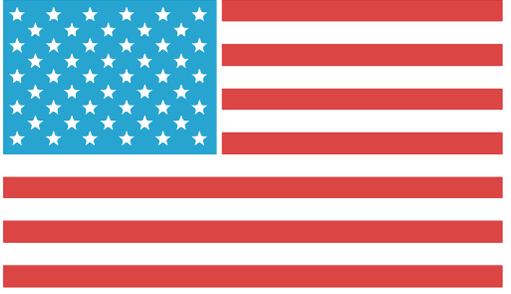


# REMAKING AMERICAN SECURITY



## SUPPLY CHAIN VULNERABILITIES & NATIONAL SECURITY RISKS ACROSS THE U.S. DEFENSE INDUSTRIAL BASE

BRIGADIER GENERAL JOHN ADAMS, U.S. ARMY (RETIRED)

ALLIANCE FOR  
**american**  
manufacturing

## ABOUT THE AUTHOR

**Brigadier General John Adams, U.S. Army (Retired)**, is President of Guardian Six Consulting LLC. General Adams served his final military assignment as Deputy U.S. Military Representative to the NATO Military Committee in Brussels, Belgium. He retired from the U.S. Army in September 2007.

On September 11, 2001, General Adams was stationed at the Pentagon as Deputy Director for European Policy in the Office of the Secretary of Defense (OSD). He participated in immediate disaster recovery operations at ground zero and coordinated international support for the U.S. diplomatic and military response.

He is a veteran of Operation Desert Storm (1991) and Operation Guardian Assistance in Rwanda (1996). During more than 30 years of service in command and staff assignments, he spent nearly 18 years in Europe, Asia, the Middle East, and Africa, including assignments with U.S. Embassies in Belgium (1994-1997), Rwanda (1996), Croatia (1998-2001), and South Korea (2002-2003). As an Army Aviator, General Adams has more than 700 hours as pilot-in-command in fixed- and rotary-wing aircraft.

General Adams' military awards and decorations include the Defense Superior Service Medal (with Oak Leaf Cluster), the Bronze Star Medal, the Army Aviator Badge, Parachute Badge, and Ranger Tab. He is a recipient of the Military Intelligence Corps Association's Knowlton Award and the Director of Central Intelligence's Exceptional Collector National HUMINT Award for excellence in gathering human intelligence.

Born and raised in the Washington, D.C., area, General Adams is a Ph.D. candidate in Political Science at the University of Arizona and holds Masters Degrees in International Relations (Boston University), English (University of Massachusetts), and Strategic Studies (US Army War College).

## ABOUT AAM

**The Alliance for American Manufacturing (AAM)** is a nonprofit, non-partisan partnership formed in 2007 by some of the United States' leading manufacturers and the United Steelworkers to explore common solutions to challenging public policy topics such as job creation, infrastructure investment, international trade, and global competitiveness.

We believe that an innovative and growing manufacturing base is vital to the United States' economic and national security, as well as to providing good jobs for future generations. AAM achieves its mission through research, public education, advocacy, strategic communications, and coalition-building around the issues that matter most to the U.S. manufacturing sector.

AAM's capacity includes a Washington D.C.-based lobby and research operation and a national field staff. Current platforms include promoting strong Buy American provisions at both the federal and state levels, advocating for fair trade, and promoting revitalization through a long-term national manufacturing strategy.

The blueprint for the future was built by AAM.

## ABOUT GUARDIAN SIX

**Guardian Six Consulting** is a defense and national security consulting firm that advises governments, businesses, and nonprofits. Our experts have decades of practical, military, and academic experience in national security, defense policy, intelligence, international relations, and economic analysis.

We provide in-depth policy research, rigorous analysis, and innovative strategic advice on national security issues, bringing our expertise to bear on sensitive issues that demand the utmost pragmatism and insight. We distill complex issues and deliver usable products to our clients. Guardian Six is ideally suited to help companies with defense-related products and services compete in the growing global defense and national security marketplace. We address problems such as defense critical requirements, strategic threats, defense industrial policy, arms control, non-proliferation, terrorism, and new security threats.

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# NATIONAL SECURITY REQUIRES A STRONGER U.S. MANUFACTURING SECTOR

The United States' national security is threatened by our military's growing and dangerous reliance on foreign nations for the raw materials, parts, and finished products needed to defend the American people. The health of our manufacturing sector is inextricably intertwined with our national security, and it is vital that we strengthen the sector.

