

The Military Industrial Base in an Age of Globalization

Guiding Principles and Recommendations for Congress

Edited by Jack Spencer



© 2005 by The Heritage Foundation
214 Massachusetts Avenue, NE
Washington, DC 20002
202.546.4400
heritage.org

All rights reserved.

Printed in the United States of America.

ISBN: 0-89195-118-0

Cover and book design by Elizabeth Brewer



Table of Contents

Preface	4
Executive Summary	6
Chapter 1: The Changing Military Industrial Base	9
Chapter 2: Challenges and Concerns	15
Chapter 3: Principles for Congress.....	21
Chapter 4: Putting the Principles into Practice	29
Chapter 5: Recommendations for Congress	38
Appendices.....	42
A. Study Methodology	42
B. Acronyms	43
C. Legislation Affecting the U.S. Military Industrial Base	44
D. Project Participants	46
Acknowledgments.....	48



Preface

Edwin J. Feulner, Ph.D.

THE MOST IMPORTANT function of the federal government is to provide for the common defense, as mandated by the U.S. Constitution. Although the world is becoming more connected as globalization accelerates across the full spectrum of human activity, the fact remains that Congress's most important goal must be to advance sound national security policy.

It is within this context of globalization that some of the most pro-national security Members of Congress cannot agree on how to build and sustain—or even define—a healthy, reliable, and adequate military industrial base. Some believe that national security is best served by protecting America's industrial base and maintaining maximum domestic capacity. Others believe that open competition, both domestically and internationally, is the best way to assure that America's men and women in uniform have what they need, when they need it.

No organization is better positioned to bridge the gap between these perspectives than is The Heritage Foundation. We have a rich history of supporting strong national security policy as well as advancing the principles of free markets. For this reason, we believe it is our responsibility to address this issue.

The seemingly arcane nature of the military industrial base relegates most debate over it to the halls of Congress, small offices in the Pentagon, and the boardrooms of America. Yet the decisions made today regarding the military industrial base affect every American and will influence the armed forces for decades to come, just as decisions made over the past 100 years continue to have ramifications as our soldiers, sailors, airmen, and Marines are engaged in today's global war on terrorism. As critical as the military industrial base is to U.S. national security today, it is not a new issue.

The United States was unprepared when it became part of World War I in 1917. The nation entered into

the largest ground war in history with an Army that was short nearly 2 million rifles and an Air Corps that had crashed all six of its operational planes chasing after Pancho Villa. As a result of this laxity, U.S. land forces would depend largely on the industrial bases of our allies to meet their requirements.

The nation found itself similarly unprepared for World War II. America's failure to heed the rise of an expansionist Japan and fascist Europe again resulted in major setbacks early in the war. The Allies, for example, endured an unnecessary loss of life and damaging early defeats in North Africa and the Pacific. It was not until 1943 that, with the sheer weight of an "arsenal of democracy" in full swing, the United States was able to turn the tide of World War II in its favor.

Again in Korea, America was caught off guard. Still basking in the euphoria of victory over the Axis, American forces were again forced into a major conflict woefully unprepared for battle. If not for the courage and determination of the men in the Pusan Perimeter, South Korea might very well have been lost due to our inability to respond quickly to the force and material requirements of the situation.

Fortunately, the onset of the Korean conflict changed the way the government managed the military industrial base. President Harry Truman called for a mobilization that would fulfill the needs of our forces in Korea and deter World War III. Thus, for the next 50 years, a close watch was maintained on the state of the industrial base. This was more an effort to guarantee America's technological superiority as a necessary component of strategic deterrence than actual preparation for conventional war.

With the Cold War over, China and India on the rise, and technology thrusting the world toward greater globalization, the parameters of industry, trade, and national security are changing. Just as a pre-World War I approach was inadequate to get the United States through the first half of the last century, a Cold War approach will not be adequate for today. Now is the time for a new approach to assuring that America's armed forces have access to the goods and services they need.

The same close monitoring constructed in the 20th century must be applied to the future military industrial base to ensure that the U.S. maintains technological superiority across the defense spectrum.

The Heritage Foundation has been clear from the beginning of our project that we will not back down from our commitment to free markets. We also understand that the military "market" is unique and that we could not allow our commitment to free enterprise to cloud our vision of what is right for national security. What we found through our analysis, consultations, and research is that free markets once again best serve America's freedom.

The reality is that the military industrial base on which the United States depends is global. To think that the United States could, or even should, be independent from the world regarding the goods and services of the military sector is absurd. So the central question then became: *What is the best way to assure that America's armed forces have access to whatever they need, whenever they need it, to defend our national security?* This report will help Members of Congress answer that question.

Edwin J. Feulner, Ph.D.

President, The Heritage Foundation

and Former Distinguished Fellow, Mobilization Concepts Development Center,

National Defense University



Executive Summary

THIS STUDY IS intended to help Congress answer a simple but vital question: What kind of legislation is needed to ensure that the U.S. military is supported by an adequate industrial base in the 21st century? Our approach to helping to answer this question is equally simple but essential.

Congress needs a set of guiding principles—a doctrine of goals and values against which any proposed laws can be measured. This study provides those principles and then illustrates the results that can be achieved when they are applied, particularly during periods of national crisis. The results demonstrate that policies that maximize the Pentagon’s capability to operate in accordance with these principles will also make us safer and freer while promoting economic growth.

What Is the Military Industrial Base?

America’s military industrial base is comprised of the private-sector (both privately and publicly owned) and government-owned entities, located in the U.S. and globally, that provide the full array of goods and services required by the armed forces of the United States and select allies.

The military industrial base is essential to national security. The means to forge, deploy, sustain, and maintain fighting forces have been and remain the lifeblood of war. A secure industrial base is a prerequisite for conducting prompt and sustained military operations.

What Is the Problem?

Congress has made many attempts to influence America’s industrial capacity regarding national security matters. These efforts have nearly always interrupted the natural tides of the market and have led to unintended consequences, including inefficient practices, high prices, and limited choices for the military. America’s war-fighting institutions have consistently achieved better results when they have relied on the market to decide where industrial capability should flourish.

Today, the tension between exploiting the advantages of the marketplace to obtain the best equipment at the

best price and Congress's desire to accommodate other priorities has never been greater and is exacerbated by the global character of the 21st century industrial base and a plethora of risks, opportunities, and unknowns.

What We Did

To address this issue, The Heritage Foundation drew on experts in military affairs and industrial practices from government, Congress, academia, and public policy research centers to help develop a framework for guiding Congress in its approach to military industrial base maintenance.

Over the course of a year, through interviews, workshops, and an extensive literature search, we developed a set of principles for Congress. These principles were tested and validated during a series of tabletop exercises, from which we developed a list of recommendations. In each exercise, a team of experts was tasked with addressing a significant national security crisis involving the delivery of goods or services. The principles proved useful both for guiding effective decision making and for deriving insights, which are reflected in our recommendations, about how best to exploit the potential of the global industrial base.

Principles for Congress

The following principles comprise the right framework for maintaining access to the industrial resources necessary for the U.S. armed forces in the 21st century.

PRINCIPLE #1: Excessive central control is inconsistent with national security and should be avoided.

Generally, national security is hampered by excessive legislation and regulation, which hurts the ability of the military industrial base to produce goods and services quickly and efficiently.

PRINCIPLE #2: Policies on the domestic military industrial base should focus on critical technologies, industries, and skills that are not readily available in the global market.

In Congress, debate relating to the military industrial base is caught between free-market trade and protectionism. However, in this policy area, Members of Congress should be concerned primarily with reducing risk for military forces and enhancing the security and defense of the U.S., not protecting local economies or politics.

PRINCIPLE #3: Incentives and open competition in critical technical areas can provide a disproportionate return on investment, encourage the development and furthering of hard science skills, and broaden defense-related industrial capabilities.

The U.S. should identify, develop, and sustain the intellectual capital necessary to support a robust and evolving military industrial base. The military industrial base will lag behind non-defense industrial trends without a cadre of vibrant intellectuals that understands how traditional industrial practices must change to fit 21st century defense requirements.

PRINCIPLE #4: A comprehensive divestiture strategy can generate growth in new technology and manufacturing areas.

The United States invests too many resources in old technology. By moving beyond or divesting from these programs, the Pentagon can reinvest those resources in new, more relevant programs. With the right strategy, the technology base will not get bogged down by yesterday's investments and always be focused on the latest technological trends.

The Military Industrial Base in an Age of Globalization

PRINCIPLE #5: The U.S. should impose research and development costs and manufacturing costs on potential adversaries.

The U.S. should actively look for opportunities to redefine areas of competition through those defense products that industry manufactures domestically. By playing to its strengths, the U.S. can force potential enemies to incur research and development costs as they attempt to counter new or improved U.S. capabilities.

PRINCIPLE #6: Stop paying more for decreasing returns.

Procurement policies should support defense-related manufacturing that can remain profitable *and* competitive. Members of Congress need to view the global defense market in much the same way they view the market for everyday goods and services. If a manufacturer does not produce a defense product that works better at less cost, it should expect the Department of Defense to look for another supplier, whether inside and outside of the U.S.

PRINCIPLE #7: Assured access to the global industrial base is necessary for long-term national security.

Industrial independence should not be a national security objective. Maximizing access to the global industrial base and the wide range of products, services, and materiel available advances national security.

PRINCIPLE #8: Not all trading partners are equal. America's closest allies should be considered reliable trading partners/allies for nearly all defense materials. However, geostrategic military and economic alliances will change, and the U.S. must be prepared to adapt.

In developing the manufacturing, supplier, technology-sharing agreements and alliances, the U.S. should carefully consider how global strategic alliances might change over the next century.

PRINCIPLE #9: Greater supply chain transparency is a prerequisite to understanding industrial base vulnerability. The United States must understand where supplies originate and how they are moved before it can undertake any accurate assessments.

Without greater supply chain transparency, risk and vulnerability factors are invisible to planners. Primary and secondary suppliers are largely understood, but third-, fourth-, fifth-, and sixth-tier suppliers are often not as well understood.

PRINCIPLE #10: The military industrial base requires an amalgam of approaches to ensure both access to vital goods and services and reasonable prices.

Given the diversity of goods and services used by the U.S. armed forces, neither a pure free-market approach nor a protectionist approach is adequate to sustain the long-term health of the military industrial base. Instead, the U.S. should rely largely on markets to determine who provides which military goods and services, except for an extremely limited number of functions that should be sustained domestically.

What Is in the Study?

This study consists of five chapters. Chapter 1 describes the industrial base as it exists today and why and how it has evolved. Chapter 2 summarizes the issues and concerns presented by the modern global industrial base. Chapter 3 proposes objectives and principles for guiding policy decisions. Chapter 4 demonstrates how the principles can be applied in practice. The study concludes with Chapter 5, which provides a set of recommendations for congressional initiatives.

CHAPTER 1

The Changing Military Industrial Base

THIS CHAPTER DESCRIBES the character of the military industrial base and why it exists the way it does today. The term “military industrial base” and its variants are used liberally but are seldom precisely defined. Many in Congress, industry, and the Department of Defense (DOD) use the terms “defense industrial base,” “industrial base,” “military industrial base,” and “defense technology base” interchangeably.

Title 10, Chapter 148, of the U.S. Code, one of the primary statutes governing the U.S. military industrial base, defines “national technology and industrial base” as the persons and organizations that are engaged in research, development, production, or maintenance activities conducted within the United States and Canada.¹ However, this definition is obsolete and inadequate.

A more appropriate definition for the 21st century would define the U.S. military industrial base as *a global enterprise that consists of privately and publicly owned infrastructure and people, located in the U.S. and abroad, that provide the full array of goods and services required by U.S. armed forces and select allies*. It should also be understood that the U.S. domestic industrial base is a narrow sector of the larger global industrial base.

Origins of Today’s U.S. Military Industrial Base

The global military industrial base that exists today reflects the changing nature of the United States’ role as a global and industrial power. From the end of World War II to the end of the Cold War (1947–1991), the military industrial base existed largely as a three-tiered pyramid. At the uppermost tier were the large prime contractors. Subcontractors filled the middle tier, and suppliers of parts, components, and materials formed the base. While the government heavily regulated the top tier, it paid insufficient attention to subcontractors and only marginal attention to suppliers. Policymakers sought to use regulatory mechanisms appropriate to the unique nature and requirements of the Defense Department to achieve a balance between free-market principles and private risk.

The government acted as a monopsony in the defense sector. This limited competition and innovation to the prime contractors. The lack of free-market pricing mechanisms and the extensive use of government-owned,

The Military Industrial Base in an Age of Globalization

government-operated (GOGO) facilities and subsidies imposed an artificial pricing structure. These factors have helped to isolate and weaken the private domestic military industrial base within the growing global defense market. As the possibility that Communism would collapse increased, defense spending declined and ill-defined global threats emerged. The effect on the base was dramatically increased risk and uncertainty.

During the Cold War, the U.S. and its allies faced a known and predictable threat—the Union of Soviet Socialist Republics (USSR). For decades, the USSR, together with other Central and Eastern European nations, provided a socioeconomic framework for stable defense-related manufacturing in the U.S. and Western Europe. During this time, U.S. government and industry invested in physical plants and a workforce that could meet a predictable military demand, in type and quantity, for warfighting systems and materials (e.g., tanks, planes, and ships). Many federal, commercial, and private industries adopted investment practices geared to steady defense spending if not increased growth.

However, the defense manufacturing framework changed with the collapse of the Berlin Wall. In the midst of ongoing downsizing, consolidation, and restructuring, U.S. forces deployed to Panama and Iraq. While victorious, the U.S. was fortunate that these major contingencies did not occur simultaneously with a larger conflict. The United States would likely have had difficulty responding. The result was that strategic mobility of U.S. forces emerged as a chief issue and billions of dollars flowed into domestic aircraft and shipbuilding industries.²

Following Operation Desert Storm, it was almost a race between the Defense Department and industry to see who could resize and restructure the fastest. Catalysts for change included cost, excess manufacturing capacity, and loss of strategic direction. This so-called strategic pause affected government and industry differently. The government used it as an opportunity to refocus tax dollars toward domestic needs. However, the impact on the defense industry was severe. Without revenue from the government, reform and change became matters of survival. It was in the midst of this uncertainty, following scores of base realignments, base closures, and unprecedented industry mergers and layoffs that spanned a decade, that al-Qaeda attacked the United States.

