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The U.S. Defense Industrial Base: Background and Issues for Congress

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SUMMARY

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The U.S. Defense Industrial Base: Background and Issues for Congress

The U.S. defense industrial base (DIB) is the network of organizations, facilities, and resources that provides the U.S. government—particularly the Department of Defense (DOD)—with defense-related materials, products, and services.

The DIB encompasses a wide variety of entities, including commercial firms operated on a for-profit basis, not-for-profit research centers and university laboratories, and government-owned industrial facilities. It provides everything from large, technologically sophisticated weapon systems and highly specialized operational support to general commercial products and routine services. By supplying and equipping the armed services, the DIB enables the United States to execute national strategy and develop, maintain, and project military power.

Since World War II, the U.S. government has devoted considerable resources and attention to ensuring the DIB can meet the requirements of national defense. Within DOD and the executive branch, a diverse array of organizations and programs exist to monitor, protect, and strengthen the industrial base. Congress appropriates hundreds of billions of dollars annually to acquire materials, products, and services from DIB suppliers, and has established and funded a number of programs intended to assess or modify aspects of the DIB as a whole. Congress also routinely oversees the executive branch exercise of industrial base-related functions.

In conducting its role in resourcing, overseeing, and legislating for the U.S. defense industrial base, Congress may consider a number of questions, including

- Do suppliers have adequate capacity to meet U.S. defense needs?
- What is the appropriate degree of regulation for the commercial defense industry?
- How resilient should defense supply chains be? What role should sourcing, content, and production requirements play in government stewardship of the industrial base?

Contents

Figures

Tables

Contacts

Background

Defining the U.S. Defense Industrial Base

The term *defense industrial base* appears to have entered common parlance during the Korean War.[1] Usage may vary slightly by context, but today Congress, the executive branch, think tanks, and media outlets frequently employ the term to refer to the organizations, facilities, and resources that supply the U.S. government—principally, but not exclusively, the Department of Defense (DOD)—with materials, products, and services for defense purposes.[2] Government acquisition from DIB entities is mainly managed through the use of contracts.[3]

As typically used, the DIB includes public and private owners and operators of relevant productive capacity, to include some organizations that may not exclusively or predominantly produce specialized defense equipment.[4] When referring to private industry, the term encompasses both those suppliers with a direct contractual relationship with the government (referred to as *prime contractors*) and those that provide prime contractors with the goods and services necessary to perform defense contracts (known as *subcontractors*).[5]

Definitions of the DIB and related concepts often have a geographic component, especially when described in statute. The Defense Production Act of 1950 (DPA), for instance, defines the *domestic industrial base* as consisting of "domestic sources which are providing, or which would be reasonably expected to provide, materials or services to meet national defense requirements during peacetime, national emergency, or war."[6] For the purposes of the DPA, these *domestic sources* are further defined as businesses that perform contracted activities at, and source contracted components and assemblies from, locations inside the United States, Canada, Australia, and the United Kingdom.[7]

Similarly, 10 U.S.C. §4801 defines the *national technology and industrial base* (NTIB) as "the persons and organizations that are engaged in research, development, production, integration,

[1] The earliest use of the full phrase that CRS was able to identify was in an Associated Press article syndicated in May 1953. The article referred to industry as a 'base' upon which military power was built, detailing a debate between former Truman Administration officials—who had favored a 'broad' base—and Eisenhower Administration officials—some of whom favored a 'narrower' base. "House Group Opens Hearing on Weakened Controls Bill," *The Washington Post*, May 22, 1953. For another contemporaneous account of the 'broad' vs. 'narrow' debate, see Austin Stevens, "Pentagon Aroused by Plan to Narrow 'Defense Base,'" *The New York Times*, April 9, 1953.

[2] Terms other than the *defense industrial base* have also been used by policymakers, analysts, and other participants in defense policy discourse to express similar meanings (examples include the *national technology and industrial base*, the *national security industrial base*, and the *military-industrial complex*). For consistency, this report uses *defense industrial base* (abbreviated *DIB* or *industrial base*) throughout. The DIB also supports other federal agencies that exercise defense-related functions (for example, the Coast Guard and the Central Intelligence Agency). For the purposes of this report, consideration of the DIB will mainly concern its role in supporting DOD.

[3] For a general overview of defense contracting, see CRS Report R44010, *Defense Acquisitions: How and Where DOD Spends Its Contracting Dollars*.

[4] The *DOD Dictionary of Military and Associated Terms*, for instance, defines the DIB as "the Department of Defense, government, and private sector worldwide industrial complex with capabilities to perform research and development and design, produce, and maintain military weapon systems, subsystems, components, or parts to meet military requirements." Department of Defense, *DOD Dictionary of Military and Associated Terms*, February 2023, p. 55.

[5] See 41 U.S.C. §8701 for statutory definitions of *prime contract*, *prime contractor*, *subcontract*, and *subcontractor*.

[6] 50 U.S.C. §4552(7).

[7] 50 U.S.C. §4552(8).

services, or information technology activities conducted within the United States, the United Kingdom, Australia, New Zealand, and Canada."[8]

Policymakers and analysts often divide the defense industrial base by key products. Thus, those organizations and facilities that build submarines may be referred to as the "submarine industrial base," those that manufacture helicopters may constitute the "rotary-wing aircraft industrial base," and so on.[9]

Historical Development

Early Origins through the Cold War

Since the Revolutionary War, the United States has relied on a variety of organizations and facilities to supply and equip its military forces. However, for the first 150 years of its existence, the federal government devoted few resources to the management and maintenance of a permanent defense industrial base.[10] Although the Army and Navy operated several government arsenals and shipyards, these had limited production capacity, and in times of conflict the armed services depended heavily on private contractors.[11] The rapid arms buildups that accompanied the wars of this period were followed by corresponding capacity reductions, with the vast majority of wartime contractors returning their focus to the commercial market when hostilities ended.[12] As the logistical and technological complexity of conflict grew, the U.S. government made larger efforts to manage these aspects of warfighting—industrial mobilization during World War I, for instance, was coordinated by several government bodies—but it wasn't until the 1940s that the foundations of the modern DIB were laid.[13]

America's entry into World War II sparked an industrial mobilization effort of unprecedented scale. The production of materiel ranging from basic commodities (like steel and rubber) to specialized weapons systems (such as planes and tanks) expanded, and U.S. suppliers ultimately provided over two-thirds of Allied equipment.[14] This expansion created the present structure of the DIB: the federal government worked with private firms to convert, expand, or construct thousands of facilities for defense production, while also building smaller numbers of

[8] For more on the national technology and industrial base, refer to the "Government Management of the DIB" section of this report. See also CRS In Focus IF11311, *Defense Primer: The National Technology and Industrial Base*.

[9] For respective examples of these usages, see Team Submarines Public Affairs, "U.S. Navy Submarine Industrial Base Celebrates Growing Workforce," U.S. Navy, June 29, 2023, https://www.navsea.navy.mil/Media/News/Article-View/Article/3444392/us-navy-submarine-industrial-base-celebrates-growing-workforce/; and Section 163 of the FY2023 National Defense Authorization Act (P.L. 117-263).

[10] For an overview of U.S. defense production in the 18th and 19th centuries, see Merritt Roe Smith, "Military Arsenals and Industry Before World War I," in *War, Business, and American Society*, ed. Benjamin Franklin Cooling (New York: Kennikat Press, 1977), pp. 24-42.

[11] Ibid.

[12] Of the 48 major U.S. arms contractors active during the Civil War, for instance, 37 had exited the sector by 1870, while 17 of the 19 U.S. plants built to manufacture artillery during World War I had closed by 1920. Ibid., p. 36, and Benedict Crowell and Robert Wilson, *Demobilization: Our Industrial and Military Demobilization after the Armistice, 1918-1920* (New Haven: Yale University Press, 1921), p. 167.