This report—prepared by Guardian Six Consulting LLC for the Alliance for American Manufacturing—recommends 10 actions to make America less dependent on foreign nations for the vital products that enable America's soldiers, sailors, airmen, and Marines to be the most powerful and effective fighting force in the world.

The recommendations (detailed below) call for a joint strategy by government, industry, academic research institutions, and the military to increase U.S. domestic production of manufactured items and recovery of natural resources that the armed forces require. In addition, the recommendations emphasize the importance of investment today in the technological innovation, education, and training needed to keep America secure tomorrow.

This report also calls for properly enforcing existing and internationally accepted laws that give U.S. defense manufacturers certain preferences over foreign competitors. This enforcement will ensure a level playing field, high-quality materials and products, and a healthy U.S. defense industrial base. The report further recommends federal investment in America's high-technology manufacturing infrastructure, especially in advanced research and manufacturing capabilities.

Another recommendation calls for increasing U.S. production of certain key raw materials needed for the nation's defense to supplement our imports. The recommendation also proposes stockpiling these raw materials to ensure an adequate supply.

# DANGERS OF MILITARY DEPENDENCY

With the closing of factories across the United States and the mass exodus of U.S. manufacturing jobs to China and other nations over the past 30 years, the United States' critically important defense industrial base has deteriorated dramatically. As a result, the United States now relies heavily on imports to keep our armed forces equipped and ready. Compounding this rising reliance on foreign suppliers, the United States also depends increasingly on foreign financing arrangements.

In addition, the United States is not mining enough of the critical metals and other raw materials needed to produce important weapons systems and military supplies. These products include the night-vision devices (made with a rare earth element) that enabled Navy SEALs to hunt down Osama bin Laden.

Consequently, the health of the United States' defense industrial base—and our national security—is in jeopardy. We are vulnerable to major disruptions in foreign supplies that could make it impossible for U.S. warriors, warships, tanks, aircraft, and missiles to operate effectively. Such supply disruptions could be caused by many factors, including:

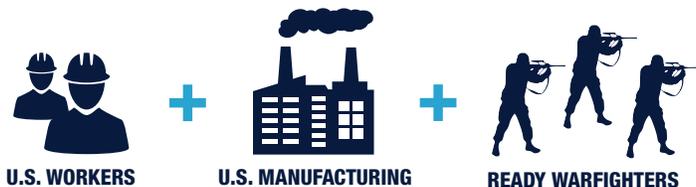
- Poor manufacturing practices in offshore factories that produce problem-plagued products. Shoddy manufacturing could be inadvertent, could be part of a deliberate attempt to cut costs and boost profits, or could be intentionally designed to damage U.S. capabilities. Motivated by expected gains in cost, innovation, and efficiency, the Department of Defense (DoD) began a decided shift from parts made to military specifications (Mil-Spec) to commercial-off-the-shelf (COTS) parts and equipment two decades ago. However, COTS parts often lack the quality control and traceability necessary to ensure that parts used in the defense supply chain meet the rigorous standards we expect of equipment vital to our national security. Faulty and counterfeit COTS parts are already taking a toll on readiness in several defense sectors.
- Natural disasters, domestic unrest, or changes in government that could cut or halt production and exports at foreign factories and mines.
- Foreign producers that sharply raise prices or reduce or stop sales to the United States. These changes could be caused by political or military disputes with the United States, by the desire of foreign nations to sell to other countries, by the need to attract foreign investment and production, or by foreign nations wanting to keep more of the raw materials, parts, and finished goods they produce for their own use.