The September 11, 2001, attacks demonstrated to the United States that tangible threats to the nation do exist. The primary near-term threat to the United States was organized global terrorism. Sponsored by nation-states, private groups, and even individuals, terrorism has no easily definable geopolitical borders. However, it is a threat against which new strategies, policies, and even entire institutions and organizations continue to take form. It is toward this threat that much of the military industrial base is turning.

The Military Industrial Base Bureaucracy

Although its history is rich and its roots precede the Civil War, today's domestic military industrial base is largely a product of four things.

First, Presidents have issued executive orders and Congress has enacted statutes to protect U.S. interests.

Second, despite extensive consolidation and restructuring within the industry and government enterprises, the domestic industrial base is largely a product of World War II. Institutions, acquisition processes and regulations, and physical plants were used to manufacture large numbers of expensive weapons systems (e.g., aircraft, ships, and land warfare systems) through multi-year, winner-take-all, cost-plus or fixed-price contracts.

Third, in many sectors, it is a product of technology.

Finally, the current U.S. military industrial base is a product of a growing interdependence between democracies around the world and their defense-related economies.

Executive Orders and Statutes

A review of presidential executive orders³ and defense-related statutes⁴ reveals dozens of rules that affect the U.S. military industrial base. Each exists for one or more of three broad reasons:

- **NATIONAL SECURITY.** This is the most frequently cited justification for a specific rule. The documents may use terms like “defense production,” “critical defense technology,” “defense requirements,” “unique military capabilities,” or “sensitive technology,” but the underlying argument is a need for the U.S. to retain the capability to manufacture defense-related articles domestically so that success in future conflicts will not depend on factors outside of U.S. control.
- **FAIR AND OPEN COMPETITION.** In the past 15 years, dozens of large U.S.-owned companies have consolidated into what many consider to be a consortium of five or six mega defense contractors that have global presence, economic and political influence, and employ thousands of people. In this environment, it is easy to imagine how venture capitalists, small businesses, and backyard inventors would have difficulty competing for defense-related contracts. While legislators have attempted to legislate opportunities for small or disadvantaged organizations, it remains difficult.
- **U.S. ECONOMY AND TRADE.** Intended to guarantee that the U.S. receives its fair share of global business, much of this legislation directly affects the U.S. military industrial base. For example, the Jones Act⁵ was intended to promote a healthy U.S.-flagged commercial fleet and protect that fleet from unfair foreign competition. However, by guaranteeing a continuing role for U.S. oceangoing traffic, the law has arguably had a negative affect on the U.S. shipbuilding industry.

EXECUTIVE ORDERS. Since President Herbert Hoover, U.S. Presidents have signed approximately 13,370 executive orders, and many of these orders continue to affect the U.S. military industrial base. Executive Order 12919, National Defense Industrial Resources Preparedness, signed by President Bill Clinton, is of particular interest because it contains very specific requirements. It does not apply to all aspects of defense or the industrial base, but it does use national security as its framework, and it delegates principal authorities and duties associated with the Defense Production Act of 1950.⁶ Section 102 states:

The United States must have an industrial and technology base capable of meeting national defense requirements, and capable of contributing to the technological superiority of its defense equipment in peacetime and in time of national emergency. The domestic industrial and technological base is the foundation for national defense preparedness. The authorities provided in the Act shall be used to strengthen this base and to ensure it is capable of responding to all threats to the national security of the United States.⁷

The second sentence uses the words “domestic industrial and technological base,” and the third sentence refers back to these words, using the term “this base.” It has been argued that this order justifies the use of protectionist policies to restrict both trade and procurement of certain foreign-made defense items. In other words, if something is critical to U.S. defense, the domestic industrial base must be able to make it.

This order continues to affect the domestic military industrial base and, to some degree, the larger commercial base and economy. Yet specific provisions of the order remain unmet. Making its existence more debatable, important funding issues to guide the military industrial base fall under the jurisdiction of commerce and banking committees, not the House and Senate Armed Services Committees.

STATUTES. The Pentagon must also comply with many domestic source restrictions in addition to Chapter 148 of Title 10. It is virtually impossible—certainly as part of this study—to itemize all of the statutes that affect the domestic military industrial base. Appendix D provides a small sampling. Even a thorough list would be

The Military Industrial Base in an Age of Globalization

incomplete because other related socioeconomic restrictions, such as the Javits–Wagner–O’Day Act, indirectly establish domestic preference requirements. Four examples illustrate these types of restrictions:

- **THE BUY AMERICA ACT**⁸ sets overarching domestic preferences. It is perhaps the most influential domestic preference provision that Congress has enacted. Governing public and defense-related purchases, it has been a centerpiece of the government’s trade policy since 1933. For members of the European Union, it serves as a justification for equally protectionist and subsidized trade policies. In certain instances, it pits the Pentagon’s needs against economic policy. For example, anticipating a potential supply problem, the Army applied for a waiver from this act to allow it to use foreign suppliers if domestic suppliers run short of the ceramic composites necessary to assemble protective vests for its soldiers.⁹
- **THE SMALL BUSINESS ACT**¹⁰ exists to protect the interests of U.S. small businesses and to preserve free competitive U.S. enterprise. Defense industry is often discussed in terms of the industry’s end products (e.g., ships, planes, and tanks). However, these things generally involve a large number of second-, third-, fourth-, fifth-, and sixth-tier (and beyond) suppliers of circuits, diodes, parts, and components, many of which are supplied by smaller enterprises.
- **THE BERRY AMENDMENT**¹¹ sets domestic preferences involving food, clothing, textile products, various components and materials, specialty metals, stainless steel flatware, hand tools, and measuring tools. Small-business representatives present reasons why the domestic base must retain the capability to produce these materials. However, global supply proponents argue best value and the use of global suppliers. They argue that, from food to aircraft, the Department of Defense should purchase its materiel from any global source that can meet quantity and delivery requirements while offering the best quality for the price.
- **CORE LOGISTICS CAPABILITY—DEPOT-LEVEL MAINTENANCE AND REPAIR.**¹² This statute requires the Department of Defense to maintain a core organic industrial capability to provide depot-level maintenance and repair. The law defines core as “capabilities that are necessary to maintain and repair the weapon systems and other military equipment that are identified by the Secretary [of Defense], in consultation with the Chairman of the Joint Chiefs of Staff, as necessary to enable the armed forces to fulfill the strategic and contingency plans.” This law directly links the U.S. domestic manufacturing base’s ability to maintain warfighting equipment to the government’s need for contingency planning.

Industrial-Age Framework

INSTITUTIONS. Institutions are important because they define the rule sets and enforcement policies that surround the defense industry enterprise. For example, the Department of Commerce affects the industrial base by overseeing and enforcing policy on the import and export of defense-related goods and technologies. The Department of Homeland Security (DHS) directly specifies critical domestic technology areas warranting investment and indirectly competes for DOD funding. The degree to which DHS will affect the military industrial base remains a matter of debate.

The federal institution having perhaps the greatest direct effect on the domestic military industrial base is the Department of Defense. As the custodian of defense procurement and acquisition policies, the Office of the Deputy Secretary of Defense (Industrial Policy) within the Office of the Assistant Secretary of Defense for Acquisition, Technology and Logistics (OSD-ATL) writes, reviews, and oversees policies that control all transactions within the Department. Over the past 11 years, three important things have occurred that affect acquisition policy and, ultimately, the military industrial base.

- **SINGLE PROCESS INITIATIVE (SPI).** Implemented in 1994, the SPI exempted defense firms from multiple processes driven by redundant government procurement offices.
- **DEFENSE CONTRACT MANAGEMENT AGENCY (DCMA).** Reporting to the Deputy Undersecretary of Defense for Industrial Policy (DUSD-IP), this agency became responsible for overseeing all DOD defense contracts, which was previously done by each service's contract monitoring office.
- **JOINT DEFENSE CAPABILITIES STUDY (THE ALDRIDGE STUDY).** In harmony with a policy shift to a capabilities-based planning model from a threat-based model, the Secretary of Defense commissioned former Assistant Secretary Pete Aldridge to complete a study on the process of generating defense requirements. This study, completed in December 2003, led to the implementation of a risk-based Joint Capabilities Integration and Development System (JCIDS) that uses top-down defense strategy and concepts to guide acquisition decisions.

ACQUISITION PROCESSES AND REGULATIONS. The Aldridge Study led to the cancellation and reissue of DOD Directives 5000-1 (The Defense Acquisition System); DOD Instruction 5000-2 (Operation of the Defense Acquisition System); and DOD 5000-2R (Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information Systems Acquisition Programs).

The changes that are occurring within the Pentagon as a result of these three initiatives, especially the Aldridge Study, are both unprecedented and necessary. Emerging materiel requirements, to a large degree, reflect a shift away from high-dollar, multi-year fixed-price programs to provide large numbers of expensive weapons. The JCIDS process will lead to lower-cost programs that produce information-centric systems that take advantage of existing systems. However, it will take some time before the emerging joint information materiel requirements process through the system to affect the military industrial base.

PHYSICAL PLANTS. The shipbuilding industry is perhaps the most visible example of a residual industrial-age manufacturing capability. While it can easily be argued that the U.S. has the most capable navy in the world and that no other nation builds warships as well, it can also be argued that U.S. shipyards have fallen far behind in terms of efficient shipbuilding processes. One example concerns welding thick aluminum plate. The Army and Marine Corps find aluminum-hulled catamarans manufactured in Australia to be of great value to their warfighting strategies. However, the U.S. does not manufacture aluminum-hulled ships.

Likewise, U.S. shipbuilders do not use composite materials to manufacture ships. While composite technology is arguably the future of shipbuilding, domestic manufacturing capability deals primarily in steel. From producing vast quantities of carbon fiber or other composites, to developing large-scale manufacturing processes, to forming the materials into sheets and then connecting the sheets, the U.S. shipbuilding industry seems unwilling to make such a dramatic shift in its plant facilities.

A Global Military Industrial Base

The 21st century military industrial base is global. Airbus has grown to compete with Boeing, and the Joint Strike Fighter will be built in multiple nations, including the United Kingdom, Italy, the Netherlands, Turkey, Canada, Denmark, Norway, and Australia. From the selection of a foreign supplier to manufacture the President's helicopter fleet, to leasing Australian catamarans for the Army and Marine Corps, to the potential foreign acquisition of the Future Cargo Aircraft, the Department of Defense continues to look outside of America's borders to meet its defense needs. Commercial firms are increasingly engaging in international trade that takes many forms.

The Military Industrial Base in an Age of Globalization

Today's global defense market dictates that:

- A significant portion of the defense-related materials produced in the U.S. and abroad will be imported and exported;
- These goods compete in a global marketplace for a share of available business based on best value (quality and cost);
- Defense trade will increase among allies and friends, if not in assembled ready-to-use major end items (e.g., ships, planes, satellites, computers, and tanks), then certainly in the lower-tier components of these systems (e.g., flat panel displays, processors, plating, and rolled steel); and
- Given reasonable access to raw materials and transition to modern manufacturing processes, countries such as China and India could develop a distinct advantage over the rest of the world because of sharply lower production costs.

The domestic military industrial base is part of a global trading community. While it is possible to discuss a domestic industrial and technology base, the reality is that the Department of Defense will continue to draw upon a global market for defense-related materials, components, and systems. This raises the difficult question of how to identify and prioritize those domestic defense-related manufacturing capabilities and skills that are necessary to safeguard U.S. national security.

Ammunition

The ammunition industrial base is a unique sector of the larger military industrial base. Instead of a single statute or regulation governing the acquisition of ammunition, the ammunition industrial base is a derivative of regulations that Congress has legislated over time to govern Army arsenals and depots. The result of that legislation is that most of the ammunition used by American warfighters is currently produced by an astonishingly low number of facilities. According to Pentagon estimates, 71 out of 302 critical components needed to manufacture ammunition are currently available only from single-source suppliers.¹³

Advocates of U.S. ammunition manufacturing note that dependence on foreign sources for such critical items as ammunition puts U.S. troops at unacceptable levels of risk. They argue that if the government of a foreign supplier adopted a political position counter to the U.S. position, it could stop shipments of necessary items. Critics of this thinking note that this has never happened before. They see Operation Iraqi Freedom's Joint Direct Attack Munition (JDAM) incident, which involved a Swiss crystal supplier, as an example of how well defense and industry can adapt to retain wartime manufacturing capability.

Overall State of the U.S. Military Industrial Base

A principal measure of the state of the domestic military industrial base might be the success of U.S. military forces. The broad questions to consider are how well U.S. forces perform in combat and how U.S. military forces compare to other countries' military forces. In concept, if the military equipment used by U.S. forces is sufficient to win wars with few casualties, regardless of where the equipment or components are manufactured or assembled, then the military industrial base is fulfilling its national security obligations to the nation.

Along this line of reasoning, there is widespread agreement that U.S. military forces are the best in the world and that U.S. forces will remain dominant throughout the world for the foreseeable future. It follows, therefore, that the U.S. military industrial base is the best in the world and that it will remain the best for some time.

As logical as this argument might be, however, it is flawed. Without proper management and oversight, the United States armed forces have no guarantee of access to the resources they need to conduct their activities.

Challenges and Concerns

THIS CHAPTER SUMMARIZES the priority issues and emerging concerns regarding the military industrial base. Priority issues are problems that require near-term solutions, while concerns represent problems that could arise in the future.

Priority Issues

The United States could be facing real vulnerabilities in its military industrial base. Without resolution, the United States might have significant difficulty sustaining access to certain industrial-base resources necessary to fulfill future military requirements.

LACK OF A CENTRALIZED WARGAMING, NATIONAL EXERCISE, AND CRISIS ACTION PLANNING CAPABILITY. The military industrial base cannot be broken into individual pieces, treated separately, and then recombined. No one entity in the U.S. government is responsible for or able to consider these complex systems—to wargame their interaction and develop outcomes that consider unexpected stress.

This weakness represents a clear and present danger. The negative effects of an attack on or failure of one system—such as a bulk manufacturer of an antigen used by the military industrial base or energy production within the commercial industrial base—could ripple through all systems in unimaginable ways. Rather, the military industrial base must be considered as part of a systems continuum in terms of what is in balance or out of balance. This process of nested systems, or “globalocalization,” helps to label something that is large, complex, and messy.¹⁴ Policymakers must embrace the complexity of the military industrial base before they attempt to affect it. Failure to recognize the interrelationships and complexities can result in unintended and unexpected consequences.