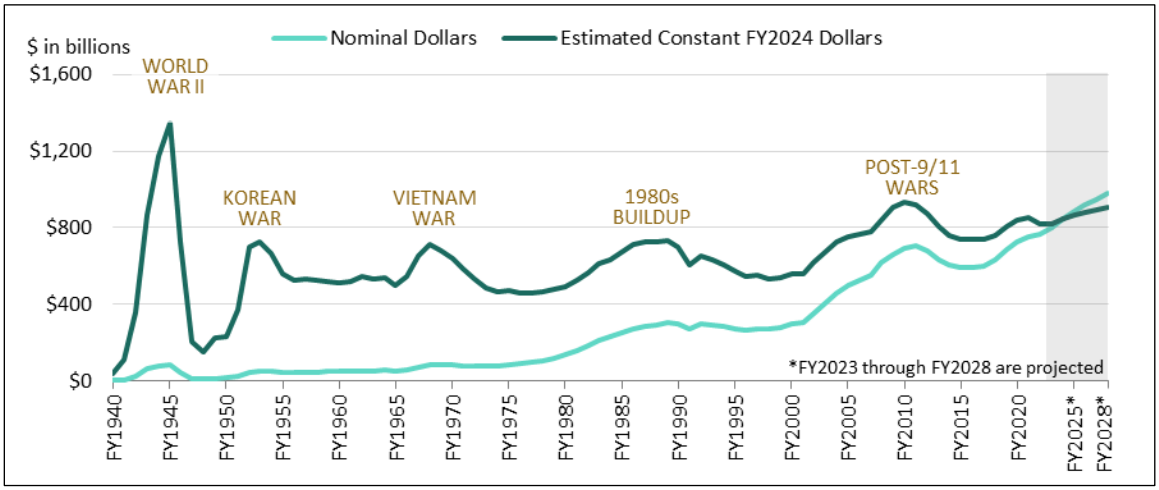
[13] For an overview of the War Industries Board—the most important of these bodies—see Randall Kester, "The War Industries Board 1917-1918: A Study in Industrial Mobilization," *The American Political Science Review*, vol. 34, no. 4 (August 1940), pp. 655-684. Available at https://www.jstor.org/stable/1947819.

[14] This included 86,000 tanks, 2.5 million trucks, 286,000 aircraft, 434 million tons of steel, and 41 billion rounds of ammunition. Arthur Herman, *Freedom's Forge: How American Business Produced Victory in World War II* (New York: Random House, 2012), p. ix.

government-owned plants to manufacture items considered difficult or unsuitable for private industry to make (e.g., high explosives).[15]

Although some economic demobilization occurred after 1945, the wartime industrial base was not entirely dismantled, and by the late 1940s the onset of the Cold War led to renewed investments in military capabilities (see **Figure 1**).[16] From 1948 to 1963, annual spending on defense increased by an average of 8.4%, with annual outlays for research, development, test, and evaluation (RDT&E) and procurement each growing by an average of 19.7%.[17] The Korean War provided another major impetus to industry, raising demand for defense equipment and leading Congress to pass the Defense Production Act (DPA).[18]

Figure 1. U.S. Defense Outlays, FY1940-FY2028 (Projected)



Sources: Figure created by CRS using data from OMB Budget of the U.S. Government, FY2024, Historical Tables, Table 3.1 and Table 10.1, March 2023; and CBO, Budget and Economic Data, Spending Projections, by Budget Account, February 2023.

Note: Figure originally developed for CRS Report R47582, *FY2024 Defense Budget Request: Context and Selected Issues for Congress*, by Cameron M. Keys and Brendan W. McGarry.

As a result, the early decades of the Cold War were a dynamic period for the DIB, characterized by rising production output (see **Figure 2**).[19] Commercial firms played a critical role in this expansion, developing and producing the sophisticated technologies and weapons systems on which U.S. military power increasingly depended (although DOD continued to use government-

[15] As a 1944 congressional study put it: "Prior to 1939, there were practically no powder-explosives, shell-loading, and bag-loading plants in America compared with our tremendous future requirements. Private industry could not expand to meet this tremendous need … the War Department had to build plants." Rep. Albert Engel, "Ordnance Ammunition Production," *Army Ordnance Report*, no. 6 (August 1944), p. 4. Available at https://www.jstor.org/stable/45367625.

[16] For an influential articulation of the strategic rationale informing these spending patterns, see National Security Council, "A Report to the National Security Council—NSC 68," April 12, 1950, pp. 64-65. Available via the Harry S. Truman Presidential Library and Museum at https://www.trumanlibrary.gov/library/research-files/report-national-security-council-nsc-68.

[17] CRS analysis of the "percent real growth" figures for DOD outlays between FY1948 and FY1963. See Office of the Under Secretary of Defense (Comptroller), "National Defense Budget Estimates for FY2024," DOD, May 2023, pp. 162-163. Available at https://comptroller.defense.gov/portals/45/documents/defbudget/fy2024/fy24_green_book.pdf.

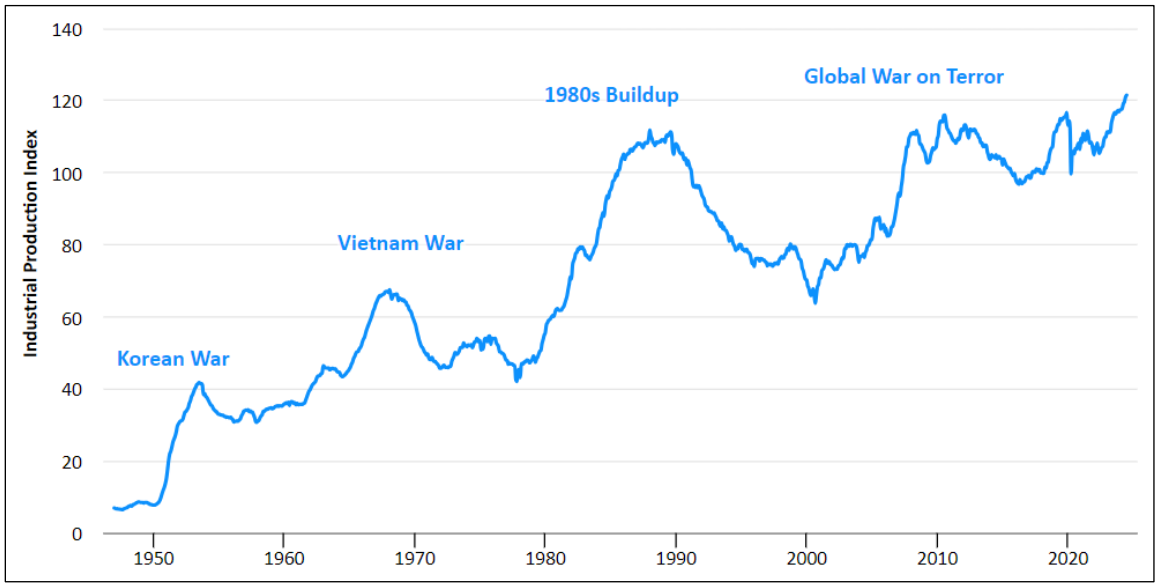
[18] For more information on the DPA, refer to the "Government Management of the DIB" section of this report; see also CRS Testimony TE10092, *Mission Critical: Restoring National Security as the Focus of Defense Production Act Reauthorization*, by Luke A. Nicastro.

[19] See **Figure 2** for historical production output figures.

owned production facilities, their relative importance declined).[20] The growing economic and military importance of such firms led some policymakers to express concerns about their political influence. President Dwight D. Eisenhower, for instance, observed in a 1961 address that the "conjunction of an immense military establishment and a large arms industry is new in the American experience" and cautioned against "the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex."[21]

Figure 2. U.S. Defense Production, 1947-2024

Annualized Monthly Output of Defense and Space Equipment from January 1947 to June 2024



Source: CRS graphic based on data from the Board of Governors of the Federal Reserve System, "Industrial Production: Equipment: Defense and Space Equipment," at https://fred.stlouisfed.org/series/IPB52300S.

