defending population centers, military bases, and forces from ballistic missile and G-RAMM attacks. Ballistic missile defense systems will need deeper magazines of interceptors if they are to withstand larger missile salvos. Small, highly distributed landing parties will be needed to designate anti-ship missile batteries and air defense facilities for attacks and create counter-GRAMM perimeters so that larger forces can attain lodgments ashore. Solid-state directed energy systems look particularly attractive in countering G-RAMM threats given their virtually unlimited "shot magazines." With appropriate funding, it may be possible to field, within the next decade, the first high-power solid state laser weapons system capable of providing ship-borne defenses against anti-ship cruise missiles, UAVs, and fast attack craft.

Conducting special reconnaissance, direct action and unconventional warfare in denied areas. Special operations forces may require new long-range airborne and undersea systems to insert and extract teams undetected. Future gunships should be suited for operations in non-permissive environments and be day/night/all-weather-capable.

Conducting unwarned land attack, sea denial and reconnaissance from undersea. Undersea warfare is a longstanding U.S. military advantage, but there is a need to increase the precision-guided conventional weapons payloads of U.S. submarines and increase the endurance of Large Diameter Unmanned Underwater Vehicles. U.S. submarine forces, as well as surface combatants, could also be enhanced by developing the means and methods for them to re-arm at sea rather than returning to port.

Channeling or controlling access and movement via non-lethals. Non-lethal technologies can improve force protection while reducing U.S. manpower requirements. For example, non-lethal technologies could be used to create "virtual fences" around captured weapons

aches, or to protect forward operating bases from attacks employing far fewer soldiers than might otherwise be required. Non-lethal weapons also offer the promise of increased security to our deployed forces without the risk of causing unwanted and potentially costly collateral damage to civilians and civilian infrastructure.

Disrupting, degrading, deceiving, manipulating or negating the sensors and processing capabilities of hostile powers. In countering the growing threat of precision-guided weaponry, the ability to deny an adversary effective means of targeting – especially against mobile or redeployable forces – will confer a significant military advantage. While many elements of U.S. forces are involved in countering ISR systems, there is no integrated mission area that addresses the emerging importance of “blinding campaigns.” Technologies that help to disrupt, degrade or spoof enemy sensor networks will play critically important roles in new concepts such as AirSea Battle.

Building up the capacities of key allies and friendly states for internal and external defense. In recent years, the Department of Defense has been focused on building the capacities of partner military forces to combat internal security threats. These efforts should be continued. But they should also be expanded to assist allies and other key partners in building greater capacity for themselves to withstand external military threats with less reliance on U.S. forces for their self-defense. U.S. allies and partners, especially in the Indo-Pacific region should be encouraged to build up their own A2/AD battle networks to constrain the power projection options of shared adversaries.

## **V. Conclusion**

In closing, let me express my appreciation to the Committee for its efforts to raise the level of discourse and awareness on these important issues. Given our country’s fiscal situation, there is little margin for error in the investment choices we make for the U.S. military in the years ahead. By emphasizing capabilities that perform well in non-permissive condition, counter emerging coercive threats, and apply across a range of global scenarios, I believe we can best meet the challenges ahead. Thank you.

## **About the Center for Strategic and Budgetary Assessments**

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