INADEQUATE INDUSTRIAL BASE SURGE CAPACITY. Whether it was the fall of Communism, the 1991 Gulf War, or the September 11 attacks, the United States has repeatedly been caught off guard when confronted with major shifts in the national security environment. To account for this uncertainty, the Pentagon has changed its planning strategy from threat-based to capabilities-based.¹⁵ A capabilities-based approach should allow the U.S. armed forces to respond across a broad array of threats. The Department of Defense

The Military Industrial Base in an Age of Globalization

should therefore have a pair of primary defense-based goals: providing the best equipment for warfighters and cultivating an innovative and competitive global industrial base that can manufacture that equipment.

While these goals support a capabilities-based strategy, uncertainty about the future remains the greatest concern. Any number of crises could evolve into conflict that requires a U.S. military response. Indications are that if this occurs while the U.S. is heavily engaged in Iraq, the domestic military industrial base might be ill prepared to receive, reconstitute, or build in time the new equipment that the U.S. needs. While the Pentagon is acting to mitigate future risk, Congress and the Administration need a mechanism to help them project and test how unforeseen crises might affect the military industrial base right now.

INADEQUATE DEFENSE APPROPRIATIONS AND SPENDING PROCESS. What the Department of Defense buys affects the manufacturing capability and capacity of the domestic military industrial base and the manufacturing skills associated with that base. One of the problems is that a plethora of interests influence the process in Congress and the Pentagon. The armed services fight for their constituent commanders, Members of Congress and the Administration fight for their constituents, and lobbyists argue on behalf of whomever they represent. The result is often investments that are more consistent with the most powerful parochial interests than with the national interest.

Conversely, some programs that do not survive could advance national security but simply do not receive sufficient endorsement to make the cut. For example, the nation continues to lack sufficient ballistic missile defenses, primarily because of the lack of political support throughout the 1990s. Alternatively, the Crusader and Comanche programs are powerful examples of how the Department of Defense (and Congress) can save money or reappropriate it to fund programs that are more relevant to modern defense requirements. Divestiture should be developed as a strategy to fund critical technologies and rapid operational prototyping.

OUTDATED OR INEFFECTIVE MANUFACTURING INCENTIVES. Given similar quality, the defense acquisition process generally rewards manufacturers who offer lower prices. Generally, defense contractors are best able to achieve lower prices by combining efficient operations with large-quantity production runs of large complex systems over time (e.g., 250 aircraft over 10 years).

This incentive structure, as codified in the Federal Acquisition Regulation and Defense Federal Acquisition Regulations Supplement, dates back to the 1980s. Today, even after acquisition reform, several issues related to this incentive structure remain, including:

- **THE SHIFT TO A CAPABILITIES-BASED PLANNING MODEL.** The U.S. faces an amorphous threat that may not require the kind of systems that the military industrial base has become very good at building. For the Department of Defense, the uncertainty means fewer big, fixed-price programs. For the defense industry, the current incentive structure means increased risk and less profit.
- **TECHNOLOGY TURNOVER.** The world is in the midst of an information revolution. Policymakers recognize that information systems and networks can create a warfighting synergy that in many cases offsets the need for mass and kinetic weapons systems in the battlespace. Technology is changing so fast that the idea of 20-year development programs and extended production runs no longer fits. However, incentive structures still favor efficiency over timeliness and innovation.
- **WARS ARE GETTING SHORTER.** While unpredictable, trends indicate that conventional force-on-force wars will start fast and be short in duration. Even the best-equipped forces will be relevant only if they can intervene using the military equipment that is immediately available to them. There will be no time for the military industrial base to reconstitute production capacity in preparation for war. The GOGO and government-owned, contractor-operated (GOCO) concepts are inadequate.

U.S. FOREIGN TRADE REGULATIONS AND SUBSIDIES. Nearly all industrialized countries regulate their trade in one way or another. Some of these trade policies may be unfair. In socialist countries, defining what constitutes a government subsidy can be difficult because private business and the government intermingle and overlap on so many different levels that it is nearly impossible to determine where one ends and the other begins. In a global economy, regulation policies, counter-regulation, and counter-counter-regulation can lead to broad new trade alliances and military alliances that do not favor the United States. A 21st century economic cold war brought on by overregulation could be as dangerous to democracy as the Cold War was.

However, there is a significant difference between regulating the trade in something for reasons of national security and regulating it for economic reasons. For example, most countries would recognize the need to regulate the manufacturing and technology associated with an *Ohio*-class nuclear submarine, but not for a common material, commodity, or system that is available globally from multiple supply sources. Congress needs to make legal distinctions between these different types of technologies and manufacturing capabilities.

DISRUPTIVE TECHNOLOGIES. Nuclear technology is an example of a disruptive technology. For a brief period, the U.S. was its sole proprietor. Detonation of an atomic bomb by the Soviet Union signaled the start of a bipolar arms race that continues to influence global policies today. Other technologies have the potential to become equally disruptive (i.e., militarily significant and able to affect global security policy). Two examples are technologies related to the biological sciences (e.g., the development of target-specific viruses, bacteriological factories, toxins, vaccines, genetic manipulation, biomechatronics, and pharmacology) and advanced computing (e.g., superprocessors, artificial intelligence, command by thought, and code and software development).

The military industrial base has little capability to develop defensive or offensive solutions in these areas. If the U.S. were attacked tomorrow, and if that attack involved an evasive biological weapon that targeted specific populations based on unique aspects of their DNA, both the military and commercial industrial bases would be caught unprepared. The Future Combat System uses approximately 35 million lines of computer code. The F-15A uses about 15,000 lines of code. The F-15E uses about 11 million. As military systems become more complex and require more and more lines of code, current processes of developing code and software will prove inadequate.

ENERGY PRODUCTION. Energy production is a critical manufacturing capability for a 21st century military industrial base. From next-generation batteries and fuel cells, to energy sources to power directed-energy weapons, to reducing or eliminating dependence on fossil fuels, the military industrial base is not postured to develop new sources of energy.

SHIPBUILDING INDUSTRY. A recent Industrial College of the Armed Forces study¹⁶ says that the national shipbuilding industry is in peril, based on production rates over time, industry definition and current condition analysis, an examination of government goals and roles, and a study of current industry issues in the commercial and government shipbuilding sectors. The study concludes that the commercial shipbuilding industry has lost the ability to compete in all but a few niche markets.

As the global shipbuilding industry continues to innovate by exploring the use of composite materials and lightweight metals, the U.S. shipbuilding industry is falling further behind. Both the commercial and government sectors continue to maintain uneconomical overcapacity. However, there is no reason why the U.S. shipbuilding industry, both defense and commercial, cannot be as vibrant and competitive as the U.S. aerospace industry.

SPACE. America's ability to access space should be an asymmetric advantage for decades to come. The problem, however, is that the costs associated with space operations make this technology difficult to exploit

The Military Industrial Base in an Age of Globalization

fully. This is largely because the United States has never committed adequate resources to decreasing the cost to access space. This is unfortunate, given that recent programs, such as the X-33 and Delta Clipper Experimental, held great promise.

This lack of investment provides other nations, such as China, an opportunity to develop space programs that could challenge U.S. access to space in the future. The United States should extend its advantage by assuring a robust space industrial capability.

Issues of Concern

While the United States must obviously address the top issues first, other concerns could present serious problems in the future.

U.S. DEPENDENCE ON FOREIGN SUPPLIERS AND FOREIGN SOURCING. The U.S. must understand where supplies originate and how they are moved before it can undertake any accurate assessments. Without increased supply chain transparency, risk and vulnerability factors are invisible to planners. While primary and secondary suppliers are largely understood, third-, fourth-, fifth-, and sixth-tier suppliers are not. This may not be a huge problem today, as globalization moves ahead, but it could become a significant problem in the future. Now is the time to begin addressing it.

Currently, neither the Department of Defense nor other agencies track the sources of supply for everything that the Pentagon uses down to the raw materials. This is reasonable given the prohibitive cost of doing so. Instead, different elements of the government examine different elements of the supply chain. Congress requires a limited annual report on the foreign content of selected defense systems. The DUSD-IP reviews foreign sourcing studies from other agencies and each year selects and dissects additional systems. In any instance in which the government suspects a problem, it can dig deeper.

The problem is that no one is coordinating these efforts to give the government a comprehensive understanding of the full supply chain. Furthermore, there is ample disagreement among experts about the extent to which the federal government truly has any understanding of the full supply chain. However, one thing is true: More military-related components for systems are being produced overseas, and this could become a serious vulnerability for the United States, so long as the extent of that supply is unknown.

LOSS OF STRATEGIC DEFENSE MANUFACTURING INFRASTRUCTURE, PERSONNEL, AND SKILLS. If a U.S. defense industry cannot compete in the U.S. or global marketplace or restructure itself or merge with a larger industry, it may go out of business. If a similar industry is not available or if the skilled labor force and managers do not relocate, the skills could be lost to the U.S. military industrial base.

Loss of manufacturing capability that involves common articles may be of little consequence to the domestic military industrial base. In other cases, such as the construction of space systems or nuclear reactors, the consequences of losing manufacturing infrastructure and a trained workforce might be significant. Concern should be proportional to the commodity's overall importance to Department of Defense warfighting strategy. The Department of Defense, with help from Congress, does try to approach each domestic manufacturing capability on an individual basis. It understands that concerns and outcomes affecting the textile sector may not apply to the shipbuilding industry or the ammunition sector, and vice versa.

THE SHEER VOLUME OF U.S. TRADE AND DEFENSE ACQUISITION REGULATIONS. It seems unlikely that trade regulations, many of them enacted almost a century ago, are still relevant in a 21st century global free-trade economy. Thirty-five percent to 45 percent of the companies developing technologies that the Pentagon needs to advance the "way ahead" and "way, way ahead" priority-critical technologies identified

during the Defense Industrial Base Capabilities Study have fewer than 100 employees.¹⁷

Small companies promote competition and innovation. The ease with which small U.S. companies can break into the defense industry is therefore important. Although the Department of Defense has worked hard to reduce acquisition-related bureaucracy, the process remains daunting. With trade regulations superimposed on acquisition regulations, the volume of bureaucracy can be overwhelming. An inventor trying to break into the defense industry sector with a compelling new technology may have difficulty finding and understanding applicable governmental restrictions or preferences.

HOSTILE COMPONENTS. Subsystems and components of much of America's military equipment (e.g., software and microelectronics) have become so complex that they cannot be thoroughly tested.¹⁸ As systems become more complex and electronics become smaller, it becomes increasingly possible for a supplier or manufacturer to include malicious undetectable hostile components as part of electronic assemblies. For example, computer keyboards might contain micro keystroke loggers (small devices that record each keystroke) to capture classified data for later retrieval (e.g., upon return of the keyboard to a manufacturer for warranty service), or a circuit board supplied by a foreign manufacturer might contain a micro global positioning system transmitter that could be activated remotely or at a predetermined time.

INSUFFICIENT INTEGRATION OF MILITARY INDUSTRIAL BASE ISSUES INTO MAJOR STRATEGIC REVIEWS. The Pentagon is engrossed in the 2005 Quadrennial Defense Review (QDR), a major, reoccurring strategic review. While it is unclear how it will address military industrial base issues, past reviews have been inadequate in relating national security strategy to industrial concerns. The 2005 QDR, which takes a 20-year outlook, will focus on four issues: defeating terrorist networks, proliferation of weapons of mass destruction, the military's role in homeland defense, and threats, disruptive or conventional, of an emerging power. It seems difficult to undertake a comprehensive analysis of these issues without considering the role of the industrial base in supporting these activities.

NEED FOR INTEROPERABILITY. Nurturing interoperability and sharing technology with U.S. allies is critical. With the exception of direct action in response to an attack on the homeland, U.S. military forces would almost never fight alone. History supports this argument. Therefore, it is in America's explicit interest to encourage varying degrees of interoperability with its allies and potential allies—varying because strategic alliances change over time. Interoperability and the technology transfer behind it is a two-way street. When the U.S. can use a system developed by an ally, it becomes more interoperable with that ally. Interoperability also holds the potential for significant savings in research and development (R&D) and infrastructure.

REDUCED COMPETITION AND INNOVATION. There are a very few instances in which concerns over the certain or potential loss of military technology should prohibit free-market competition. However, lack of competition limits the potential number of solutions and opportunities for innovation. For these reasons, Congress and the executive branch must carefully review existing directives that directly or indirectly limit competition. Even more important, Congress and the Department of Defense must look for opportunities to promote competition and innovation even when the technologies must be controlled.

CHINA'S EFFECT ON THE GLOBAL ECONOMY AND DEFENSE INDUSTRY. Through nationalized ownership, protectionism, and massive subsidies, China's communist government affords its industries an unfair short-term, sector-specific, advantage in the global marketplace. Similarly, China has become very attractive internationally as companies find that they can produce large amounts of products for relatively low cost.

This system may not be sustainable over the long term, but it can present difficult industrial base challenges in the near and mid terms if significant industrial capability leaves the U.S. and its trusted allies and moves to

The Military Industrial Base in an Age of Globalization

China. This has already begun to occur with some computing and electronics capabilities. While this is not a threat at present, it is a potential vulnerability. It would become a serious problem if China, for whatever reason, decided to use its industrial interconnectedness to leverage pressure against the United States to achieve a political outcome.

Globalization and Competition: A Complicated Interaction

As a 1999 Defense Science Board report on globalization and security suggests, globalization offers tremendous benefits to U.S. security that, if embraced by the Department of Defense, can counter the associated risks.¹⁹ Not participating in the global defense marketplace will increase, not decrease, risk to the U.S.

To the Department of Defense, the military industrial base is a global entity. The department studies and reports on problems affecting domestic production, but there is clearly a trend toward favoring the benefits of competition, innovation, and pricing at the expense of reliability, redundancy, and long-term domestic base production capabilities.

The U.S. defense industry, like the U.S. automobile industry, must continually redefine itself to remain globally competitive. To maintain its technological lead, or to recapture the lead in some cases, the defense industry must focus on new processes and capabilities. To fund these new capabilities, evolve, and remain competitive, industry leaders must accept the loss of selected manufacturing capability to overseas competitors. That said, before awarding defense contracts to foreign competitors, the Department of Defense must assess how these awards could affect those defense industries that are unique to the U.S. domestic military industrial base and whether or not the possible consequences of foreign awards are acceptable.