Notes: The Y-axis shows the Federal Reserve's industrial production (IP) index for defense and space equipment, which measures the monthly output of U.S.-based defense and space production facilities expressed as the percentage of the average monthly real output for a base year (currently 2017). Figure is interactive in the HTML version of this report.

Following lower output during the 1970s, the DIB experienced strong growth during the 1980s, concurrent with the military buildup pursued by the Reagan Administration. According to one study, defense-related private employment increased from approximately 1.9 million workers in 1977 to 3.2 million in 1985, and defense-related production rose across dozens of industrial

[20] By the end of the 1950s, government-operated facilities produced less than 10% of U.S. defense equipment. Merton Peck and Frederic Sherer, *The Weapons Acquisition Process: An Economic Analysis* (Boston: Harvard University, 1962), p. 98. The early Cold War period also saw the establishment of the first federally funded research and development centers (FFRDCs) and a number of government-owned RDT&E facilities such as DOD and Department of Energy laboratories (refer to the "Nonprofit and Public Sector" section of this report for more information).

[21] For more on the genesis and impact of Eisenhower's speech, see James Ledbetter, *Unwarranted Influence: Dwight D. Eisenhower and the Military-Industrial Complex* (New York: Yale University Press, 2011).

subsectors.[22] At the same time, shifting macroeconomic conditions during this period also led to output declines for several defense-relevant subsectors, including shipbuilding and explosives.[23]

1991 to Today

With the end of the Cold War, the U.S. government assessed that its military requirements had diminished and began to reduce defense spending. Because many firms in the commercial DIB were heavily reliant on the defense market, DOD determined that the sector's continued viability depended on restructuring. Accordingly, the government actively encouraged companies to pursue consolidation, with the result that by the early 2000s the number of prime contractors had diminished from 51 to 5.[24] Another consequence of reduced defense spending was a decline in production: over the course of the 1990s, the output of the commercial DIB decreased by approximately 35%.[25] The changing defense environment also affected government-owned capabilities, leading DOD to close many of its industrial facilities and reduce employment and activity at remaining sites.[26]

Defense production rose again in the 2000s with the commencement of the Afghanistan and Iraq Wars (the importance of operational support—the use of contractor personnel to support military operations—to the business model of many defense firms also grew during this period).[27] Production stalled and declined beginning in the early 2010s, as defense outlays decreased in response to developments like the Budget Control Act of 2011 and U.S. drawdowns in Iraq and Afghanistan.[28]

As the United States' strategic focus shifted from counterterrorism to great power competition during the 2010s and early 2020s, industrial base matters began to feature more prominently in defense policy discussions. Geopolitical developments such as intensifying U.S. competition with the People's Republic of China (PRC or China) and Russia's 2022 invasion of Ukraine generated concern among policymakers about the health of the DIB, and led to increases in relevant appropriations as well as other executive and legislative actions.[29] In terms of monthly output, production began to expand steadily in the late 2010s, returning (after a sharp but brief dip during

[22] David K. Henry and Richard P. Oliver, "The Defense Buildup, 1977-85: Effects on Production and Employment," *Monthly Labor Review* (U.S. Bureau of Labor Statistics), August 1987, pp. 6-8. For another estimate that cites a total DIB workforce of 1.7 million in 1976 and 3.3 million in 1986, see Eugene Gholz and Harvey Sapolsky, "Restructuring the U.S. Defense Industry," *International Security* vol. 24 no. 3 (Winter 1999-2000), p. 9.

[23] Ibid., p. 6. This decline in output may have had capacity implications: over the course of the 1980s, for example, three major private shipyards closed. See Gholz and Sapolsky, "Restructuring the U.S. Defense Industry," p. 19.

[24] The remaining five are Lockheed Martin, Boeing, RTX (formerly Raytheon), Northrop Grumman, and General Dynamics. DOD, "State of Competition within the Defense Industrial Base," February 2022, p. 1, https://media.defense.gov/2022/feb/15/2002939087/-1/-1/1/state-of-competition-within-the-defense-industrial-base.pdf.

[25] In January 1990, monthly defense and space related output was measured at 107.99 on the IP index, while in December 1999 it was 70.3. Federal Reserve, "Industrial Production," at https://fred.stlouisfed.org/series/IPB52300S.

[26] This was particularly true for Army industrial facilities. See W. Michael Hix et al., *Options for Managing the Army's Arsenals and Ammunition Plant*s, (RAND Corporation: Santa Monica, 2003) and U.S. Army, "Ammunition Production During the Cold War," April 2009, https://aec.army.mil/application/files/1614/9505/0982/ammo-storage02.pdf.

[27] Reliance on contractor personnel during the Global War on Terror and Overseas Contingency Operations (the term used by the Obama Administration) drew considerable interest and controversy. See CRS Report R43074, *Department of Defense's Use of Contractors to Support Military Operations: Background, Analysis, and Issues for Congress.*

[28] For more information on the budget enforcement mechanisms enacted as part of the Budget Control Act, see CRS Report R44874, *The Budget Control Act: Frequently Asked Questions*.

[29] These included the creation of new government organizations; invocations of the DPA; and authorizations of multi-year procurement. Refer to the "Government Stewardship" section of this report for more information.

the COVID-19 pandemic) to a record high in June 2023 and continuing to rise through the time of this writing.[30]

Contemporary Overview

The contemporary DIB encompasses a large number of organizations and facilities supporting a diverse array of military requirements. DIB-related sites are spread across the United States and range from sprawling corporate 'campuses' with multiple production lines to research laboratories and office buildings.

There are many ways to conceptually divide the DIB—by platform supported (e.g., submarines, combat aircraft), by public law title supported (i.e., RDT&E, Procurement, Operation and Maintenance, Military Personnel, or Military Construction), by production function (testing, final assembly, etc.), by the value or workforce size of constituent entities, or by ownership model (i.e., government-owned, government-operated; government-owned, contractor-operated; or contractor-owned, contractor-operated). This report divides the DIB into two broad sectors: the *commercial sector*, in which the chief actors are private firms operated on a for-profit basis, and the *nonprofit and public sector*, in which the chief actors are government bodies and academic or scientific institutions operated on a not-for-profit basis.

Commercial Sector

Compared to other parts of the U.S. economy, the commercial defense industry is unique in several important ways. Because the federal government is effectively the only buyer for most defense products and services, the commercial DIB may be described as a *monopsony* market environment.[31] Additionally, many firms in the commercial DIB focus primarily or even exclusively on defense, leading some analysts to argue the sector as a whole is isolated from the broader U.S. economy.[32]

The defense industry is also highly regulated, with many of its products and services subject to restrictions on both domestic possession or usage and international import or export.[33] In addition, defense contractors are required to comply with an array of government requirements intended to protect sensitive information and systems.[34]

[30] Refer to Federal Reserve data presented in **Figure 2.** See also Matthew Boesler and Roxana Tiron, "U.S. Industrial Production of Defense Equipment Hits Record High," *Bloomberg Government*, July 18, 2023. Note that the Federal Reserve dataset begins in 1947 and thus does not include World War II.

[31] See, for instance, R. Carril and M. Duggan, "The Impact of Industry Consolidation on Government Procurement," National Bureau of Economic Research, October 2018, p. 28.

[32] Gregory Allen and Doug Berenson, "Why Is the U.S. Defense Industrial Base So Isolated from the U.S. Economy?" CSIS, August 20, 2024, https://www.csis.org/analysis/why-us-defense-industrial-base-so-isolated-us-economy.

[33] See, for instance, 27 C.F.R. Part 479.

[34] This may include obtaining and maintaining security clearances for contractor employees, constructing and maintaining secure facilities, etc. According to the Defense Counterintelligence and Security Agency (DCSA), there are approximately 12,500 contractor facilities cleared to handle classified information. See DOD, "National Industrial Security Program," DCSA, https://www.dcsa.mil/Industrial-Security/National-Industrial-Security-Program-Oversight/.