# VITAL AND VULNERABLE

## THE U.S. DEFENSE INDUSTRIAL BASE

### VITAL TO OUR NATIONAL SECURITY

The U.S. workforce provides the tools for ready warfighters

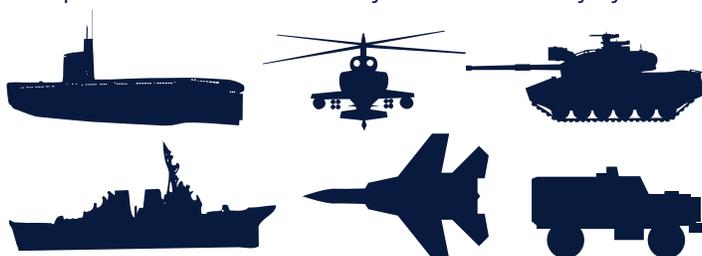


CREATING GREATER  
U.S. NATIONAL  
SECURITY



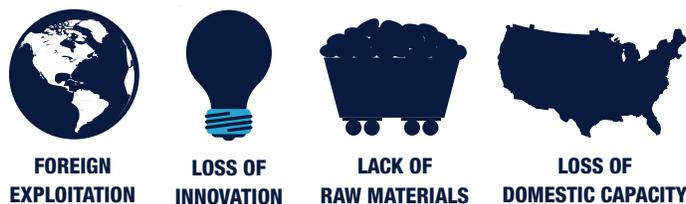
### IMPORT DEPENDENCE

The United States currently relies heavily on the foreign supply of imports to manufacture many essential military systems



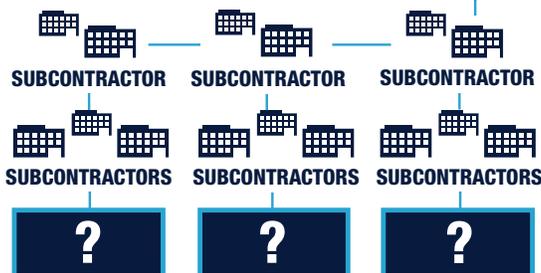
### SUPPLY CHAIN VULNERABILITIES

The defense industrial base faces multiple supply chain vulnerabilities



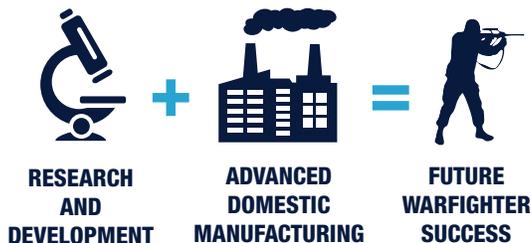
### SUPPLY CHAIN COMPLEXITY

DEPARTMENT OF DEFENSE  
LACKS VISIBILITY OF  
DEFENSE SUPPLY CHAIN  
LOWER TIER SUPPLIERS



### RESEARCH TODAY CAPABILITIES TOMORROW

Investment in research, coupled with advanced domestic manufacturing, will directly contribute to future warfighter success



### SUPPORTING DEFENSE

American manufacturing supports critical U.S. defense needs



# RECOMMENDATIONS

This report's 10 recommendations to make the United States less dependent on the importation of products essential to our national security are based on the premise that the U.S. defense industrial base is a vital national asset that is no less critical to our national security than our men and women in uniform. The recommendations call for:

- 1** Increasing long-term federal investment in high-technology industries, particularly those involving advanced research and manufacturing capabilities. The distinguishing attribute of the U.S. defense industrial base is technological innovation. As foreign nations continue manufacturing an ever-larger share of America's defense supplies, the United States increases its risk of diminishing its capacity to design and commercialize emerging defense technologies. To help ensure that our armed forces dominate the future battlefield, Congress should provide funding for American manufacturers to develop and implement advanced process technologies.
- 2** Properly applying and enforcing existing laws and regulations to support the U.S. defense industrial base. Domestic source preferences already enacted into law, such as those that apply to the steel and titanium industries under the Specialty Metals Clause, must be retained to ensure that important defense capabilities remain secure and available for the U.S. armed forces.