The three greatest concerns or risks involve the percentage of foreign components in U.S. defense systems, the inability of domestic manufacturers to produce critical components, and the potential loss of sensitive defense-related technology. Using the DCMA's Industrial Analysis Center as its principal analytical arm, the Defense Department stays familiar with these issues. It is not practical to expect either DOD or its suppliers to track and report every component through tier six.²⁰ In those few instances when a government office or agency suspects a potential foreign sourcing problem, it is possible to trace specific components and materials to their sources. This is the current rule of thumb, and it seems reasonable for now.

In providing the best systems, U.S. acquirers will look routinely beyond U.S. sources. This practice encourages innovation and provides better products at reduced costs. The question is not whether a given commodity, system, or material is available from a U.S. company on U.S. soil, but whether these products are competitively available through the global marketplace.

With the exception of very limited-source commodities, as long as the Department of Defense can purchase what it needs, the U.S. defense manufacturing base does not need to retain the capability (or labor skills) to manufacture certain items domestically for the purposes of national security. This enables U.S. firms to focus their technology, research, and development forward into new areas.

The challenge for policymakers is to establish an appropriate framework for utilizing a global military industrial base—one that ensures security, promotes free markets, and encourages economic growth.

CHAPTER 3

Principles for Congress

THIS CHAPTER OUTLINES principles for addressing the complex issues and concerns of the global marketplace.

Objectives

To give direction to its work affecting the health of the military industrial base, Congress must begin with a list of reasonable expectations and objectives. Specifically, Congress should:

- **ENSURE ACCESS TO PURCHASE THE BEST MILITARY MATERIEL AND EQUIPMENT.** The term “access to purchase” should be understood as being distinctly different from “capability to manufacture.” Access could be secured through domestic, international, private, or public means.
- **DEVELOP RISK-CONSCIOUS FOREIGN MANUFACTURING DEPENDENCIES.** In a global market with an unequal distribution of resources, the U.S. should expect to develop foreign defense manufacturing dependencies. Congress and the Department of Defense should constantly reassess these risks to guide development of technology and domestic capabilities that minimize these dependencies.
- **CREATE DEFENSE INDUSTRY RESEARCH AND DEVELOPMENT PROFIT CENTERS.** Congress and the Department of Defense should encourage commercial U.S. industries to develop for-profit R&D centers. These sector-based for-profit commercial business enterprises would allow defense industries to reduce investment risk, interpret the Pentagon’s concept-based warfighting needs more broadly, and maximize free thinking and innovation to competitively develop prototype breakthrough technologies and platforms. These profit centers will keep U.S. defense technology ahead of the rest of the world; allow combatant commanders to immediately import, apply, and assess the value of the technologies as part of their mission requirements; and help defense industries to reform in order to address many of the issues they currently face.
- **CULTIVATE MANUFACTURING VITALITY.** A military industrial base that cultivates manufacturing vitality can have great influence over educational institutions. Such a base will create demand among teachers and

The Military Industrial Base in an Age of Globalization

students for opportunities to help expand and profit from the manufacturing sector. By helping to create such a dynamic, Congress can ensure that there will be a skilled workforce.

- **IMPROVE EFFICIENT LOW-VOLUME MANUFACTURING PROCESSES.** A healthy 21st century industrial base should be able to rapidly supply the Department of Defense with prototypes and other technologies in small quantities to facilitate joint warfighting ideas, concepts, capabilities, and doctrine.
- **GENERATE A DOMESTIC BASE THAT CAN SURGE DURING TIMES OF CRISIS.** The domestic industrial base should hedge risk by planning surge capacities. While this may decrease efficiency to some extent, doing so is necessary to meet manufacturing needs that may stem from unconventional, disruptive, and catastrophic attacks on the U.S. and its military forces.
- **SECURE REDUNDANCY OF CRITICAL MANUFACTURING CAPABILITIES.** Like access, a redundancy does not demand that manufacturing capabilities be located in the continental U.S. It is important only that the capability is secure, available, and able to produce when it is needed. Some redundant capabilities may be more secure abroad because of varying vulnerabilities, political circumstances, and industrial capacities.
- **NURTURE NEW AREAS OF MANUFACTURING COMPETITION.** A healthy defense manufacturing base will create new production techniques and processes to ensure competitiveness. As a consequence, other firms will seek further improvements. This will lead ultimately to better products and prices for the Pentagon.
- **ORGANIZE INTEGRATED INTERAGENCY PLANNING AND EXERCISES.** An essential part of a healthy military industrial base is some coordinating mechanism that helps to organize the nation's requirements, vulnerabilities, and excess equipment, infrastructure, and manufacturing capacity. One of the best means to do this is through simulations and exercises. The armed forces have the National Training Center to perform this function from a military perspective. However, there is no national domestic planning and exercise capability from which to identify potential stresses on the domestic industrial base.
- **INCREASE ALLIED MANUFACTURING PARTNERSHIPS.** Sharing infrastructure responsibilities and technology may offer advantages in certain cases. Space exploration and shipbuilding are two examples. Where one nation cannot afford to sustain a national industry, perhaps two or three partner nations can afford to do so. Such relationships would also promote interoperability.
- **BUILD EXPEDITIONARY MANUFACTURING CAPABILITIES.** Greater capability to deploy or make mobile critical manufacturing technologies would greatly increase America's military industrial flexibility. Being able to move the production facilities for such items as energy, critical components, batteries, or munitions would dramatically decrease America's strategic vulnerability during times of conflict.

Principles for Congress

To achieve these objectives, The Heritage Foundation developed the following principles.

PRINCIPLE #1: Excessive central planning is inconsistent with national security and should be avoided.

Generally, national security is hampered by excessive legislation and regulation, which hurt the ability of military industrial base industries to produce goods and services quickly and efficiently.

The effect of nearly a century of "Buy or build American" trade legislation has often been the exact opposite of what legislators intended. A vibrant commercial shipbuilding industry does not exist. Ammunition and textile industries and depots and arsenals also have deep "Buy American" roots. Restrictive legislation and varying levels of government control have often isolated companies from the need to innovate and compete in a global market. Now, faced with reduced government contracts, the number of profitable companies has declined dramatically.

The reasons that industry officials continue to seek subsidies and long-term government contracts offer valuable insight. Some argue that because subsidies have worked in the past, they should now. Others note that the Department of Defense has deep financial pockets and can absorb cost overruns more readily than commercial buyers can or that long-term government contracts guarantee shareholder stability over time. Perhaps others view the alternatives—fundamental change and direct competition—as too difficult and risky, especially when an industry is already in trouble.

Each GOGO and GOCO facility has unique characteristics. Members of Congress should encourage private enterprise to develop for-profit business plans that consider these unique characteristics in the context of a global marketplace. Congress can best help America by helping these industries to establish footholds in the highly competitive global market. Without a plan, overnight rescission of existing legislation would probably make matters worse.

Global competition has the potential to reduce the government’s need to own or landlord facilities while reducing U.S. dependence on limited sources of supply. While government customers may require additional bureaucracy, their purchasing power and relative consistency make them attractive business partners. Opening the supply market to the private sector will be an incentive for existing manufacturers to provide products and for entrepreneurs to invest in new production facilities, thereby giving the Pentagon additional and diverse sources.

PRINCIPLE #2: The domestic military industrial base must focus on critical technologies, industries, and skills that are not readily available in a global market.

The answers to three questions determine whether or not a defense-related item or system is sufficiently important to warrant special handling by the domestic military industrial base. Specifically, does the item or system:

- Perform a unique military function,²¹
- Contain classified or sensitive technology that could be used against the U.S., or
- Enable a unique strategic national or military advantage?

If the answer to any one of these three questions is yes, then promoting special relationships that both ensure access to the item and stimulate academic interest in similar technology is appropriate. The relationships could include global manufacturing sponsorship through allied defense partners, creation or broadening of manufacturing capabilities, government-sponsored national technology advancement goals to achieve “next generation” capabilities, and time-sensitive crisis-related production or stockpiling objectives.

In many instances, answering yes to any one of the three questions leads to an answer of yes to one or both of the remaining questions. This is a good indication that access to the item or system is strategically important and should be safeguarded.

If the answer to all three questions is no, manufacturers and/or suppliers of the items or systems should not receive special preference.

In Congress, debate relating to the military industrial base is caught between free-market trade and protectionism. However, the chief concern should be reducing risk for military forces and enhancing the security and defense of the U.S., not local economies or politics. There is a huge distinction between maintaining or advancing a manufacturing base that can build nuclear-powered ships and space systems and one that can manufacture castings, anchor chains, and gloves.

The Military Industrial Base in an Age of Globalization

PRINCIPLE #3: Incentives and open competition in critical technical areas can provide a disproportionate return on investment, encourage the development and furthering of hard science skills, and broaden defense-related industrial capabilities.

The United States must identify, develop, and sustain the intellectual capital necessary to support a robust and evolving military industrial base. The military industrial base will lag behind non-defense industrial trends without a cadre of vibrant intellectuals who understand how traditional industrial practices must change to fit 21st century defense requirements.

Between 1905 and 1935, hundreds of aviation prizes stimulated the creation of hundreds of diverse aircraft designs. In 2005, the Ansari Foundation used a \$10 million Ansari X Prize to promote commercial space flight technology. Twenty-six teams from seven countries competed for the prize. Without government oversight, infrastructure, or bureaucracy, this single prize leveraged more than \$100 million in private research and development. The Ansari X Prize should serve as a model—for Congress, the Department of Defense, and the Administration—of how to promote and encourage new technology, domestic military industrial base innovation and competition, and the development and retention of hard science skills.

While the Pentagon does invest billions in programs like the X Prize, these efforts are generally bureaucratic, tightly structured, and overregulated. More important, while the Pentagon runs its programs according to the rules of law, the programs somehow do not capture the spirit of competition that fuels a disproportionate return on investment.

For example, over the course of a year, Congress and the Department of Defense could promote 500 critical technology competitions throughout the public sector, academia, and industry. From energy efficiency, to information systems, to space launch, to composite-hulled high-speed commercial ships, a host of backyard inventors, entire school science departments, and entire sectors within industry—both foreign and domestic—might set their sights on winning a prize. Some will do it for nothing more than the recognition. Such an approach would stimulate and leverage private interest and investment. For-profit R&D centers might emerge. As the technologies advance, the U.S. can redefine and extend the global defense (and non-defense) manufacturing space.

PRINCIPLE #4: Develop a comprehensive divestiture strategy to generate growth in new technology and manufacturing areas.

The United States invests too many resources in traditional technology. By moving beyond or divesting from these programs, such as the Crusader artillery system or the Comanche helicopter, the Pentagon can reinvest those resources in more relevant programs.

It is necessary to recognize that the armed forces continue to rely on older, proven systems that remain very effective. Likewise, the Pentagon does not have unlimited resources to pay for replacing the entire force. Nevertheless, this is not an excuse to remain wedded to the status quo. With the right strategy, the United States can get rid of those programs that are least relevant and promote programs that show promise. Such a strategy would ensure that the technology base remains focused on the latest technological trends without getting bogged down by yesterday's investments.

While this is important from a military perspective, it is also critical from a military industrial base perspective. The military industrial base will produce what the Pentagon wants. If the Pentagon wants old technology, the base will produce that. This puts those industries at a disadvantage as they compete with the rest of the world, because it allows them to sustain themselves without developing, much less instituting, the innovations

necessary to remain competitive in the market. This then leads to less choice for the warfighter, the need for special subsidies, and, ultimately, the emergence of new firms, often abroad, that provide better value for the Pentagon.

PRINCIPLE #5: Impose R&D and manufacturing costs on potential adversaries.

The United States is in a unique position that should empower it to define and drive the market in directions that suit it. The United States has not only abundant resources, but also an entrepreneurial spirit that is reflected throughout society. This combination should equate to being at the forefront of whatever technologies it chooses.

This dynamic can also be used for national security purposes. For example, some have suggested that the United States is becoming too dependent on foreign silicon chips. While this may or may not be the case, the answer is not to protect the American silicon chip industry, thereby undermining future computing innovations and allowing the rest of the world to catch up. Instead, the United States should allow this old technology to be produced elsewhere so that its resources will be freed to finance development of the next generation of computing. Adversarial nations will be forced either to lag behind or to devote resources to keeping up with U.S. producers.

This has worked in the past. President Ronald Reagan's arms buildup and Strategic Defense Initiative compelled the Soviet Union to try to maintain parity with U.S. innovation. However, the Soviets overspent, which contributed to the eventual collapse of the Soviet Union. The same should be true today. If a nation is focusing its resources on a specific capability, such as high-speed anti-ship cruise missiles to attack specific American assets such as aircraft carriers, then the U.S. should develop alternative means of sea-based power projection. This will force that potential adversary to divide its limited resources among multiple efforts.

PRINCIPLE #6: Stop paying more for decreasing returns.

Members of Congress need to view the global defense market in much the same way as they view the market for consumer goods. If a manufacturer does not produce a defense product that works better at less cost, they should expect the Department of Defense to look for another supplier—both in and outside of the U.S.

At one time in U.S. history, making muskets was a major industry that involved thousands of people and dozens of plants. This manufacturing capability still exists today, to a limited degree, to meet the demand of collectors and gun enthusiasts. However, U.S. industry has not retained the capability to mass-produce muskets. As technology evolved, arms manufacturers either changed or went out of business.

Similarly, IBM recently sold its personal computer and laptop division to Lenovo, a well-established computer manufacturer in China. In all likelihood, decreasing returns on investment was one of the reasons that IBM chose to divest itself of this manufacturing capability. A decade ago, consumers were willing to spend a few thousand dollars to buy a state-of-the-art brand-name computer. Today, consumers can buy high-quality computers for a few hundred dollars. As the number of global suppliers increases, profitability decreases. At some point, manufacturing risk (e.g., retaining sources of supply, transportation, and employees) outweighs potential profit.

Procurement policies should support defense-related manufacturing that can remain profitable and competitive. If a defense-related industry cannot find new ways to remain competitive, it is not difficult to predict that it will support more restrictive trade legislation—legislation that holds the potential of further isolating the U.S. and its defense manufacturing capabilities from the global market. IBM's example is worth

The Military Industrial Base in an Age of Globalization

noting, U.S. defense manufacturers may need to cede selected manufacturing sectors to foreign countries to free the capital needed to steer their industries in fundamentally new manufacturing directions. For example, the U.S. continues to support a military industrial base that builds steel ships when promising new materials are available to build better ships.²²

PRINCIPLE #7: Assured access to the global industrial base is necessary for long-term national security.