Because of the sector's unusually direct reliance on government spending, some contractors fund extensive lobbying activities.[35] Commercial defense firms also employ tens of thousands of former DOD personnel, both military and civilian.[36]

The commercial sector constitutes the largest element of the DIB, both in terms of resources, facilities, and personnel employed as well as the value of the products and services provided to the U.S. government. According to a 2023 report by the National Defense Industrial Association (a defense industry trade association), the defense industry employed 1.1 million U.S. workers and encompassed 59,678 companies as of 2021.[37] In FY2023, DOD spending on contracts with DIB suppliers in the 50 states and the District of Columbia totaled $440.7 billion, or approximately 1.61% of the total U.S. gross domestic product (GDP) for calendar year 2023.[38] According to DOD, about 50% of FY2023 contract spending went toward supplies and equipment, 37% went to services, 10% went to research and development., and 3% went to construction.[39] As **Figure 3** shows, this spending was distributed across the country, with contractors located in Texas, Virginia, California, Connecticut, and Florida receiving the largest amounts.[40]

[35] In 2022, for instance, the nonprofit group OpenSecrets claimed that defense contractors spent over $100 million on lobbying activities. Taylor Giorno and Filip Timotija, "Defense Sector Spent $101 Million on Lobbying During the First Three Quarters of 2022," OpenSecrets, November 3, 2022. To characterize the relationship between defense contractors and government more broadly, analysts have described the commercial DIB as part of an *iron triangle*—that is, "a political relationship that brings together three key participants in a clearly delineated area of policy-making"—comprised of private industry, DOD, and Congress. See Gordon Adams, *The Politics of Defense Contracting: The Iron Triangle* (New York: Council on Economic Priorities, 1981).

[36] In 2019, the Government Accountability Office found that over 37,000 former DOD personnel were employed at 14 defense contractors whose employment figures the organization reviewed. U.S. Government Accountability Office, *Post-Government Employment Restrictions*, GAO-21-104311, September 9, 2021.

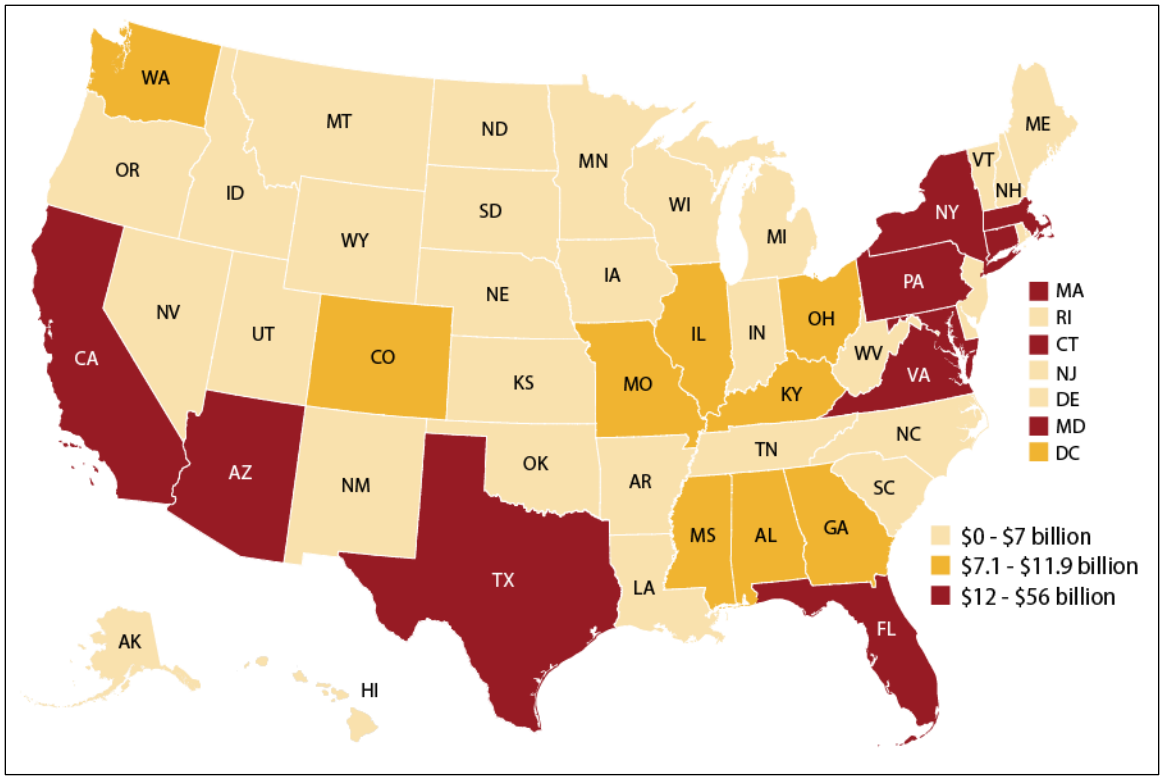
[37] Jennifer Stewart et al., "Vital Signs 2023: Posturing the U.S. Defense Industrial Base," National Defense Industry Association, February 2023, https://www.ndia.org/policy/publications/vital-signs.

[38] DOD Office of Local Defense Community Cooperation (OLDCC), *Defense Spending by State—Fiscal Year 2023 Executive Summary*, May 2024, https://oldcc.gov/resource/fy23-defense-spending-state-executive-summary. Note that OLDCC figures are estimates and may be subject to revision. Current-dollar GDP figure of $27.36 trillion from the Bureau of Economic Analysis, https://www.bea.gov/news/2024/gross-domestic-product-fourth-quarter-and-year-2023-second-estimate.

[39] OLDCC, *Defense Spending by State—Fiscal Year 2023 Executive Summary*, p. 1.

[40] OLDCC, *Defense Spending by State—Fiscal Year 2023 Executive Summary*, p. 1.

Figure 3. DOD Contract Spending by State, FY2023



Source: CRS graphic based on DOD contract spending data provided in OLDCC, *Defense Spending by State—Fiscal Year 2023 Executive Summary*, May 2024, https://oldcc.gov/resource/fy23-defense-spending-state-executive-summary.

Notes: OLDCC figures are estimates and may be subject to revision.

The 'Big Five'

Considered in terms of both total market capitalization and annual DOD contract spending, the commercial sector is dominated by five large, publicly traded U.S. firms, sometimes referred to as the 'Big Five' (see **Table 1** below).

Table 1. Five Largest U.S. Defense Contractors

Company	Location of Corporate HQ	FY2022 DOD Contract Obligations	Total Market Capitalization[a]	Employees
Lockheed Martin (LMT)	Bethesda, MD	$44.5 billion	$136.39 billion	122,000
RTX (RTX)	Arlington, VA	$25.4 billion	$160.03 billion	185,000
General Dynamics (GD)	Reston, VA	$21.5 billion	$83.09 billion	111,600
Boeing Co (BA)	Arlington, VA	$14.2 billion	$98.63 billion	171,000
Northrop Grumman (NOC)	Falls Church, VA	$12.8 billion	$76.04 billion	101,000

Sources: Annual DOD contract obligation figures are from OLDCC, *Defense Spending by State—FY2022.* Market capitalization and employee figures are from *The Wall Street Journal,* "Market Data" (https://www.wsj.com/market-data/quotes/company-list; information current as of September 11, 2024).

Notes: Each firm's New York Stock Exchange ticker symbol is in parentheses.

a. As of September 11, 2024. Market capitalization refers to the total value of a publicly traded company's outstanding shares of stock and may vary considerably over time.