- 3** Developing domestic sources of key natural resources required by our armed forces. Right now the United States relies far too heavily on foreign nations for certain key metals and other raw materials needed to manufacture weapons systems and other military supplies. For example, most rare earth elements, which are essential components of many modern military technologies, currently must be purchased from China. The U.S. government and industry must stockpile these vital raw materials, strengthen efforts to resume mining and transformation of the materials in the United States, improve recycling to make more efficient use of current supplies, and identify alternate materials.
- 4** Developing plans to strengthen our defense industrial base in the U.S. National Military Strategy, National Security Strategy, and the Quadrennial Defense Review process. This would make creating and sustaining a healthier defense industrial base a higher national priority, with a focus on increasing support for the most important and vulnerable industrial sectors.
- 5** Building consensus among government, industry, the defense industrial base workforce, and the military on the best ways to strengthen the defense industrial base. These sectors must work collaboratively to successfully address the concerns of all defense industrial base stakeholders.
- 6** Increasing cooperation among federal agencies and between government and industry to build a healthier defense industrial base. The Departments of State, Treasury, Energy, Commerce, Homeland Security, and others in the Executive Branch should join the Department of Defense in working to bolster the defense industrial base.
- 7** Strengthening collaboration between government, industry, and academic research institutions to educate, train, and retain people with specialized skills to work in key defense industrial base sectors. The loss of U.S. manufacturing jobs has reduced the size of the workforce skilled in research, development, and advanced manufacturing processes.
- 8** Crafting legislation to support a broadly representative defense industrial base strategy. Congress and the Administration must collaborate on economic and fiscal policies that budget for enduring national security capabilities and sustain the industrial base necessary to support them.
- 9** Modernizing and securing defense supply chains through networked operations. These operations should be built on the excellent work that the DoD and industry are already doing to map and secure defense supply chains. The operations would provide ongoing communications between prime contractors and the supply chains they depend on. Closer communications, patterned on the networked operations of U.S. military forces around the world, would help managers identify and solve recurring problems with military supplies.
- 10** Identifying potential defense supply chain chokepoints and planning to prevent disruptions. This recommendation would require determining the scope of foreign control over critical military supply chains and finding ways of restoring U.S. control.

# EXAMINING THE DEFENSE INDUSTRIAL BASE

This report examines defense industrial base nodes that are vital to U.S. security. Rather than focusing on final high-cost manufactured products (such as aircraft, ships, missiles, or tanks) the sectors we studied deal with 14 lower-tier commodities and raw materials, subcomponents, and end-items needed to build and operate the final systems. Some nodes are essential for foundational military capabilities, and others provide the tactical and logistical advantages necessary for our modern military. Still others provide niche capabilities that enable members of the military to operate in environments that would otherwise be inaccessible or exceedingly dangerous.

Studying the nodes allows us to conduct a bottom-up review of key sectors of the defense industrial base. This report devotes a chapter to each of the nodes, looking at the critical role each node plays in our national security, each node's contribution to U.S. military capabilities, and the consequences losing these capabilities would have on our defense. The nodes we analyze typically escape notice in Washington, D.C., but they are vital nonetheless. (For example, the absence or failure of a tiny fastener or semiconductor can hobble an aircraft that costs tens of millions of dollars.)

The commodities and raw material nodes examined in this report are steel armor plate, specialty metals, titanium, and high-tech magnets. The subcomponent nodes examined are fasteners, semiconductors, copper-nickel tubing, lithium-ion batteries, HELLFIRE missile propellant, advanced fabrics, and telecommunications. The end-item nodes examined are night-vision devices, machine tools, and biological weapons defense.