National industrial independence should not be a national security objective. Instead, the objective should be to maximize access to the global industrial base and the wide range of products, services, and materiel available from foreign and domestic companies.

The existing military industrial base must support military activities that could occur tomorrow. The base must provide U.S. warfighters with timely and direct access to the materials and maintenance capabilities necessary to win more conventional untimely, unexpected conflicts. Manufacturing response time should dictate use of foreign suppliers. If foreign suppliers cannot meet the needs of U.S. warfighters, the alternatives are to stockpile and maintain warehouses of equipment and supplies or to retain excess manufacturing capacity.

In today's unpredictable security environment, the United States must be prepared to respond militarily without the luxury of knowing how, when, or where that response will be required. This has significant ramifications for the military industrial base. Obtaining the best equipment too late to make use of it, regardless of its source, is pointless. Timeliness must influence decisions involving excess capacity and foreign sourcing. Unexpected globally changing events, such as two passenger jets crashing into the World Trade Center, can occur in a few minutes. This does not allow time to build things or cache supplies.

Building things and caching supplies assumes that the threat is known. It also involves maintaining manufacturing facilities; trained workers and managers; raw material suppliers; parts, components, and subsystem providers; and readily available transportation (air, ground, and sea) to deliver the things to staging or assembly points and, ultimately, to their destinations.

As a matter of survival, it may be necessary to retain and encourage a very limited number of strategic manufacturing capabilities because during times of crisis, money may not be sufficient to offset time constraints. The problem then becomes one of how to secure these manufacturing resources without relying on failed protectionist measures. One option is for Congress to explore other options for innovating—not retaining—critical manufacturing skills and production capabilities. Promoting for-profit R&D centers and rapid prototyping competitions is one example.

Although the Department of Defense might argue that its shift to capabilities-based warfare has eliminated the need to invest in these kinds of manufacturing and mobilization capabilities, it is certainly not the Pentagon's responsibility to consider how destruction of selected domestic rail facilities, bridges, airports, seaports, and communication nodes might affect the U.S. or global economies, although what happens to each will affect the military industrial base. The effect of focused attacks on specific systems, the overlap of systems, and how these systems will affect other systems is something that national leaders need to study holistically.

No single government agency or entity has the responsibility to wargame and test these kinds of interrelated systems. There is little argument that U.S. military forces are the best in the world. Therefore, it seems likely that threats to American hegemony will not occur where America is strongest—head-to-head with its military forces. While it is physically impossible to protect everything, it is quite possible to establish a proactive national planning and exercise capability that can test suspected weaknesses and inform elected leaders. Congress and the Administration will then be in a better position to make decisions that affect the adequacy of systems, including the domestic military industrial base.

PRINCIPLE #8: Not all trading partners are equal. America’s closest allies should be considered reliable trading partners/allies for nearly all defense materials. Geostrategic military and economic alliances will change, and the U.S. must be prepared to adapt.

China and India will redefine global industrial competition in the 21st century, and that may affect geostrategic alliances. Except perhaps for nuclear technology, most defense-specific items (e.g., weapons systems) and defense-common items (e.g., trucks, fuel, and food) will be open to global competition.

Obviously, the U.S. cannot control which countries build what commodities and the prices at which they sell those commodities. As foreign industries bloom and more sources of supply emerge, prices will go down. Prices for common goods, both commercial and defense-related, will decline first.

The potential effects of Chinese automobile, commercial shipbuilding, and pharmaceutical industries on world markets are considerable, as is China’s potential effect on the global defense industry. A dedicated pursuit of resources and a vast pool of labor can allow China and India to offer world-class defense-related products at lower prices. It is likely that other nations, perhaps even U.S. allies, would buy them. Army berets are a real-world example at the low end of a sliding technology scale. The more common a material, part, component, subsystem, or system is, the easier it will be to procure it from a global source. Berets will become computer chips, computer chips will become computer displays, computer displays will become individual weapons systems, and so forth.

In developing the manufacturing, supplier, technology-sharing agreements and alliances, the U.S. needs to consider carefully how global strategic alliances might change over the next century. Not all U.S. allies are equal, nor do all allies have equal manufacturing capabilities. Not all allies will remain allies. Although the Council on Foreign Investment in the U.S. (CFIUS)²³ can inform the debate, this responsibility is beyond any existing planning and analytical activity.

PRINCIPLE #9: Greater supply chain transparency is a prerequisite to understanding industrial base vulnerability. The United States must understand where supplies originate and how they are moved before it can undertake any accurate assessments.

Without greater supply chain transparency, risk and vulnerability factors are invisible to planners. While primary and secondary suppliers are largely understood, third-, fourth-, fifth-, and sixth-tier suppliers are not.

Defense systems are becoming increasingly complex—composed of exotic materials, diodes, resistors, parts, components, relays, subsystems, systems, assemblies, and software. It remains reasonably easy to inspect or bench test a system’s key components and software to ensure that they function properly. However, it is becoming increasingly difficult to identify components or functions that may be concealed or inactive. While malicious code and software present known and understandable threats, increased miniaturization and increasingly complex systems mean that the possibility of use of hostile components is just beginning.

For example, even if the DOD buys circuit boards from a trusted ally, that ally might do business with another nation the U.S. does not trust as much. The ally, like the U.S., might have trade agreements that allow it to import components from other nations and certify them as having been locally manufactured. Given a multitude of global sources, issues of profitability, and multilevel trade agreements, it is possible that a particular part on the circuit board might be manufactured by a nation that is less aligned with U.S. policy. The nation might tamper with the component in such a way that the tampering remains undetectable to trained technology experts.

Congress must embrace the complexity of the military industrial base. In 2005, “military industrial base” means the global military industrial base unless one specifies the U.S. domestic military industrial base. Therefore,

The Military Industrial Base in an Age of Globalization

when addressing issues related to the military industrial base, lawmakers need to distinguish among (1) U.S.-based and U.S.-owned manufacturing enterprises, (2) U.S. manufacturing enterprises located in foreign countries, (3) foreign enterprises located in the U.S., and (4) foreign enterprises located in foreign countries.

Similarly, national economic policies, foreign alliances, “Buy American” legislation, trade policies, acquisition regulations, and small-business rules affect more than just the targeted entities. Because of this, these policies cannot simply be extracted from their complex systems, “repaired,” and reinserted. Overlap and underlap of complex defense industrial manufacturing and trade policy systems may pose a greater danger to America than foreign sourcing does.

Congress simply does not have the time to consider the complexities of any single system (much less the interaction between systems), and there is no single coordinating government authority for military industrial base issues. These two major factors hamper effective coordination by Congress, the Department of Defense, and the Administration on vital decisions affecting the military industrial base in the age of globalization.

PRINCIPLE #10: The military industrial base requires an amalgam of approaches to ensure access to vital goods and services at reasonable prices.

Too often, legislative efforts to address military industrial base problems assume a certain amount of homogeneity in the industrial base. This leads to calls for protectionist efforts, such as “Buy American” policies, that affect nearly the entire military industrial base. Given the diversity of the goods and services required by the Pentagon and the diversity of the providers of those goods and services, blanket legislation will rarely strengthen the military industrial base. Instead, it will likely have the opposite effect, protecting some sectors in the short term but leading to high costs and less innovation in the long term.

However, it is important to define the current baseline approach to sustaining a healthy military industrial base. There is a spectrum of theoretical approaches, none of which could really be applied comprehensively in the real world. However, they do provide a useful framework to help understand how the military industrial base works.

At one end of this spectrum is a nationalized defense industry. At the other end is a situation in which the Department of Defense buys what it needs exclusively from private contractors on an immediate basis but has no policy of maintaining a competitive, stable defense industry. The current system, by accident or design, is a mixed system, and the problem must be addressed on the basis of whether this is the best mix for meeting national security needs at a reasonable cost.

Putting the Principles into Practice

THIS CHAPTER EXAMINES how a global military industrial base might provide for Defense Department requirements when various hypothetical geostrategic conditions place the domestic base under stress.

Alternative Policy Models

The global military industrial base is a vast, complex enterprise focused on providing U.S. warfighters with “best value.” In navigating the politics, policies, funding issues, and national security concerns involving the military industrial base, this focus is exactly right. While subtle in written policy, it is constant and unrelenting in execution.

However, the success of the military industrial base in achieving this goal is affected by larger macroeconomic currents. Different economic models exert force on the military industrial base at different times and in different ways, thus creating a complicated situation. It is worth remembering that the military industrial base is part of multiple interactive, adaptive, constantly changing systems; therefore, it can only be influenced and is almost impossible to control.

In an age of increasing globalization, seeking to influence the military industrial base in ways that protect or benefit the U.S. can result in unintended consequences and long-term negative effects. However, it may be possible to identify which economic model offers the greatest probability of success in fulfilling the mission of the military industrial base.

NATIONALIZATION. Nationalization, the most extreme form of protectionism, is not a truly viable option for any sector of the military industrial base. Even in critical manufacturing areas that are unique to defense (e.g., the production of stealth material) and in which the solvency of the companies should be of national concern to U.S. policymakers and the Department of Defense, nationalization is almost never a good idea.

It is true that socialist governments that own or significantly underwrite their heavy industries (e.g., steel, automobiles, pharmaceuticals, mining, defense, shipbuilding, and computers) are in a better position to regulate labor rates and overhead costs without regard to profit. For capitalist economies like the U.S., this does

The Military Industrial Base in an Age of Globalization

not present a problem as long as issues of quality or availability outweigh lower prices. But nationalization inherently encourages unfair labor and economic practices. As these socialist economies begin to manufacture high-quality items that are competitively priced and readily available throughout a global marketplace, U.S. manufacturers will be at a disadvantage. Nationalization is not regarded as a viable model to mitigate this situation, but it does explain why arguments for domestic advantage, trade regulation, and government subsidies will increase, not decrease.

CONTROLLED COMPETITION. Artificial barriers that a government uses to affect its economy and free trade are undesirable. However, national security concerns about certain commodities may dictate situations in which controlled competition is the preferred model. While arguments to promote competition and innovation are exactly right, in some cases, the Department of Defense cannot apply the free-market solution to its acquisition or manufacturing interests.

This philosophy should apply equally to CFIUS transactions. The President must use his authority to block the proposed sale of U.S. companies to foreign investors when it is possible that the transfer of technology might be used against the United States, and Congress should assist the President as needed. However, as the need to protect technology rises, the Department of Defense should restrict competition to a list of trusted allies. In certain cases, the need to protect technology may be so sensitive that national security concerns compel the Department of Defense to restrict competition to a handful of U.S.-owned, U.S.-based companies. This is not the norm, but it might be necessary on occasion.

TARGETED PROTECTIONISM. Taking targeted protectionism to an extreme, the U.S. government could require that its domestic industrial base be capable of supplying all of DOD's warfighting needs. Implementing and maintaining this policy would require massive regulation—legislation that would make today's Buy American Act, Berry Amendment, and other trade legislation pale by comparison. It would almost certainly require government subsidies to sustain companies that might not otherwise be solvent.

If this policy were enacted, the generally free-market capitalist economy that exists would become essentially socialist. Foreign manufacturers and their governments would almost certainly consider U.S. trade policies to be isolationist. If alternative sources of supply are available, they would likely respond by reducing, if not curtailing, U.S. imports. The U.S. might retaliate against these policies.

The Jones Act exemplifies the factor of unintended consequences. Congress enacted it in 1920 to protect the U.S. shipbuilding industry and U.S. shipbuilding skills, but it has failed in this regard. The reasons stem from decades of unintended consequences that began in 1920, capped by labor and material costs that have priced the U.S. shipbuilding industry out of the global market. The Jones Act exemplifies much of the negative impact of protective trade legislation.

Subsidies and trade regulations offer temporary solutions, may harm industry competitiveness, and will not guarantee the best product and value for the military. They cannot be used effectively to level the "playing field" when it includes countries with such different political systems and trading philosophies. Subsidies and trade regulations may offer an industry a near-term advantage, but if the industry fails to innovate and remain globally competitive, that advantage will be fleeting.

As regulatory advantages in particular defense industries fade, the temptation too often is to blame the government for not protecting the industry and the workers. The frustration should be with the industry leaders who allowed the industry and the industry's product to become less competitive in a global marketplace.

Policymakers should ask why the domestic industrial base is shrinking and what actions might spur U.S. manufacturing without increasing trade regulation and subsidies. The answer to the first question is simple:

Competition and profit are shrinking the domestic industrial base. If left to themselves, U.S. firms will do whatever they can do to remain profitable. If that means moving offshore to take advantage of cheaper labor, tax advantages, or lower overhead costs, they will do so.

The answer to the second question is not as simple. Attempting to balance against offshore “advantages” through subsidies or regulation will not work in the long run. Economics aside, this would not make sense from a national security perspective. International trade and regulatory regimes are not changing in a vacuum. Alliance systems and national security interests for many nations are also going through a period of transition. Therefore, the policies that the U.S. adopts to protect itself in the current environment could create unparalleled risks to American security in the future.

FREE-MARKET APPROACHES. There are non-protectionist actions that the industry and the government can take to promote new areas of manufacturing in the United States. Regardless of the product, each industry is responsible for maintaining its global competitiveness. Consumers will continue to measure the value of products—including defense products—in terms of price, quality, and availability. If an item is competitively priced and exceptionally well-built but not available when needed, consumers will turn to other sources of supply.

For U.S. domestic defense-related industries to remain solvent, they must produce high-quality products on time that are competitively priced in a global defense market. The shipbuilding industry itself, one of the hardest hit in recent years, recognizes that the solution lies in the very things most threatening to the industry: innovation, global competition, and the principles associated with free-market trade.

How should defense industries be motivated to meet the Defense Department’s emerging needs? Today’s manufacturing focus should not be to make a few massive systems repeatedly, but rather to make many small different systems. Many of the current defense industry incentives are outdated or backwards. Market competition and attrition are forcing the Department of Defense to rely more and more on a very limited number of private-sector suppliers to fulfill some of its most essential needs. Free-market incentives can be more powerful and effective than any amount of regulation. The challenge is to identify and implement the incentives and advertise their availability to a wide audience.