Over the past four fiscal years, these five firms have tended to receive about one-third of all annual DOD contract obligations in the United States (the group received approximately 30.3% of FY2022 obligations, 29.1% of FY2021 obligations, 34.6% of FY2020 obligations, and 31% of FY2019 obligations).[41] Of the 78 major weapons systems DOD identified in its FY2024 budget materials, 58—over 74% of the total—featured at least one of the 'Big Five' as a prime contractor.[42] All five of these companies (or their predecessors) have been major recipients of defense contracts since at least the 1950s.[43] In addition to supplying the U.S. government with defense articles and services, these companies also supply foreign governments through Foreign Military Sales (FMS) and Direct Commercial Sales (DCS).[44]

Considered in an international context, these five firms also occupy dominant positions. In a 2024 *Defense News* ranking of global defense companies by annual revenues, Lockheed Martin, RTX, Northrop Grumman, General Dynamics, and Boeing ranked first, third, fourth, fifth, and sixth, respectively.[45] Other firms in the global top 10 were the Aviation Industry Corporation of China (PRC, #2), BAE Systems (United Kingdom, #7), China State Shipbuilding Corporation Limited (PRC, #8), China North Industries Group Corporation Limited (PRC, #9), and L3Harris Technologies (United States, #10).[46]

Other Large Firms

In addition to the 'Big Five,' the DIB includes numerous other large U.S. commercial firms. These include industrial concerns specializing in the production of specific systems (such as the shipbuilder Huntington Ingalls Industries or the automotive manufacturer AM General), companies focused on providing services (such as Amentum, ManTech, or Booz Allen Hamilton), and corporations that generate most of their revenue from the civilian market (such as Microsoft or IBM).

[41] CRS analysis of obligation information provided in OLDCC's FY2022, FY2021, FY2020, and FY2019 "Defense Spending by State" reports. Available at https://oldcc.gov/sites/default/files/defense-spending-rpts/oldcc_dsbs_fy2021_final_web_revised.pdf (FY2021); https://oldcc.gov/sites/default/files/op-034-oldcc_dsbs_fy2020-sm1.1_chax_r2.pdf (FY2020); and https://oldcc.gov/sites/default/files/defense-spending-rpts/oldcc_dsbs_fy2019_final_web.pdf (FY2019).

[42] CRS analysis of information provided in DOD, "FY2024 Program Acquisition Costs by Weapon System," March 2023, https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2024/FY2024_Weapons.pdf.

[43] For example, all five firms (or their predecessors) were in the top 25 defense contractors by DOD obligations for the period FY1958-1960. Peck and Scherer, *The Weapons Acquisition Process*, p. 613.

[44] The FMS process is managed by the U.S. government, whereas DCS allows U.S. companies to sell articles and services directly to foreign customers. For more information, see CRS Report R46337, *Transfer of Defense Articles: U.S. Sale and Export of U.S.-Made Arms to Foreign Entities*.

[45] "Top 100 for 2024," *Defense News*, August 6, 2024, https://people.defensenews.com/top-100/.

[46] Ibid.

Venture Capital and Start-Ups in the Defense Industry

Over the past several years, the role of *venture capital* (VC)—financing provided to new or small firms with high growth potential (i.e., *start-ups*)—in the defense industry has increased considerably.[47] Since 2021, VC investors have provided defense companies with more than $130 billion in funding; according to *The Wall Street Journal*, about 100 defense start-ups have been founded during this same period.[48]

Examples of VC investors active in the defense sector include the Founders Fund, Andreesen Horowitz, Scout Ventures, Lux Capital, and the CIA-established fund IQT.[49] Examples of defense firms that have received funding from VC investors include Anduril Industries, Palantir Technologies, Shield AI, Epirus, Relativity Space, Saildrone, and Hadrian.[50]

VC-backed companies are involved in the development and production of several high-profile weapon systems and capabilities, including the Collaborative Combat Aircraft, the Maven Smart System, and the Replicator initiative.[51] Within the last decade, DOD has established both the Defense Innovation Unit (which is charged with accelerating the adoption of commercial and dual-use technology to solve operational challenges at speed and scale) and the Office of Strategic Capital (which seeks to facilitate and scale private investment in critical supply chain technologies), both of which have undertaken efforts to integrate more defense start-ups into DOD's supplier base.[52] Despite this, VC-backed firms still represent a relatively small proportion of the DIB when measured by contract obligations, reportedly receiving less than 1% of DOD contract awards in FY2023.[53]

Many analysts have suggested that VC support is facilitating the growth of a more diverse slate of defense suppliers, especially start-ups.[54] Some claim that this will catalyze innovation across a range of capability areas, and expand both the capacity and the efficiency of the DIB as a whole.[55] Others have questioned the ability of newer firms to deliver, arguing that overreliance on such suppliers could introduce additional risk into the defense ecosystem.[56]

Small Businesses

For the purposes of government contracting, *small businesses* are businesses that both meet the statutory definition of a small business and fall below certain size standards, as determined by the

[47] For more information on VC, see CRS In Focus IF12412, *Venture Capital Operations and Regulation*, by Eva Su.

[48] Media reports suggest that annual VC investment in defense firms has increased fivefold since 2016. See Heather Somerville and Sharon Weinberger, "Tech Bros Are Betting They Can Help Win a War with China," *The Wall Street* Journal, August 9, 2024; Heather Somerville, "Investors Are Betting on Defense Startups. The Pentagon Isn't," *The Wall Street Journal*, January 25, 2024; Mark Sullivan, "Pitchbook Says Defense Tech Is a Stalwart in an Otherwise Chilly VC Environment," *Fast Company*, July 9, 2024, https://www.fastcompany.com/91152692/pitchbook-defense-tech-investment-chilly-vc-environment; and Tabby Kinder, "Silicon Valley VCs Rush Into Defence Technology Start-Ups," *Financial Times*, June 20, 2023.

[49] For one overview of VC investors in the defense sector, see Camden Mead, "Venture Capital's Return to Aerospace and Defense," 47G, April 12, 2024, https://www.47g.org/resources/venture-capital-return-aerospace-defense/.

[50] Ibid. According to *The Wall Street* Journal, there are now more than twelve defense "unicorns," or privately held companies worth more than $1 billion. Somerville and Weinberger, "Tech Bros Are Betting They Can Help Win a War with China," *The Wall Street Journal*, August 9, 2024.

[51] Anduril Industries, "Anduril Selected for U.S. Air Force Collaborative Combat Aircraft Program," press release, April 24, 2024, https://www.anduril.com/article/anduril-air-force-collaborative-combat-aircraft-CCA/; Courtney Albon, "Palantir Wins Contract to Expand Access to Project Maven AI Tools," *C4ISRNet*, May 30, 2024; and Defense Innovation Unit, "Replicator," https://www.diu.mil/replicator.

[52] Defense Innovation Unit, "About," https://www.diu.mil/about; and Office of Strategic Capital, https://www.cto.mil/osc/.

[53] Heather Somerville, "Investors Betting on Defense Startups," *The Wall Street Journal*.

[54] Ibid. See also Josipa Majic Predin, "VCs Fuel the Boom in Defense and Military Startups Amid Global Conflicts," *Forbes*, November 2, 2023.

[55] See, for example, Brian Schimpf and Morgan Brennan, "Securing America's Future: How Technology Companies and Washington Are Building A Safer World," Andreesen Horowitz, March 5, 2024, https://a16z.com/securing-americas-future-how-technology-companies-and-washington-are-building-a-safer-world/.

[56] See, for example, Andrew Cockburn, "The Pentagon's Silicon Valley Problem," *Harper's*, March 2024.

