NEWPORT PAPERS

A Series of Point Papers
from the Naval War College and the
Navy Warfare Development Command
For Senior Leadership
In Response to Critical Issues

Strategy / CONOPS / Doctrine / Decision

United States Naval War College
Navy Warfare Development Command
Newport, Rhode Island

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TECHNOLOGICAL MOBILIZATION FOR THE TERROR WAR

Purpose: To examine the requirements for and alternative approaches to technological mobilization for the global war on terror.

Background: Effective technological mobilization is important in fighting and winning the long term global war on terror. New technologies and weapons can enhance the ability of the combatant commanders to find and destroy terrorist organizations. In contrast to economic mobilization, which involves shifting the economy to full-scale, high-rate, war-time levels of production, the war against terrorism requires the United States to mobilize its public and private sector technological infrastructure. Technological mobilization involves accelerating the development of innovative technologies that will increase the ability of the U.S. military, intelligence, and law enforcement establishments to prosecute the war on terror and defend U.S. interests. Policymakers must determine how best to accelerate the development of technologies that will most effectively strengthen U.S. military capabilities and enhance U.S. security

Discussion: Effective technological mobilization requires policymakers to address two questions: (1) What are the critical technologies that the United States should develop? and (2) What is the best way to develop these technologies? Difficult and complex choices face decision-makers in government agencies, most notably the Department of Defense, and private sector firms, about which technologies should be developed and how to most rapidly, effectively, and efficiently develop those technologies. Alternative approaches to developing and fielding the new technologies that the United States will need to fight terrorism, as well as the costs and benefits associated with those approaches, deserve serious attention.

Critical Technological Capabilities

There are six areas in which accelerating technological mobilization for the war on terror may be particularly advantageous:

1. Detection of weapons of mass destruction, particularly nuclear weapons and materials. While the United States has invested in developing technologies for detecting nuclear materials, it has not yet established the technological capabilities or operational infrastructure that give federal, state, and local officials high levels of confidence that the movement of nuclear materials into or around the United States will be detected. In view of evidence that Al Qaeda has attempted to acquire nuclear weapons and materials—and that some states may have been accomplices in that endeavor—the United States has a vital interest in ensuring that such devices and materials do not enter the country.

2. Defense against bioterrorism. The release of anthrax in the United States with letters mailed on 18 September 2001 from New Jersey highlights how imperative it is that government agencies detect and respond rapidly to releases of biological weapons. Government agencies and private sector firms should develop as rapidly and effectively as possible sensors that detect biological agents and the means to protect and or treat victims after detection.

3. Imaging, particularly for wide-area surveillance. While U.S. military and intelligence collection capabilities are without equal, the ability to find and identify mobile targets—and immediately task aircraft or other platforms to destroy them—must be improved. In particular, the U.S. military should improve its ability to detect, track, and destroy time-critical targets as they move about the battlefield. New technological capabilities should also be developed for real-time battlefield interdiction.

4. Detection and destruction of underground caves, tunnels, and facilities. The Taliban and Al Qaeda had an extensive array of underground complexes from which to operate and in which to hide. A number of states have also developed underground facilities. The United States must develop airborne and space-borne technologies for detecting precisely where these underground facilities are located, who or what is being stored in them, and their vulnerabilities. In addition, weapons to destroy these facilities should be developed and fielded.

5. Unmanned aerial vehicles. The U.S. military and Central Intelligence Agency operated unmanned aerial vehicles over Afghanistan for the purpose of collecting information. Both Predator UAVs armed with Hellfire anti-tank missiles and Global Hawk surveillance UAVs were employed by the United States in Afghanistan. Such platforms can loiter for extended times over an area while conducting surveillance, limiting the ability of enemy forces to move with impunity. Additional resources should be devoted to developing this promising technology.

6. Integrating and disseminating information. The ability to fuse, disseminate and act upon the enormous volumes of information collected by sensors deployed on ground, air, sea, and space platforms needs to be improved. The value of more effectively integrating and disseminating information has long been recognized. Events in Afghanistan reinforce the need to efficiently collect and transmit military and intelligence information in usable form to those who can act upon it in a timely manner.

Promoting Technological Mobilization

Technological mobilization for the ongoing war on terror can be accomplished in two ways. The first is to rely on established mechanisms and organizations—the traditional array of private sector defense firms, national and service laboratories, and universities—to develop the needed technologies and capabilities. Reliance on this approach has enabled the United States to develop and field military capabilities that are without equal. The second is to rely on organizations expressly designed to short-circuit the traditional approach and accelerate the development of advanced military technologies. This second

approach may well be the optimal route to technological mobilization for the global war on terror.

The DARPA Model. Since the late 1950s, the United States has invested much of its hopes for dramatic technological breakthroughs in one organization: the Defense Advanced Research Projects Agency. DARPA has assumed a unique and essentially dominant position in the U.S. defense research and development establishment. Its programs are responsible for impressive advances in military and commercial technologies alike.

DARPA was established in 1958 during the Eisenhower administration to mobilize U.S. technological resources for the space race with the Soviet Union. Its explicit function is to invest in the high-risk, high-payoff programs that, if successful, significantly advance the technological state of the art. DARPA developed many of the leading technologies of the late twentieth century, including the Internet, low observable ("stealth") technology, and computer chips, and has explored the potential of directed energy.