There are benefits to be gained in both directions by the free-market economic model, especially as applied to U.S. national defense interests. Foreign investment is growing in the U.S. aerospace industries, far outpacing other investment in the U.S. This investment finances the construction of new facilities, creates jobs, and generates tax revenues.²⁴ In general, the free market:

- **BENEFITS CONSUMERS BY GIVING GREATER CHOICES AT LOWER PRICES.** It is in the best interest of the Department of Defense to have access to the widest range of products and services necessary and to be able to obtain them at the most competitive prices.
- **BENEFITS PRODUCERS BY ENCOURAGING MORE COMPETITIVE ACCESS TO LESS EXPENSIVE COMPONENTS.** This allows producers to be competitive, productive, and efficient and to provide quality products at reasonable prices.
- **ENCOURAGES INNOVATION THROUGH GLOBAL COMPETITION.** The Defense Department’s transformation vision depends largely on acquiring innovative new technology and using it in innovative ways.
- **ADVANCES AMERICA’S INTERESTS ABROAD** by increasing the opportunities for people in other countries to become more productive, raising their quality of life and increasing the incentives for peace.

The Military Industrial Base in an Age of Globalization

A truly free market does not exist at this time with all trading partners that the U.S. military industrial base might need to engage. On certain levels, embracing an entirely free-market approach remains theoretical, not practical. Some military items have specific and sensitive national security considerations for which an entirely free-market approach might not be suitable or appropriate.

In the absence of exigent circumstances, the U.S. government should not intervene through subsidy programs, policy, legislation, or any other means to artificially value U.S. defense products if better products are available for less cost in the global marketplace. A free-market approach, although no panacea, offers the highest probability of success for obtaining the “best value” so earnestly sought by the Department of Defense.

The Heritage Foundation conducted a series of simulations to help shed further light on how these alternative policy models affect the military industrial base.

Scenario Design

For the scenarios, members of the Heritage Foundation study team selected two defense commodities (batteries for precision-guided munitions and small arms ammunition) and two defense systems (submarines and satellites). They then created a strategic scenario around each commodity and system to identify, isolate, and test stress points involving the industrial base.

Each simulation involved a team of 10 to 12 subject-matter experts, which was divided into two subgroups: acquirers and providers. Each team was assigned to resolve the industrial base dilemma presented by their respective scenario, with the acquirer subgroup defining an acceptable resolution from the government perspective and the provider subgroup focusing on how to achieve it. The four simulations took two days, with the two simulations run simultaneously on each day.

In debating the four scenarios, the experts referred to the military industrial principles outlined in Chapter 3. The case studies provided an opportunity for the acquirer/provider teams to evaluate these principles as they debated potential solution sets.

SCENARIO #1: Submarines

U.S. intelligence indicates that a large Pacific nation has been secretly and steadily building up its submarine fleet over the past 15 years. During that same period, the United States has allowed its submarine force to decrease to 40 boats. Due to declining shipbuilding rates, the United States was forced to close one of its nuclear-licensed shipyards, leaving it with only one. Due to rapidly increasing tensions, policymakers decide they must roughly double the U.S. submersible force structure over the next decade to counter the expanding global submarine threat.

SCENARIO #2: Batteries for Precision-Guided Munitions

The United States is involved in major conflicts in two distant regions. While the intensity of the smaller conflict has decreased, victory continues to elude the United States as periods of increased violence and general instability dictate continued U.S. presence. After four months, the larger regional conflict continues to progress at medium to high intensity with no one able to predict an end to hostilities.

Meanwhile, a hostile agent has successfully sabotaged one of only two critical production plants that supply the batteries for U.S. precision-guided munitions. That plant is now producing nothing and will take a year to return to full production. The U.S. must find an alternative supplier for this critical component before it depletes its three months of reserves.

SCENARIO #3: Satellites

Increased access to commercial space technology has led to the proliferation of anti-satellite capabilities. One country is taking full advantage of this revolution in space technology and has been growing increasingly hostile toward the United States. It has come to the attention of America's top decision makers that this nation is far more capable than previously believed. This burgeoning capability creates major vulnerability for the United States, which has not invested adequately in either offensive or defensive space assets.

America's top decision makers determine that within five years, the nation must be prepared both to replace any two critical satellites within a week to ensure access to the most critical one-third of its space capabilities and to replace another one-third within two months of losing access. These requirements can all be fulfilled on a capabilities basis rather than on a one-for-one basis.

SCENARIO #4: Small Caliber Ammunition

American and coalition forces have successfully defeated major aggression in two regions of conflict and are now engaged in massive post-conflict operations in both theaters and an extensive humanitarian/security operation in a third. Both post-conflict operations have been challenged with organized guerrilla opposition: one very significant, one less so. Due to ongoing hostilities, Lake City ammunition plant had instituted a series of upgrades that allowed it to produce 1.5 billion small caliber rounds per year (in 2004, it produced 1.2 billion).

Because of heavy demands, the facility was operating at maximum surge capacity of 2 billion per year when terrorist strikes successfully destroyed a significant portion of the plant. The facility will be unable to produce any ammunition for at least three months and will be only at half production for the first six months after partial production is restored. American ammunition reserves are already very low from the war and are not an option. How can the United States restore access to small caliber ammunition production at production rates roughly equivalent to 2 billion rounds per year until the plant is once again operating at full capacity?

Analysis and Insights

OBSERVATION #1: Preference for Global Solutions

DESCRIPTION. In each scenario, the acquirer/provider teams turned to a global defense market and U.S. allies in their efforts to resolve the industrial base problems. The degree to which foreign sources and allies could help varied.

ANALYSIS. Much as the United Kingdom, France, and the Soviet Union turned to the U.S. for manufacturing capability and capacity during World War II, it is logical to expect the U.S. teams to look abroad for help. The global defense market provided access to industrial capacity that was simply not available in the U.S. If the U.S. had adopted more isolationist policies or had maintained more restrictive trade policies, it is possible that access to global defense providers might have been more limited. Therefore, it can be argued that cultivating free-market defense trade may help to mitigate risk in times of national crisis.

OBSERVATION #2: Technology Considerations

DESCRIPTION. The ability of foreign nations and suppliers to assist the U.S. defense industry depended on the classification of the technology involved. For example, the submarine acquirer/provider team clearly preferred to

The Military Industrial Base in an Age of Globalization

add high-tech U.S. nuclear submarines to the U.S. fleet. However, the industrial capacity was not available.

ANALYSIS. During times of crisis, the amount of support available from the global defense market will be limited in those technology areas in which the U.S. maintains a unique advantage (e.g., nuclear submarines, satellites, and space launch). In some cases, like nuclear submarines, there may be no global options. If defense strategists and policymakers believe that a given technology will continue to be critical to U.S. national security for the next several decades, then the U.S. must develop some options beyond simply exposing its most sensitive technologies to the free market or subsidizing those technologies to sustain them.

Some options might be to share selected classified technologies with selected allies but require them to contribute to U.S. infrastructure to access its production capacity. Collective production requirements might be sufficient to resolve industry profitability issues while allowing multiple countries to reduce their defense costs.

Similarly, as an alternative to long-term contracts, the U.S. might consider options to make R&D centers that involve critical manufacturing technologies into industry profit centers. Instead of defense contracts that require industry to mass reproduce things over time, the U.S. could sign multiple smaller contracts that require industry to demonstrate stepped innovation plateaus in key technology areas.

OBSERVATION #3: Strategic Planning Failure

DESCRIPTION. Although the Heritage Foundation team instructed the acquirer/provider teams not to fight the strategic scenarios, multiple teams expressed frustration that the U.S. did not anticipate the strategic manufacturing crises and act to prevent them.

ANALYSIS. The U.S. military industrial base is part of a complex, open hierarchical system of systems. Each system has a guiding body and support structure. For example, the DUSD-IP administers the U.S. military industrial base for the Secretary of Defense. Its support structure includes direct access and input to all components of OSD-ATL's vast structure to include the acquisition and R&D communities. The Departments of Homeland Security, Health and Human Services, Commerce, and Transportation and the U.S. Trade Representative, among others, also administer systems. Although the actors and roles differ, they have similar support structures.

Systems interact daily through formal (e.g., CFIUS) and informal (routine staffing and coordination) mechanisms. However, when systems interact, each represents its own specific concerns and goals. What remains at issue is exploring how the systems might react and perform collectively in time of national crisis. What is missing is a national level planning, exercise, and assessment tool that can test, forecast, and act to avert crises such as those the acquirer/provider teams experienced during the case studies.

OBSERVATION #4: Facilities Management

DESCRIPTION. The small arms ammunition crisis involved a GOGO industrial facility. During the case study debriefing, the teams debated whether the destruction of the plant actually presented an opportunity to convert it to a commercially owned and operated facility. The teams learned that the Canadian government had privatized its GOGO small arms ammunition facility. After upgrading or purchasing new plant equipment and diversifying, the plant began selling ammunition to global consumers. In a short time, profitability at the Canadian plant had improved to the point that it was able to reduce the price of its small arms ammunition, thereby benefiting Canadian defense.

ANALYSIS. When a government owns a defense-related manufacturing facility and guarantees the income

of its employees (GOGO), the employees have no incentive to consider its global competition. The plant will continue to receive appropriated funding as long as it and its employees produce articles that meet government specifications. In the same way, when a government subsidizes or guarantees either the existence of a manufacturing facility and the income of its workers (GOGO) or just the income of its workers (GOCO), the Department of Defense has no incentive to make further investments in the plant's facility or people. The plant continues to receive funding as long as it and its employees produce articles that meet the government's specifications.

Since free-market competition promotes innovation, discovery, and lower prices, the arguments against GOGO and GOCO facilities seem almost intuitive. Yet the U.S. Army currently owns and operates three arsenals and 14 depots and plants. Six of the depots and plants produce only ammunition. It owns an additional 11 ammunition manufacturing depots and plants and one arsenal that are operated by contractors.²⁵ The Navy owns and operates four shipyards.²⁶

Although no single solution can be applied equally to all GOGO/GOCO problems, the Canadian small arms manufacturing example provides useful insight. As the ongoing base realignment and closure (BRAC) process considers the future of U.S. military bases, it should also examine U.S. defense manufacturing facilities, U.S. access to global manufacturing capacity (in times of peace and crisis), and the possible benefits to U.S. defense manufacturers that could come from continued privatization.

OBSERVATION #5: Inadequacy of Money Alone

DESCRIPTION. Acquirer/provider teams noted that in times of national crisis, funding will not be the limiting factor in meeting the time constraints presented by a strategic requirement. Discussions of cost largely became moot. Regardless of how the U.S. was threatened, the teams concluded that U.S. lawmakers would pass whatever funding legislation might be needed to resolve dire threats to U.S. national security.

ANALYSIS. There is little argument that the U.S. military forces are the most capable in the world. However, the ability of these forces to respond to crises exists on a sliding scale. At one extreme, all forces are at their home stations. None would be engaged in conflict, and their equipment would be predominantly new or refurbished. These forces would have the ability to self deploy or access the mobility assets necessary to deliver and sustain them anywhere on the planet.

At the other extreme, all forces are globally engaged in combat or safeguarding the homeland. They have been using their equipment for a long time under rugged conditions, and the wear and tear translates into increased maintenance, decreased availability, and reduced effectiveness. Mobility assets to deploy, reposition, and sustain forces remain engaged.

Given a dire threat to U.S. national security, it can be argued that the forces stationed at home are in better shape to respond to an unexpected global crisis. It could likewise be argued that forces already engaged are less prepared to respond to a new threat. To some degree, this is how some U.S. adversaries view U.S. military might. They see no need to face U.S. forces directly. One or two more global crises and, regardless of how much money the U.S. applies to mobilize its industrial base, there will not be sufficient time to prevent the adversary from achieving some or all of its short-term goals.

OBSERVATION #6: Maintaining Excess Manufacturing Capacity

DESCRIPTION. The teams tasked with acquiring submarines were thankful that the problem occurred while the U.S. shipbuilding industry had excess shipbuilding infrastructure. Although U.S. law requires the Department

The Military Industrial Base in an Age of Globalization

of Defense to build only nuclear submarines, the teams believed that Congress would waive this requirement. In addition to maximizing the capacity of nuclear-capable yards in the U.S., the teams planned to purchase diesel submarines on the global market and import diesel submarine “kits” to build the ships domestically in non–nuclear-capable yards.

ANALYSIS. Allowing excess or redundant manufacturing capability to exist in the U.S. is a viable risk-hedging strategy. However, it is quite inefficient. Rather than mothballing facilities for future use, the shipbuilding industry would certainly prefer to sign long-term contracts involving limited production—to keep the lines “hot.” This is certainly an option, but there are others.

OBSERVATION #7: Maintaining Defense Manufacturing Skills

DESCRIPTION. The acquirer/provider teams that worked the submarine scenario recognized that the capability to build submarines consists of manufacturing facilities and skilled workers. The teams that debated the satellite scenario made the same observation. Although additional space launch facilities might be accessed or built to allow more rapid deployment of satellites, finding a sufficient number of people to operate the facilities might be a problem.

ANALYSIS. Even if the U.S. purchases and retains shipyards or space launch facilities (e.g., mothball facilities) to hedge strategic risk, the people skills associated with these facilities remain perishable. Skilled workers and managers cannot be trained and qualified overnight, especially when the defense industry involves highly technical or dangerous systems. In the event of a national crisis requiring additional U.S. manufacturing capacity, it is entirely possible that new facilities might be opened before the people necessary to operate them could be found.

Construction of nuclear submarines and satellites, however, offers somewhat unique examples. The need for U.S. warships to traverse the oceans underwater is clearly a strategic capability and necessary to the physical security of the U.S. Although technology may change its exact form, the need will continue for the foreseeable future. Likewise, assured access to space continues to grow in strategic importance. Submarines and satellites exemplify skills that U.S. policymakers should somehow distinguish and cultivate.

Proponents of protectionism and restrictive trade would prefer that policymakers cast a much broader “critical skills” net. For them, common items that can be obtained from any number of global manufacturing sources are critical to U.S. national security, not because the items are critical but because the capability (infrastructure and skills) to make these goods in the U.S. is critical. Foundries and tool and die manufacturers are two examples in vogue. However, there is no shortage of either in the global marketplace. In a system-of-systems world, linking U.S. manufacturing capabilities to national security makes resolving issues that involve relatively common commodities even more difficult.

The manufacturing skills problem is real, and the challenge is twofold. Policymakers must distinguish between manufacturing capabilities and technologies that have current and future strategic value to the U.S. and those that have political value. In some cases, but not many, they may be the same. To retain and advance the skills associated with critical domestic manufacturing capabilities, the U.S. must foster an environment and offer incentives that will promote education, R&D, and profit-based competitive manufacturing opportunities in these areas. Free-market alternatives to promote competition and innovation should guide the solutions.