Small Business Administration (SBA).[57] Per the terms of the Small Business Act (P.L. 85-536), a small business is "one which is independently owned and operated and which is not dominant in its field of operation."[58] In addition, it must be "organized for profit, with a place of business located in the United States, and … operate primarily within the United States or … make a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor."[59] Across the federal government, small businesses are eligible for preferential consideration with respect to certain categories of contracting actions (including the exclusive reservation of certain contracts) as well as numerous assistance and investment programs.[60]

Summarizing the role small businesses play in the DIB, Secretary of Defense Lloyd J. Austin III has stated that they "keep [U.S.] military forces combat ready with critical parts, cutting edge technology, and top-notch services, and fortify [U.S.] defense supply chains in times of crisis."[61] Although a majority of defense contractors are small businesses, they collectively receive a minority of DOD contract obligations.[62] DOD reports that, between FY2011 and FY2020, between 25,000 and 30,000 small businesses have received direct contract obligations annually, and that such entities constitute "over 70% of the companies that do business with the Department."[63]

Nonprofit and Public Sector

The nonprofit and public sector of the DIB is diverse, encompassing university and government affiliated research centers, DOD laboratories and test facilities, and government-owned industrial sites, among other entities. Considered in terms of military functions, this sector primarily supports RDT&E activities, the production of conventional ammunition, and the maintenance, repair, and overhaul of weapon systems.

FFRDCs and UARCs

DOD relies on *federally funded research and development centers* (FFRDCs) and *university affiliated research centers* (UARCs) to conduct research, development, and related activities to identify, assess, develop, and transition technologies and concepts for military use.

FFRDCs are government-owned research institutions operated or administered by universities, not-for-profit organizations, or industrial firms. Per the Federal Acquisition Regulation (FAR), they are intended to "meet some special long-term research or development need which cannot be met as effectively by existing in-house or contractor resources."[64] Each FFRDC is sponsored by a

[57] For more information on small businesses and government contracting generally, see CRS Report R45576, *An Overview of Small Business Contracting*. SBA size standards are determined by NAICS code and updated regularly. See Small Business Administration, "Table of Small Business Size Standards," June 21, 2023, https://www.sba.gov/federal-contracting/contracting-guide/size-standards.

[58] 15 U.S.C. §632(a).

[59] 13 C.F.R. §121.105.

[60] See CRS Report R45576, *An Overview of Small Business Contracting*.

[61] DOD, "Small Business Strategy," January 2023, p. 5.

[62] According to DOD, small businesses tended to receive between $50 billion and $80 billion in annual contract obligation between FY2011 and FY2020. Ibid.

[63] In FY2021, "73% of all companies that did business with DOD and 77% of all the research and development companies that did business with DOD were small businesses." Ibid.

[64] FAR 35.017, "Federally Funded Research and Development Centers."

federal agency. According to the National Science Foundation, there were 43 active FFRDCs as of February 2024, of which 10 were sponsored by DOD (see **Table 2**).[65]

Table 2. DOD-sponsored FFRDCs

FFRDC	Location	Administrator	Activity Type
Center for Communications and Computing	Alexandria, VA	Institute for Defense Analyses	R&D Laboratory
Lincoln Laboratory	Lexington, MA	Massachusetts Institute of Technology	R&D Laboratory
Software Engineering Institute	Pittsburgh, PA	Carnegie Mellon University	R&D Laboratory
Arroyo Center	Santa Monica, CA	RAND Corporation	Study and Analysis Center
Project Air Force	Santa Monica, CA	RAND Corporation	Study and Analysis Center
National Defense Research Institute	Santa Monica, CA	RAND Corporation	Study and Analysis Center
Center for Naval Analyses	Arlington, VA	CNA Corporation	Study and Analysis Center
Systems and Analyses Center	Alexandria, VA	Institute for Defense Analyses	Study and Analysis Center
Aerospace FFRDC	El Segundo, CA	The Aerospace Corporation	Systems Engineering and Integration Center
National Security Engineering Center	Bedford, MA and McLean, VA	MITRE Corporation	Systems Engineering and Integration Center

Source: National Science Foundation, "Master Government List of FFRDCs," February 2024, https://ncses.nsf.gov/resource/master-gov-lists-ffrdc.

Notes: DOD reports that the total number of permanent technical staff employed by its sponsored FFRDCs is approximately 6,000. See USD R&E, "DOD FFRDCs," https://rt.cto.mil/ffrdc-uarc/.

UARCs are nonprofit research organizations affiliated with a university and possessing one or more "core competencies" (which DOD defines as "areas of domain expertise or specialization") that relate to DOD's engineering, research, or development needs.[66] Established in 1996, DOD's UARC program currently includes 14 organizations, each of which is affiliated with a DOD office that serves as a "primary sponsor" (see **Table 3**).

Table 3. DOD UARCs

UARC	University	Primary Sponsor
Georgia Tech Research Institute	Georgia Institute of Technology	Army
Institute for Soldier Nanotechnologies	Massachusetts Institute of Technology	Army
Institute for Collaborative Biotechnologies	University of California, Santa Barbara	Army
Institute for Creative Technologies	University of Southern California	Army

[65] DOD further subdivides its FFRDCs by activity types: 3 are classified as *research and development laboratories*, 5 are *study and analysis centers*, and 2 are *systems engineering and integration centers*. In addition to DOD-sponsored FFRDCs, Department of Energy FFRDCs—which include the U.S. National Laboratories—support numerous defense applications, especially those connected with the nuclear enterprise. For more information on FFRDCs, see CRS Report R44629, *Federally Funded Research and Development Centers (FFRDCs): Background and Issues for Congress*.

[66] Under Secretary of Defense for Research and Engineering, "FFRDC/UARC," https://rt.cto.mil/ffrdc-uarc/.

UARC	University	Primary Sponsor
Applied Physics Laboratory (JHU)	Johns Hopkins University	Navy
Applied Physics Laboratory (UW)	University of Washington	Navy
Applied Research Laboratory (PSU)	Penn State University	Navy
Applied Research Laboratory (UH)	University of Hawaii	Navy
Applied Research Laboratories (UT-Austin)	University of Texas at Austin	Navy
Space Dynamics Laboratory	Utah State University	Missile Defense Agency
Systems Engineering Research Center	Stevens Institute of Technology[a]	DOD
Applied Research Laboratory for Intelligence & Security	University of Maryland, College Park	Office of the Under Secretary of Defense for Intelligence & Security
National Strategic Research Institute	University of Nebraska	U.S. Strategic Command
Geophysical Detection of Nuclear Proliferation	University of Alaska	Deputy Assistant Secretary of Defense for Threat Reduction and Control
Research Institute for Tactical Autonomy	Howard University	Air Force

Source: Under Secretary of Defense for Research & Engineering, "FFRDC/UARC," https://rt.cto.mil/ffrdc-uarc/

Note:

a. Stevens Institute of Technology is the lead university, but more than 20 other "collaborating universities" also participate in the Systems Engineering Research Center.

DOD Laboratories

DOD operates a network of 20 *science and technology reinvention laboratories*, designated as such by 10 U.S.C. §4121 (see **Table 4**). According to DOD's FY2024 budget materials, these laboratories "include dozens of facilities across 22 states and employ tens of thousands of uniformed, civilian and contractor scientists, engineers, and support personnel"; their activities range from "basic research to defense system acquisition support to direct operational support of deployed forces."[67]

Table 4. DOD Science and Technology Reinvention Laboratories

Laboratory	Military Department
Air Force Research Laboratory	Air Force
Joint Warfare Analysis Center	Joint
Army Research Institute for the Behavioral and Social Sciences	Army
Combat Capabilities Development Command (CCDC) Armaments Center	Army
CCDC Aviation and Missile Center	Army
CCDC Chemical Biological Center	Army
CCDC C5ISR Center[a]	Army

[67] Office of the Under Secretary of Defense (Comptroller), "FY2024 Defense Budget Overview," March 2023, p. 79 (4-20), https://comptroller.defense.gov/portals/45/documents/defbudget/fy2024/fy2024_budget_request_overview_book.pdf.