The DARPA approach to technology development can best be understood in terms of three "rules." First, DARPA is by intent and practice perhaps the most agile and responsive of all the public and private organizations in the U.S. research and development community. It can move with startling speed to develop new programs. The pace of decision-making and autonomy granted to its senior leadership and program managers often equals or even exceeds that of firms in the private sector.

Second, and perhaps more importantly, DARPA's charter gives it the ability to ignore virtually all of the oversight and regulations established to govern the traditional system by which the government and private sector firms develop advanced defense technologies. Unlike that traditional system, DARPA has created and sustained a culture which depends on a highly streamlined and single-point review process. This permits senior decision-makers at DARPA and the Department of Defense to identify and fund the high-risk, high-payoff technologies upon which breakthroughs depend. This approach has profound implications for technological mobilization in wartime. DARPA program managers and senior leaders can be given the authority and autonomy to invest in promising technologies that could yield significant new military capabilities in a relatively short period of time.

Third, DARPA is effectively insulated from the operational requirements documents, mission needs statements, and other requirements documents that govern the traditional defense acquisition system. DARPA's ability to generate technological innovation is strengthened by its relative freedom from the rules and regulations imposed by Congress.

The Traditional Approach. While DARPA represents a critical option for accelerating technological development, government officials should not lose sight of the fact that the United States has developed large-scale, elaborate organizations for developing new military technologies. The traditional acquisition system was organized and operated by OSD and the military services to develop advanced technologies. There are several

important dimensions along which the traditional approach should be compared with the DARPA approach.

The first is the speed with which new technologies and capabilities are developed. While the traditional defense acquisition system maximizes the output of numerous weapons and systems; it is not designed to be agile or quick. Indeed, the system intentionally operates in a deliberate and measured, rather than a speedy and agile, manner (with the possible exception of "black" programs). The traditional system is not designed to generate the degree of innovation that DARPA does. It is, however, designed to minimize the risk of technological and programmatic failures.

Second, the traditional defense acquisition system is governed by a detailed, complex, and burdensome set of rules and procedures imposed for oversight and regulatory purposes. It is controlled deliberately by a highly decentralized, multiple-point review process which operates at many levels in the Department of Defense, other executive branch agencies, and Congress. Decision-makers in this system have vastly less flexibility than their counterparts at DARPA to identify, fund, develop, and test the high-risk, high-payoff technologies upon which U.S. military superiority depends.

Third, the traditional acquisition system is governed in the strictest possible sense by a legally and bureaucratically binding set of operational requirements documents, mission needs statements, and other governing documents. When a weapon system under development in the traditional acquisition system confronts technical, cost, or schedule problems or fails to meet the objectives specified in the requirements documents, the system can react harshly and decisively. Since the traditional system is tightly governed and controlled by these requirements, rules, and regulations, programs by law cannot proceed with further development until requirements are met or changed.

Accelerating Technological Mobilization for the Global War on Terror. The advantages associated with the DARPA approach are often thought to outweigh the risks. However, while DARPA has enjoyed a high degree of success in developing leading-edge technologies, its approach does have limitations. The price of pushing the development of high-risk, high-payoff innovative technologies is an extraordinarily high rate of failure. While the metric is crude, DARPA's success rate can be measured in terms of the number of programs that actually mature into operational technologies and systems. A rough estimate is that less than ten percent of DARPA new starts actually reach that level of maturity.

The value of the traditional defense acquisition system is its ability to develop technologies into weapon systems and capabilities in a routine, relatively low-risk fashion. This system by intent ensures that advanced systems and technologies move regularly and predictably from concept to operational capabilities. To guarantee that this system operates successfully, at a low rate of failure, the traditional system is governed by rules that are designed to minimize the risk of failure. At the same time, it is designed to be as open and accountable as possible, thereby increasing the number of individuals involved who may be able to slow or stop technological programs.

Policymakers must decide what levels of risk they are willing to accept as they accelerate the development of advanced technologies and systems for the global war on terror. The tradeoff is to either ensure success by using the requirements system to minimize the risk of failure (traditional system), or to reduce the importance of the requirements system's checks and balances in order to maximize technological advances (DARPA).

The U.S. defense acquisition system has balanced these two approaches to developing advanced military technologies. The vast majority of defense technology programs are conducted within the traditional system. On the other hand, while DARPA's budget is roughly $2.0 billion per year, or less than one percent of the total U.S. defense budget, it has spawned a significant number of defense technologies during the last forty years. The critical question for the U.S. leadership is whether the current allocation of resources and emphasis will produce the technological innovation and responsiveness that is necessary to win the war against terrorism.

In the past the United States turned to new organizations to accelerate technological innovation. True technological innovation thrives in an atmosphere in which failure is a serious option. If failure is not an option, our ability to develop high-payoff technologies will be severely constrained. While the traditional system for developing defense technologies minimizes risk, maximizing innovation and technological development requires that we accept the risk of failure.

Recommendation/Action: Policymakers should review the requirements for and the alternative approaches to technological mobilization for the global war on terror. The expeditious development and fielding of new technologies for the war may require that the advantages and disadvantages of the traditional approach and the DARPA approach be carefully considered.