OBSERVATION #8: Global Supply Lines: A Strategic Vulnerability

DESCRIPTION. Each solution proposed by the acquirer/provider teams involved a global supplier and assumed

that shipments from abroad would arrive intact and on time.

ANALYSIS. The U.S. can act to protect its manufacturing facilities and transportation systems, but it cannot guarantee the security of overseas suppliers or transportation to the U.S. Anti-U.S. entities may find it easier to interdict supplies bound for the U.S. at their foreign source or en route to the U.S. In the end, the effect would be the same.

While this possibility must be recognized, it is not an adequate reason to reject globalization. Like other vulnerabilities associated with international diversification of defense goods, before appropriate action can take place, the United States must have a more comprehensive understanding of where products originate and how they get to their destinations.

These observations and analyses, along with the problems identified earlier, serve as the basis of the recommendations described in the next chapter.

Recommendations for Congress

AMERICA'S ARMED FORCES are in the midst of an extraordinary period of transformation and operational commitment. A secure, robust, and responsive industrial base, including associated technological and intellectual resources, is central to the success of ongoing and future military operations and, perhaps more important, to the national security of this country and our democratic way of life. Recent changes in the industrial environment (e.g., globalization of the industrial base, the rising cost of military equipment, and fears of proliferating military technology) have led to calls for major changes in America's approach to military industrial base maintenance.

Recommendations

The arsenal of democracy is not a given. It requires constant monitoring, especially in times of systemic change and great danger. While the military industrial base is currently in relatively good health, this could change rapidly. Based on the principles laid out by the study, the problems it identifies, and the observations and analysis of the simulations, Congress should:

- **REINSTATE THE NATIONAL SECURITY RESOURCES BOARD (NSRB).** The NSRB was created by the National Security Act of 1947 and included all department secretaries with responsibility for maintaining a strong economy and the industrial base to support that economy. It was the coequal of the National Security Council (NSC), which developed the national security strategy. The new NSRB should focus on the armed forces and the military industrial base to support their activities. Together, the NSC and NSRB could produce a grand strategy by matching ends and means.
- **DEVELOP A SYSTEM TO MONITOR THE MILITARY INDUSTRIAL BASE.** There are agencies throughout the federal government that monitor different elements of the military industrial base. The problem is that no organization monitors how *all* parts of the military industrial base work together. The nation requires a means for continually monitoring the military industrial base and the critical technologies that U.S. forces require.

This system must be comprehensive and include interagency cooperation and must have the bureaucratic clout to ensure that its recommendations are followed.

- **REINSTATE A DYNAMIC MOBILIZATION PLANNING SYSTEM THAT ALLOWS SURGE PRODUCTION AND STOCKPILING IN RESPONSE TO WARNING.** When a national emergency is declared, it is too late to make up shortages in time to prevent serious losses. Simply stockpiling goods or maintaining excess capacity is often not the correct approach. Unneeded goods often accumulate and become costly to maintain, while demand for other goods that are not stockpiled may spike unpredictably. Instead, the United States should develop a dynamic stockpiling and excess capacity system whereby U.S. surge capacity is managed nearly constantly.
- **PURSUE PARTICIPATION OF ALLIES.** The United States should seek binding agreements with U.S. allies that include surge production arrangements and provisions for mutual assistance in the event of major attacks on the homeland. This could be accomplished by modifying existing treaties or by negotiating separate agreements. This will provide one more protective layer to guarantee that the U.S. armed forces have the resources that they require. The reality is that the United States depends on a credible system of alliances to advance its national security interests and that globalization of the industrial base necessitates that action be taken to protect those vital interests within this alliance structure.
- **INCREASE SUPPLY CHAIN TRANSPARENCY.** The United States can achieve great advantage by embracing the global industrial base. No other nation can attract as many of the world's brightest minds, and only the United States has the resources to scour the globe for the best equipment. Furthermore, globalization will lead to greater competition, which is very valuable in an era of domestic defense firm consolidation.

However, while globalization might provide a great opportunity for the U.S., it could also generate significant vulnerability. One of the realities of globalization is that a higher percentage of the components that make up a U.S. system will be produced abroad and that a higher percentage of them could be produced in nations that are potential adversaries. There are two significant risk factors associated with this environment. First, a critical component could be withheld from the United States for political reasons during times of conflict. More seriously, a hostile nation could use this dependence as an asymmetric vulnerability to attack.

One way to mitigate this risk is to develop a more comprehensive understanding of the supply chain. By understanding the supply chain, the United States can prepare to take corrective action if access to critical resources is threatened. However, this will make it increasingly important to understand the supply chain at all levels, including lower tiers, for some systems.
- **EMBRACE THE CONCEPT OF A GLOBAL INDUSTRIAL BASE.** Globalization of the military industrial base is often considered a vulnerability, but this is true only to the extent that the United States rejects the opportunities that the process provides. Like any change, those that embrace it and learn to use it to their advantage are the ones that rise to the top. Too often, status quo powers remain wedded to the past, and this often leads to their downfall. Current laws, regulations, and statutes embrace the idea that the domestic industrial base should be preeminent. By changing its focus from protecting the domestic industrial base to ensuring access to the global industrial base, the United States will secure its future strength from an industrial base perspective.
- **RATIONALIZE MILITARY INDUSTRIAL BASE REGULATION.** Over a century's worth of legislation governs the military industrial base. Much of it was put in place to regulate an industrial environment that no longer exists. Applying 20th century rules to a 21st century world has led to unintended consequences, perpetuating unjustifiable protections for specific sectors at the expense of others and denying the military

The Military Industrial Base in an Age of Globalization

and industry the freedom to operate efficiently.

This heavy regulatory burden often makes it difficult for smaller firms to bid on Department of Defense contracts. It stifles innovation, leads to rising costs, and reduces DOD access to many of the nation's top technology firms. The system is overly permissive toward outdated products and inefficient production processes, leaving some industries unable to compete in the international marketplace. This has created a vicious circle in which these industries demand special treatment under the rubric of national security so that they can perpetuate their old ways of business. Liberating these firms from protectionism and allowing them to compete freely is the best way to ensure their future health. If they cannot compete in a deregulated environment, then new firms will emerge to fill the market demand.

That said, the defense industry does require greater regulation than non-defense endeavors. However, this regulation should advance national security, not protect parochial interests. Congress should lead a comprehensive effort to review the defense industry regulatory regime with the intent of developing a new regime that is consistent with 21st century realities.

- **RECOGNIZE THE UTILITY OF LOW PRODUCTION RATES.** Because budgets seem always to be tight and programs are always in question, there is great incentive to achieve maximum efficiency. This often requires large production runs of major platforms. The problem with this approach is that it is impossible to predict exactly what kinds of forces the United States will require in the future. Huge investments of time, dollars, and credibility in specific platforms make ending them difficult, even if their utility has diminished. These outdated platforms then take resources away from newer ones that could be better for the nation.

Therefore, there is great value in being able to produce a diverse arsenal of platforms and capabilities that will allow the United States to move in one direction or the other once the future becomes clearer. This may be less efficient in the near term, but it would be far more efficient in the long term and better for national security. Furthermore, it would inject some competition between platforms and their advocates. Congress could facilitate this concept by creating oversight mechanisms that would reflect new efficiency metrics. Industry would then respond by developing new production processes that allow it to produce smaller runs more efficiently.

Endnotes

1. 10 U.S. Code, Chapter 148, Subchapter 1, Section 2500 (definitions).
2. Primary investments included C-17 Globemaster aircraft and three classes of Large Medium-Speed Roll-on/Roll-off (LMSR) ships.
3. For the text of executive orders, see U.S. National Archives and Records Administration, “Executive Orders Disposition Tables January 8, 1937–March 14, 2005,” at www.archives.gov/federal_register/executive_orders/disposition_tables.html (May 27, 2005).
4. For a sampling of current statutes, see Appendix C.
5. Merchant Marine Act of 1920, Section 27 (46 U.S. Code 82. 83; 19 CFR 4.80 and 4.80b). Signed into law by President Woodrow Wilson in 1917, it requires that cargo moving between U.S. ports must be carried in vessels that are built in the United States and at least 75 percent owned by American citizens or corporations.
6. 50 U.S. Code, Appendix 2061, *et seq.*
7. William J. Clinton, “National Defense Industrial Resources Preparedness,” Executive Order 12919, Part I, Section 102, June 3, 1994, at www.archives.gov/federal_register/executive_orders/pdf/12919.pdf (June 23, 2005).
8. 41 U.S. Code, Chapter 1, Section 10a–d.
9. “Force Protection Money Flows Following Supplemental Bills Passage,” *Inside the Army*, Vol. 16, No. 35 (August 30, 2004).
10. Public Law 85–536, as amended April 5, 2004.
11. 10 U.S. Code, Chapter 148, Section 2533(a).
12. 10 U.S. Code, Chapter 146, Section 2464.
13. *FY 2004 National Defense Authorization Act*, Report No. S.R. 108–46, Committee on Armed Services, U.S. Senate, May 13, 2003, p. 124, at www.dodmantech.com/funding/fy04/SASC-Rpt108-46.pdf (June 28, 2005).
14. Sheila Ronis, Ph.D., “Options for Maintaining a Robust, Adequate, and Efficient Industrial Base: A Systems Approach,” presentation at The Heritage Foundation, February 23, 2005.
15. Threat-based planning focuses on relatively fixed, predictable threats by states or other actors; historically, this was expressed in the Two-MTW (major theater war) construct. Capabilities-based planning is designed to be more flexible and responsive in a changed global security environment. It focuses on developing the full spectrum of capabilities that the United States requires to maintain the military advantage against new and different threats and adversaries.
16. National Defense University, *Report of the Shipbuilding Industry Study Seminar of the Industrial College of the Armed Forces*, February 2004, at www.ndu.edu/ica/industry/IS2004/2004%20Shipbuilding.rtf (June 23, 2005).
17. Suzanne Patrick, “Strengthening the Technological and Industrial Base for a Transformed National Security Environment,” presentation at The Heritage Foundation, February 23, 2005.
18. Defense Science Board, *Final Report of the Defense Science Board Task Force on Globalization and Security*, December 1999, at www.acq.osd.mil/dsb/reports/globalization.pdf (June 23, 2005).
19. *Ibid.* p. 5, Memorandum to the Chairman. The actual quote is “could counter the risks articulated herein.”
20. Tier 1 is direct contract program integrators; Tier 2, system producers; Tier 3, subsystem producers; Tier 4, component producers; Tier 5, parts producers; and Tier 6, basic material supplier. Defense Contract Management Agency, Industrial Analysis Center.
21. The question is not whether the item or system itself is unique or the best of its kind, but whether its function is unique. Does it do something that no other system or combination of systems can do?
22. It is becoming increasingly possible to build lightweight survivable ships out of composite materials and lighter-weight metals (e.g., aluminum). An entire industry might be created around composite materials.
23. CFIUS is an interagency committee, chaired by the Secretary of the Treasury, that seeks to serve U.S. investment policy through thorough reviews that protect national security while maintaining the credibility of an open investment policy and preserving the confidence of foreign investors here and of U.S. investors abroad so that they will not be subject to retaliatory discrimination. See U.S. Department of the Treasury, Office of International Investment, “Exon–Florio Provision,” at www.treas.gov/offices/international-affairs/exon-florio (March 14, 2005).
24. Patrick, “Strengthening the Technological and Industrial Base.”
25. Lexington Institute, “The Army’s Organic Industrial Base: What Is the Future for Depots and Arsenal?” February 1, 2005, p. 3, at www.lexingtoninstitute.org/docs/588.pdf (June 23, 2005). The May 13, 2005, BRAC list indicates that the Riverbank Army Ammunition Plant, Red River Army Depot, Maintenance Support Facility Middletown, Kansas Army Ammunition Plant, Naval Shipyard Portsmouth, Mississippi Army Ammunition Plant, Hawthorne Army Depot, Umatilla Army Depot, Lone Star Ammunition Plant, Newport Chemical Depot, and Desert Chemical Depot are all slated to be closed. However, some depots and arsenals are posting gains. The final status of these facilities will not be clear until later in 2005.
26. “Defense Seminar Concludes U.S. Shipbuilding Industry Is in Peril,” *Inside the Navy*, February 21, 2005.



Appendices

Appendix A

STUDY METHODOLOGY

Sources for the information in this report include three breakfast discussions hosted by The Heritage Foundation; interviews with key defense, industry, and legislative leaders involved with military industrial base issues; two public panels; four industrial base simulations; and independent research.

BREAKFAST SEMINARS. Each of the three breakfast discussions, hosted several weeks apart, drew experts from defense, industry, Congress, and academia to discuss and debate specific aspects of the base. The topics were “The Current State of the Industrial Base”; “Concerns, Problems, and Objectives for the Military Industrial Base”; and “Concerns, Problems, and Objectives: Recommendations for Congress.” Each session included a keynote speaker. After each presentation, study leaders used a series of questions to provoke discussion.

HIGH-LEVEL INTERVIEWS. Appendix D is a list of Project Participants including the people interviewed by The Heritage Foundation. In all but one case, the interviews were at the interviewees’ places of work. Due to scheduling, one interview was conducted by phone. Following an interview, the Heritage Foundation study team followed up with additional questions by e-mail and phone.

PUBLIC PANEL DISCUSSIONS. The two panels, entitled “Options for Maintaining a Robust, Adequate, and Efficient Military Industrial Base,” provided a forum for experts to offer their opinions, ideas, and recommendations concerning options for maintaining a robust, adequate, and efficient industrial base. In convening the panels, The Heritage Foundation asked participants to consider four broad models that might be used to maintain the military industrial base: nationalization, targeted protectionism, controlled competition, and the free market. The Heritage Foundation recognized that these approaches were largely ideological and that no single approach could exist in its purest form or be applied unilaterally to the entire military industrial base, but the approaches did provide a framework for discussion and debate.

SIMULATION EXERCISES. To facilitate the four military industrial base simulations, the Heritage Foundation study team selected two defense commodities (batteries and ammunition) and two systems (submarines and space launch), around which it created strategic scenarios to identify, isolate, and test stress points involving

the industrial base. Each case simulation occurred over a half-day period and involved four teams of 10 to 12 subject-matter experts. Each team was then divided into two subgroups of acquirers and providers and used to resolve the industrial based problem of one scenario. The teams then debriefed one another concerning their solutions and the underlying logic of these solutions. Both the process and the solutions provided insights into issues associated with today's industrial base.