Laboratory	Military Department
CCDC Ground Vehicle Systems Center	Army
CCDC Soldier Center	Army
Engineer Research and Development Center	Army
Medical Research and Development Command	Army
Technical Center, US Army Space and Missile Defense Command	Army
Naval Air Systems Command Warfare Centers	Navy
Naval Facilities Engineering Command Engineering and Expeditionary Warfare Center	Navy
Naval Information Warfare Centers, Atlantic and Pacific	Navy
Naval Medical Research Center	Navy
Naval Research Laboratory	Navy
Naval Sea Systems Command Warfare Centers	Navy
Office of Naval Research	Navy

Source: 10 U.S.C. §4121.

Notes: Some laboratories consist of multiple subordinate units with varying degrees of autonomy. For example, the Naval Sea Systems Command Warfare Centers consist of 10 sites spread across the United States (see NAVSEA, "Warfare Centers," at https://www.navsea.navy.mil/Home/Warfare-Centers/Who-We-Are/).

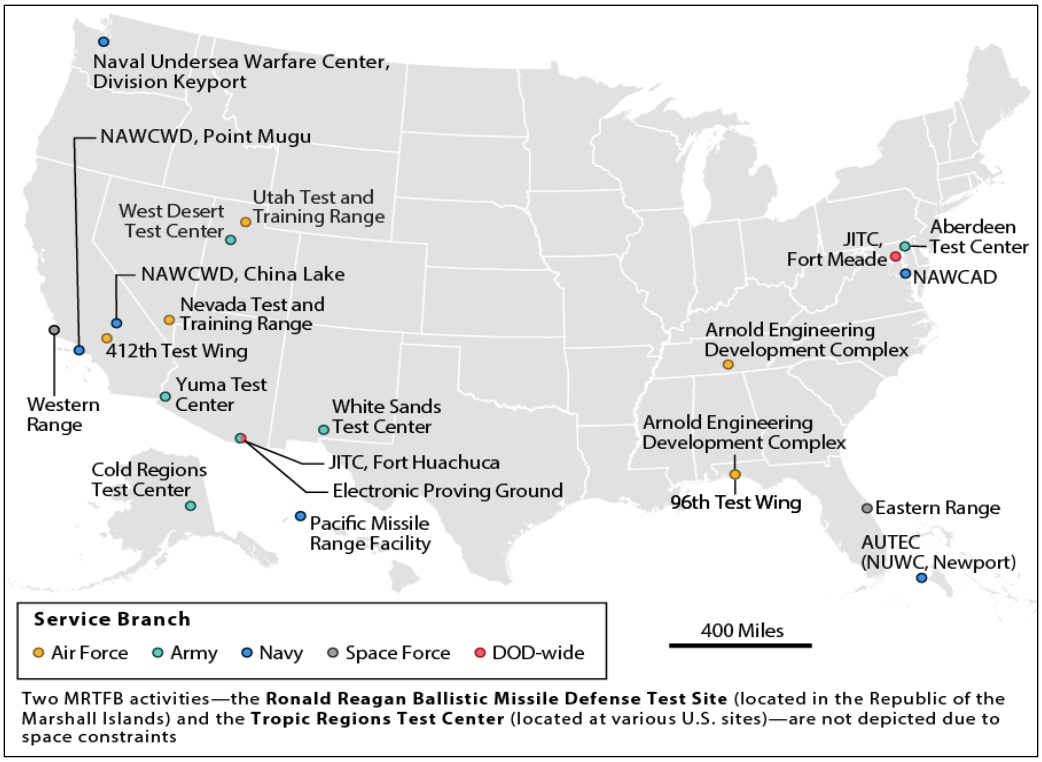
a. C5ISR is a commonly used acronym that stands for Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance.

DOD Ranges and Test Facilities

To test and demonstrate new technologies and capabilities, DOD operates a network of 23 "activities" that together constitute the Manufacturing Range and Test Facility Base (MRTFB). According to DOD, this infrastructure functions as a "national asset to provide [testing and evaluation] capabilities to support the DOD acquisition system." As of 2023, the MRTFB was supported by approximately 30,000 personnel, and encompassed about 18,000 square miles of land and 180,000 square miles of airspace (see **Figure 4**).[68]

[68] For a description of the MRTFB, see Department of Defense, "DOD Directive 3200.11," October 15, 2018, http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/320011p.pdf. For more recent information on personnel and area, see Office of the Under Secretary of Defense (Comptroller), "FY2024 Defense Budget Overview," March 2023, p. 79 (4-20), https://comptroller.defense.gov/portals/45/documents/defbudget/fy2024/fy2024_budget_request_overview_book.pdf.

Figure 4. DOD Major Range and Test Facility Base



Source: CRS graphic developed from DOD, "DOD Directive 3200.11," October 15, 2018.

Notes: To allow for their inclusion in this map, Alaska, Hawai'i, and the Bahamas are not depicted to scale. Note that AUTEC is located in the Bahamas, outside the territory of the United States.

a. *Acronyms*: NAWCAD stands for Naval Air Warfare Center, Aircraft Division; NAWCWD stands for Naval Air Warfare Center, Weapons Division; JITC stands for Joint Interoperability Test Command; and AUTEC stands for Atlantic Undersea Test and Evaluation Center.

Government-Owned Production and Maintenance Facilities

DOD also maintains a network of industrial facilities that produce certain kinds of equipment (mainly conventional ammunition) and conduct repair, maintenance, and overhaul activities for various weapons systems. Often referred to as the *organic industrial base*, this network includes a variety of government-owned sites, including *Army ammunition plants* (AAPs) and related facilities as well as *covered depots*.[69] These facilities may be either contractor-operated (as in the case of AAPs) or government-operated (as in the case of covered depots).

DOD maintains five government-owned, contractor-operated (GOCO) AAPs, as well as at least nine other industrial sites that support ammunition-related activities (see **Figure 5**). The GOCO AAPs produce most of the military's conventional ammunition, propellants, and explosives.[70] In

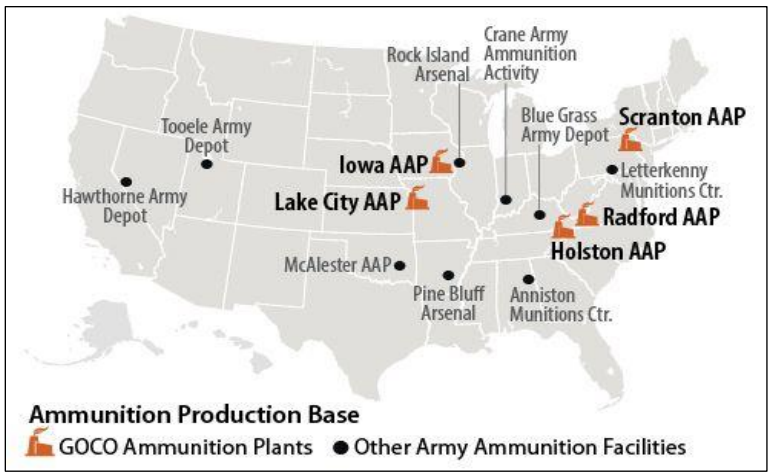
[69] The organic industrial base may also include other government-owned facilities that are not specifically identified in this section. See 10 U.S.C. §2476 regarding covered depots. AAPs are not statutorily defined.

[70] For more information on ammunition production facilities, see CRS In Focus IF12251, *Defense Primer: Conventional Ammunition Production Industrial Base*.

May 2024, the Army also opened a new Universal Artillery Projectile Lines facility to produce metal parts for large caliber ammunition in Mesquite, TX.[71]

Figure 5. Ammunition Facilities

Army Ammunition Plants and Related Facilities



Source: CRS analysis of Joint Munitions Command data as of 2023.

Notes: The Universal Artillery Projectile Lines facility in Mesquite, TX is not depicted.