# MILITARY EQUIPMENT CHART

THESE DEFENSE SYSTEMS FACE A RANGE OF SUPPLY CHAIN VULNERABILITIES

| DEPARTMENT          | WEAPON SYSTEMS  | PLATFORMS  | OTHER SYSTEMS   |
|---------------------|---|--|---|
| <b>ARMY</b>         | <ul style="list-style-type: none"> <li>■ Joint Direct Attack Munition (JDAM) Precision Guidance Kit (Semiconductors, Fasteners, High-Tech Magnets)</li> <li>■ AGM-114 HELLFIRE Air-to-Surface Missile (HELLFIRE Missile Propellant, High-Tech Magnets, Machine Tools)</li> <li>■ M4 Carbine (Fasteners, Machine Tools)</li> </ul> | <ul style="list-style-type: none"> <li>■ M1 Abrams Main Battle Tank (Steel Armor Plate, Semiconductors, Machine Tools, High-Tech Magnets, Fasteners, Specialty Metals)</li> <li>■ UH-60 Blackhawk Helicopter (Fasteners, Semiconductors, Machine Tools, Titanium)</li> <li>■ Mine-Resistant Ambush-Protected (MRAP) Vehicle (Steel Armor Plate)</li> </ul>                         | <ul style="list-style-type: none"> <li>■ Night-Vision Devices (Specialty Metals)</li> <li>■ Laser Range-Finders (Specialty Metals)</li> <li>■ Medical Counter-Measures (Biodefense)</li> <li>■ Flame-Resistant Army Combat Uniform (FR-ACU) (Advanced Fabrics)</li> <li>■ Communications Systems (Semiconductors and Telecommunications)</li> </ul> |
| <b>MARINE CORPS</b> | <ul style="list-style-type: none"> <li>■ Joint Direct Attack Munition (JDAM) Precision Guidance Kit (Semiconductors, Fasteners, High-Tech Magnets)</li> <li>■ AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM) (Lithium-Ion Batteries, High-Tech Magnets)</li> <li>■ M4 Carbine (Fasteners, Machine Tools)</li> </ul>    | <ul style="list-style-type: none"> <li>■ F-35B Joint Strike Fighter (Titanium, Lithium-Ion Batteries, Machine Tools, High-Tech Magnets, Semiconductors)</li> <li>■ V-22 Osprey Aircraft (Titanium, Semiconductors, Machine Tools)</li> </ul>   | <ul style="list-style-type: none"> <li>■ Night-Vision Devices (Specialty Metals)</li> <li>■ Interceptor Body Armor (Advanced Fabrics)</li> <li>■ All Devices Powered by Lithium-Ion Batteries (Specialty Metals)</li> <li>■ Communications Systems (Semiconductors and Telecommunications)</li> </ul>   |
| <b>NAVY</b>         | <ul style="list-style-type: none"> <li>■ AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM) (Lithium-Ion Batteries, High-Tech Magnets)</li> <li>■ Submarine-Launched Ballistic Missiles (SLBMs) (Specialty Metals)</li> </ul>  | <ul style="list-style-type: none"> <li>■ Guided Missile Destroyer (Steel Armor Plate, Copper-Nickel Tubing)</li> <li>■ Nimitz-Class Nuclear-Powered Aircraft Carrier (Steel Armor Plate, Titanium, Copper-Nickel Tubing, Machine Tools, High-Tech Magnets)</li> <li>■ Littoral Combat Ship (LCS) (Steel Armor Plate, Titanium, Copper-Nickel Tubing, High-Tech Magnets)</li> </ul> | <ul style="list-style-type: none"> <li>■ Night-Vision Devices (Specialty Metals)</li> <li>■ Copper-Nickel Tubing for all Navy Vessels</li> <li>■ Communications Systems (Semiconductors and Telecommunications)</li> </ul>  |
| <b>AIR FORCE</b>    | <ul style="list-style-type: none"> <li>■ AIM-9 Sidewinder Air-to-Air Missile (Lithium-Ion Batteries, High-Tech Magnets, Machine Tools, Titanium)</li> <li>■ AGM-114 HELLFIRE Air-to-Surface Missile (HELLFIRE Missile Propellant, High-Tech Magnets, Machine Tools)</li> </ul>  | <ul style="list-style-type: none"> <li>■ F-35A Joint Strike Fighter (Titanium, Lithium-Ion Batteries, Machine Tools, High-Tech Magnets, Semiconductors)</li> <li>■ F-22 Raptor Fighter (Specialty Metals, Semiconductors, Machine Tools, Titanium, Fasteners, High-Tech Magnets)</li> <li>■ MQ-1B Predator Drone (HELLFIRE Missile Propellant, High-Tech Magnets)</li> </ul>       | <ul style="list-style-type: none"> <li>■ Night-Vision Devices (Specialty Metals)</li> <li>■ Titanium for Aircraft Body and Armor</li> <li>■ Communications Systems (Semiconductors and Telecommunications)</li> </ul>   |

# A CALL TO ACTION



This report identifies vulnerabilities created by the United States' growing reliance on foreign inputs to produce the military systems necessary to defend our nation and our people. It is a call to action to the United States' leaders in government and industry to reduce these vulnerabilities. Leaders must demand strategic thinking about the problems confronting the defense industrial base in the same way that they demand strategic thinking about the problems confronting our armed forces on the battlefield.

The United States needs a defense industrial base strategy that serves our most important security requirements. We need to review that strategy regularly to ensure that it keeps pace with rapidly shifting global trends and endures the test of time. As we shift our national security attention towards the Asia-Pacific region, we must ensure that our defense industrial base structure—especially our procurement policy—is consistent with our national security goals. For example, it makes little sense to depend on China for critical components of our defense industrial base. If we are to preserve the United States' status as the most powerful nation on the planet, we need to produce superior weaponry for today's warriors, as well as preserve our technological edge to ensure that those who will defend our nation in the next generation and beyond are equipped with the best weapons and systems available.

Without a healthy and technologically advanced defense industrial base, the United States will be unable to provide the weapons and advanced military systems our warriors require to defend the United States now and in the future. Nothing less than the survival of our nation is at stake. ■

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