ADDITIONAL RESEARCH. Independent research took many forms. It included attendance at meetings related to the military industrial base and extensive follow-up via e-mail with experts met during those meetings. It also included follow-up with experts met during the breakfast sessions and interviews. Finally, it included open-source research, primarily using the Internet, newspapers, and professional newsletters and periodicals.

Appendix B

ACRONYMS

BRAC	Base Realignment and Closure
CFIUS	Council on Foreign Investment in the U.S.
DOD	Department of Defense
DCMA	Defense Contracting and Management Agency
DFARS	Defense Federal Acquisition Regulations Supplement
DHS	Department of Homeland Security
DUSD-IP	Office of the Deputy Undersecretary of Defense for Industrial Policy
FAR	federal acquisition regulation
FY	fiscal year
GOCO	government-owned, contractor-operated
GOGO	government-owned, government-operated
JCIDS	Joint Capabilities Integration and Development System
JDAM	Joint Direct Attack Munition
LMSR	Large Medium-Speed Roll-on/Roll-off (ship)
MTW	major theater war
NSC	National Security Council
OSD	Office of the Secretary of Defense
QDR	Quadrennial Defense Review
R&D	research and development
RDT&E	research, development, testing, and evaluation
SPI	Single Process Initiative

Appendix C		The Heritage Foundation
Legislation Affecting the U.S. Military Industrial Base		
	Statute	Coverage
Full and Open Competition	10 U.S. Code 2304(a)	Sealed bids, competitive proposals, combination of competitive procedures, and other competitive procedures
	10 U.S. Code 2304(b)(1):	Competitive procedures but excluding a particular source:
Full and Open Competition After Exclusion of Sources	10 U.S. Code 2304(b)(1)(A)	To increase or maintain competition and reduce overall costs
	10 U.S. Code 2304(b)(1)(B)	To have source available in the interests of national defense in case of national emergency or industrial mobilization
	10 U.S. Code 2304(b)(1)(C)	To establish or maintain an essential RDT&E capability in the interests of national defense
	10 U.S. Code 2304(b)(1)(D)	To ensure continuous availability from a reliable source
	10 U.S. Code 2304(b)(1)(E)	To satisfy projected needs based on a history of high demand
	10 U.S. Code 2304(b)(1)(F)	To satisfy critical need for medical, safety, or emergency supplies
Full and Open Competition After Exclusion of Sources	10 U.S. Code 2304(b)(2):	Competitive procedures but excluding other than small business concerns:
	10 U.S. Code 2304(b)(2)	To fulfill the statutory requirements of Sections 9 and 15 of the Small Business Act (15 U.S. Code 638, 644); 10 U.S. Code 2323; and Public Law 97-219
	10 U.S. Code 2304(b)(2)	To fulfill the statutory requirements relating to Section 8(a) of the Small Business Act, as amended by Public Law 100-656
	10 U.S. Code 2304(b)(2)	To fulfill the statutory requirements relating to the HUBZone Act of 1997 (15 U.S. Code 631 note)
Other Than Full and Open Competition	10 U.S. Code 2304(b)(2)	To fulfill the statutory requirements relating to the Veterans Benefits Act of 2003 (15 U.S. Code 657f)
	10 U.S. Code 2304(c):	Circumstances permitting other than full and open competition:
	10 U.S. Code 2304(c)(1)	Only one responsible source and no other supplies or services will satisfy requirements (sole source)
	10 U.S. Code 2304(c)(2)	Unusual and compelling urgency
	10 U.S. Code 2304(c)(3)	Industrial mobilization; engineering, developmental, or research capability; or export services
	10 U.S. Code 2304(c)(4)	International agreement
	10 U.S. Code 2304(c)(5)	Authorized or required by statute:
	18 U.S. Code 4124	Federal Prison Industries, Inc. (UNICOR)
	41 U.S. Code 46-48c (Javits-Wagner-O'Day Act)	Qualified nonprofit agencies employing people who are blind or severely handicapped
	44 U.S. Code 501-504	Government printing and binding
	15 U.S. Code 637	Sole source award to small disadvantaged business [Section 8(a)] concern
	15 U.S. Code 657a	Sole source award to small business concern under HUBZone Act of 1997
	42 U.S. Code 5150	Preference for local entities for major disaster relief and emergency assistance
	15 U.S. Code 657f	Sole source award under Veterans Benefits Act of 2003
Title 10 and Defense Appropriations Product or Material Restriction	10 U.S. Code 2533a (Berry Amendment)	Food, clothing, textile items/components/materials, specialty metals, stainless steel flatware, hand tools, and measuring tools
	10 U.S. Code 2534	Multipassenger motor vehicles (buses)
	10 U.S. Code 2534	Chemical weapons antidote
	10 U.S. Code 2534	Air circuit breakers for naval vessels
	10 U.S. Code 2534; Public Law 101-511, Section 8041; and similar sections in subsequent defense appropriations acts	Welded shipboard anchor and mooring chain with a diameter of four inches or less

Legislation Affecting the U.S. Military Industrial Base (cont.)

	Statute	Coverage
Title 10 and Defense Appropriations Product or Material Restriction	10 U.S. Code 2534; and Public Law 104-61, Section 8099; and similar sections in subsequent defense appropriations acts	Ball and roller bearings
	Public Law 106-259, Section 8064 (regarding FY 2000 and FY 2001)	Vessel propellers
	Public Law 102-172, Section 8111, and similar sections in subsequent defense appropriations acts	Carbon, alloy, and armor steel plate
	Public Law 100-102, Section 8112, and similar sections in subsequent defense appropriations acts	Supercomputers
	10 U.S. Code 7309 and 10 U.S. Code 7310	Construction or repair of vessels in foreign shipyards
	Public Law 105-45, Section 112	Overseas military construction
	Public Law 104-32, Section 111, and similar sections in subsequent military construction appropriations acts	Overseas architect-engineer services
	Public Law 92-570	Research and development
	Public Law 100-180, Section 222 (Defense Authorization Act for FY 1988 and FY 1989)	Ballistic missile defense RDT&E
	NOTE: 10 U.S. Code 2534 also covers marine-unique components of vessels and sonobuoys, but these are not addressed in FAR or DFARS because they are unique to the Navy.	
Policy Restriction	Policy restriction to protect the domestic (U.S.) defense industrial base	Forgings (e.g., ship propulsion shafts, periscope tubes, and ring forgings for bull gears)
	Policy restriction to protect the domestic (U.S.) defense industrial base	Polyacrylonitrile (PAN) carbon fiber
Statutory Country Restriction	10 U.S. Code 2410i	Any foreign entity that complies with the secondary Arab boycott of Israel
	Proclamations, executive orders, and statutes administered by and implementing regulations of the Office of Foreign Assets Control, Department of Treasury:	Any supplies and services from or sent through a foreign country or organization that cannot lawfully import into the U.S.:
	31 CFR Part 515	Cuba
	31 CFR Part 560	Iran
	31 CFR Part 500	North Korea (imports from North Korea into the U.S.)
	31 CFR 550	Libya
	Executive Order 13067 and 31 CFR Part 538	Sudan
	10 U.S. Code 2327(b)	Contracts with concerns and subsidiaries owned or controlled by the government of a terrorist country (i.e., Cuba, Iran, Libya, North Korea, Sudan, and Syria)
Security Restriction	10 U.S. Code 2536(a)	Award of national security program contracts
Buy American Act	41 U.S. Code 10 (Buy American Act)	Use of a price evaluation differential for all but qualifying/eligible country end products
Small Business Act	Small Business Act (15 U.S. Code 638, 644); 10 U.S. Code 2323; Public Law 97-219; Section 8(a) of the Small Business Act, as amended by Public Law 100-656; HUBZone Act of 1997 (15 U.S. Code 631 note); and Veterans Benefits Act of 2003 (15 U.S. Code 657f)	Competitive procedures but excluding other than small business, small disadvantaged business concerns, historically Black colleges and universities, and minority institutions; HUBZone small business concerns, and/or service-disabled veteran-owned small business concerns

Source: U.S. Department of Defense, Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, Office of the Director of Defense Procurement and Acquisition Policy, "Competition Requirements and Domestic Preference Requirements Affecting Purchases by the Department of Defense," June 30, 2005.

Appendix D

PROJECT PARTICIPANTS

The Heritage Foundation expresses its sincere appreciation and thanks to all those who generously contributed their time and expertise, in so many ways, to our Military Industrial Base project. This list of participants is provided for informational purposes only. Those individuals indicated with an asterisk (*) agreed to personal interviews for more in-depth background/reference material. We respect the wishes of some participants from congressional staff, the Department of Defense, the Department of Commerce, and various industries who graciously participated but wished not to be listed. The omission or addition of any participant's name outside of these conditions is purely an administrative error. *The substance of this report should not be construed as the personal or organizational position, endorsement, or recommendation of any individual named.*

Dr. Gerald Abbott, National Defense University
James H. Averell, DCMA Industrial Analysis Center
James G. Bass, Ivy Hill Partners, LLC
***Major General Barry Bates**, USA (Ret.), National Defense Industrial Association
Kenneth Beeks, Business Executives for National Security
Stephen Benson, SENSIS Corporation
Elbert C. Black, The Boeing Company
Gary S. Blasser, Department of Defense
John A. Bonsell, Office of U.S. Senator James Inhofe (R-OK)
Cynthia L. Brown, American Shipbuilding Association
Scott C. Buchanan, Department of Defense
Richard H. Buenneke, The Aerospace Corporation
Donald N. Burnett, DCMA Industrial Analysis Center
James Jay Carafano, Ph.D., The Heritage Foundation
Thomas Carter, Department of Defense
Pierre A. Chao, Center for Strategic and International Studies
Felicia Cheek, American Apparel and Footwear Association
James Dean, The Heritage Foundation
Brian Dearing, Base-X Inc.

Donald DeRossi, DeRossi & Son Co.
Colonel Michael W. DeYoung, U.S. Army House Congressional Liaison
Lieutenant General Michael M. Dunn, National Defense University
Bruce M. Elliott, U.S. Army Corps of Engineers
Kathy Ellwood, Northrop Grumman Integrated Systems
Daniel H. Else, Congressional Research Service
Richard L. Engwall, R. L. Engwall & Associates
William V. Ennis, DCMA Industrial Analysis Center
***Jonathan Etherton**, Aerospace Industries Association
***Lieutenant General Lawrence P. Farrell, Jr.**, USAF (Ret.), National Defense Industrial Association
Blair H. French, The Boeing Company
Pamela Gaudiose, Gaudiose & Associates
Kenneth J. Gordon, Raytheon Company
Major General Paul Greenberg, USA (Ret.), National Defense Industrial Association
***William Greenwalt**, U.S. Senate Committee on Armed Services
Alan L. Gropman, Ph.D., National Defense University
Colonel Lawrence K. Grubbs, National Defense University
Kathy Gudgel, The Heritage Foundation

William R. Hawkins, U.S. Business and Industry Council

Major General Charles R. Henry, USA (Ret.), Sahara International

Jo L. Husbands, The National Academies

INVISTA Company

Tim Kane, Ph.D., The Heritage Foundation

David R. King, Ph.D., U.S. Air Force

Bradley Knox, House Committee on Small Business

Richard F. Kott, Ph.D., Geographer

Colonel Merrick E. Krause, National Defense University

Frank Losey, American Shipbuilding Association

Congressman Donald Manzullo (R–IL), U.S. House of Representatives

Daniella Markheim, The Heritage Foundation

Elaine McCusker, Senate Committee on Armed Services

Marc A. Miles, Ph.D., The Heritage Foundation

Joseph Muckerman, Chairman, The Heritage Foundation’s Military Industrial Base Project

John B. Montgomery, Tighe Patton Armstrong Teasdale LLC

Mark Montroll, National Defense University

Hilda Pacheco-Taylor, Supplier Excellence Alliance (SEA)

***Suzanne Patrick**, Deputy Under Secretary of Defense for Industrial Policy

Karin Ezbiansky Pavese, Ph.D., Office of Senator Joseph Lieberman (D–CT)

Charles Pena, Cato Institute

Jeffrey Poindexter, The Aerospace Corporation

Gary A. Powell, Department of Defense

James P. Rodenborn, Hawkeye Glove Manufacturing

Colonel Anthony Romano, National Defense University

Sheila R. Ronis, Ph.D., The University Group

David Scruggs, Center for Strategic and International Studies

Dr. Wayne A. Schroeder, Lockheed Martin Corporation

Philip L. Shiman, Ph.D., Defense Acquisition History Project

Adam B. Siegel, Northrop Grumman Analysis Center

Jack Spencer, The Heritage Foundation

Joseph Sokol, Project Writer for The Heritage Foundation

Baker Spring, The Heritage Foundation

***Harald Stavenas**, U.S. House Committee on Armed Services

Jennifer Stewart, Ph.D., Embassy of Canada

***Peter Steffes**, National Defense Industrial Association

James Swanson, Finmeccanica, Inc.

Alan Tonelson, U.S. Business and Industry Council

Paul F. Uhlir, The National Academies

Irvin Varkonyi, SCOPE LLP

Robert J. Vilhauer, The Boeing Company

David K. Wallace, American Ordnance LLC

Karen L. Wilson, The Boeing Company

Larry M. Wortzel, Ph.D., The Heritage Foundation



Acknowledgments

THE HERITAGE FOUNDATION would like to thank the Tawani Foundation and its founder, Colonel (IL) James N. Pritzker ILARNG (Ret.), who are dedicated to promoting awareness and understanding of the role of the citizen soldier in America's military heritage, for their support of this project. Without their generous support, this study would not have been possible.

We also wish to extend our deep appreciation to Project Chairman Colonel Joseph Muckerman, whose wise counsel and personal perspective was invaluable, and the many outside experts who so kindly gave their time, interest, expertise, and advice and contributed in so many different ways to our project. Specifically, Joe Sokol's tireless effort, dedication, and insight did much to make this study possible. A special thank you goes to our editors, Jon Rodeback, William Poole, and Richard Odermatt, and to Elizabeth Brewer, who was responsible for designing and laying out the book.

Finally, Kathy Gudgel, Research Assistant for Defense and National Security at The Heritage Foundation, deserves special recognition as the person whose organization and commitment to this project were central to its success.