DOD owns and operates 21 government-owned, government-operated (GOGO) maintenance locations statutorily designated as "covered depots."[72] These depots conduct *depot-level maintenance and repair,* which is defined as "material maintenance or repair requiring the overhaul, upgrading, or rebuilding of parts, assemblies, or subassemblies, and the testing and reclamation of equipment."[73] Each military department (MILDEP) resources and manages the facilities that service its equipment; depending on the MILDEP and function, these may be called depots, arsenals, shipyards, fleet readiness centers, air logistics centers, or logistics bases (see **Figure 6**).[74]

[71] U.S. Army Public Affairs, "Army Inaugurates Universal Artillery Projectile Lines Facility," May 29, 2024, https://www.army.mil/article/276727/army_inaugurates_universal_artillery_projectile_lines_facility.

[72] 10 U.S.C. §2476.

[73] 10 U.S.C. §2460.

[74] For more information on covered depots, see CRS In Focus IF11466, *Defense Primer: Department of Defense Maintenance Depots*.

Figure 6. Covered Depots

DOD Facilities Designated as "Covered Depots" by 10 U.S.C. §2476

Source: CRS graphic based on 10 U.S.C. §2476.

Stockpiles

To ensure the availability of resources in emergency or wartime conditions, the U.S. government stockpiles certain defense-related products and materials. One such stockpiling program is the National Defense Stockpile (NDS), a DOD-managed reserve of strategic and critical materials intended to reduce or eliminate U.S. dependence on foreign or unreliable sources for materials vital to national defense.[75] As of March 2023, the NDS contained over 49 materials collectively valued at over $912.3 million.[76] Other DIB-relevant stockpiles include the Strategic Petroleum Reserve, which contains crude oil, and the Strategic National Stockpile, which contains medical supplies.[77]

Government Stewardship

Owing to the DIB's national security importance—as well as its dependence on government action—the executive and legislative branches devote significant attention to matters of resourcing, management, and oversight. Executive branch officials and organizations conduct administrative and assessment activities intended to accomplish a variety of purposes, including ensuring the DIB can meet military requirements. Congress considers and passes legislation (including the establishment or modification of industrial base statutes, programs, and policies, as well as relevant appropriations) and conducts oversight and public information activities.

[75] For more information, see CRS Report R47833, *Emergency Access to Strategic and Critical Materials: The National Defense Stockpile*, by Cameron M. Keys.

[76] CRS Report R47833, *Emergency Access to Strategic and Critical Materials: The National Defense Stockpile*.

[77] For more information on the Strategic Petroleum Reserve, see CRS Report R46355, *The Strategic Petroleum Reserve: Background, Authorities, and Considerations*; for more information on the Strategic National Stockpile, see CRS Report R47400, *The Strategic National Stockpile: Overview and Issues for Congress*.

The Role of the Executive

The President and the executive branch exercise a broad range of powers and responsibilities relating to the DIB. The President, as Commander in Chief, determines many of the objectives and requirements that the industrial base must support. Whether directly (as in the case of government entities) or indirectly (as in the case of private industry), the structure and output of the DIB are shaped by presidential priorities regarding national strategy, military requirements, and DOD policies and practices. Statutorily identified policy documents that reflect and articulate these priorities include

- The National Security Strategy;[78]
- The National Defense Strategy;[79] and
- The Future-Years Defense Program (FYDP).[80]

The President may also set policy and issue direction relating to the DIB through executive orders, presidential memoranda, and other administrative mechanisms, and possesses other statutorily conferred authorities relating to the management of defense production under the Defense Production Act of 1950 (described in a separate section below).[81]

Within the executive branch, DOD has primary responsibility for management of the DIB. Within DOD, the Under Secretary of Defense for Acquisition and Sustainment (USD (A&S)) is statutorily designated as the official responsible for "establishing policies for access to, and maintenance of, the defense industrial base and materials critical to national security."[82] The Assistant Secretary of Defense for Industrial Base Policy (ASD (IBP)) executes many of USD (A&S)'s industrial base responsibilities on a day-to-day basis.

In January 2024, DOD published its first ever National Defense Industrial Strategy, setting forth the Department's priorities for managing the DIB (see **shaded textbox** below).[83]

National Defense Industrial Strategy (NDIS)

In January 2024, DOD issued the National Defense Industrial Strategy. According to ASD (IBP) Dr. Laura Taylor-Kale, the aim of the strategy is to "guide the Department's engagement, policy development and investment in the industrial base over the next three to five years." To do this, the NDIS identifies DOD's four "long-term priorities" for the DIB:

- Resilient supply chains;
- workforce readiness;
- flexible acquisition; and
- economic deterrence.

The NDIS also provides details on risks and "illustrative outcomes" associated with each priority, as well as ten "systemic challenges" facing the industrial base (these are underutilization of multi-use technologies, an inadequate workforce, inadequate domestic production, non-competitive practices, long lead times, subtier supplier fragility,

[78] Prepared pursuant to Section 108 of the National Security Act of 1947 (codified at 50 U.S.C. §3043).

[79] Prepared pursuant to 10 U.S.C. §113(g).

[80] Prepared pursuant to 10 U.S.C. §221.

[81] Recent examples include Executive Order 13806 (issued in 2017), which directed DOD to assess the DIB and its supply chains as a whole, and Executive Order 14017 (issued in 2021), which directed DOD to, inter alia, assess supply chains for critical minerals and strategic materials.

[82] 10 U.S.C. §133b (3).

[83] For more information on the NDIS, see also CRS Insight IN12310, *The 2024 National Defense Industrial Strategy: Issues for Congress*, by Luke A. Nicastro.

lack of DOD market share, procurement instability, funding uncertainty, and limited knowledge of ally/partner requirements).

In July 2024, DOD released the NDIS Interim Implementation Report, intended to characterize its progress implementing the actions identified in the NDIS. This report identified a number of recent actions that the Department claims support its four long-term priorities. Some of the most significant include

- Multiple DPA Title III and Industrial Base Fund (IBF) awards;[84]
- The opening of a new GOCO facility to manufacture modular metal parts for artillery munitions;[85]
- The establishment of a Defense Industrial Base Consortium (DIBC) Other Transaction Authority (OTA);[86]
- The execution of multi-year procurements for six munitions;[87]
- The announcement of multiple vehicles and strategies for international defense industrial collaboration;[88]
- The publication of the Defense Industrial Base Cybersecurity Strategy;[89] and
- The release of the Office of Strategic Capital's first Investment Strategy.[90]

The NDIS may raise several questions for congressional consideration, including: whether or not to enact additional appropriations; whether or not to create or modify industrial base authorities; how to prioritize among competing NDIS recommendations; and how to oversee NDIS implementation. For further discussion, see CRS Insight IN12310, *The 2024 National Defense Industrial Strategy: Issues for Congress*, by Luke A. Nicastro.

Assistant Secretary of Defense for Industrial Base Policy

The Assistant Secretary of Defense for Industrial Base Policy (ASD (IBP)) serves as the principal advisor to USD (A&S) on matters related to the DIB. ASD (IBP)'s organizational remit includes

- Developing DOD policies for the maintenance of the U.S. DIB;
- Executing small business programs and policy;
- Conducting geo-economic analysis and assessments;
- Providing recommendations on budget matters related to the DIB;
- Anticipating and closing gaps in manufacturing capabilities for defense systems;
- Assessing impacts related to mergers, acquisitions, and divestitures;
- Monitoring and assessing impact of foreign investments in the United States; and
- Executing authorities under 10 U.S.C. §4811 and §4852.[91]

The office of the ASD (IBP) is structured by function (see **Figure 7** below). The Deputy Assistant Secretary of Defense for Industrial Base Resilience is responsible for assessing and managing DIB vulnerabilities, developing relevant acquisition and investment strategies, managing

[84] DOD, *National Defense Industrial Strategy: June 2024 Interim Implementation Report*, June 2024, p. 2, https://www.businessdefense.gov/docs/ndis/National%20Defense%20Industrial%20Strategy%20Interim%20Report%20-%20FINAL%20-%2003JUL.pdf.

[85] Ibid., p. 2

[86] Ibid., p. 4.

[87] Ibid., p. 4.

[88] Ibid., p. 5

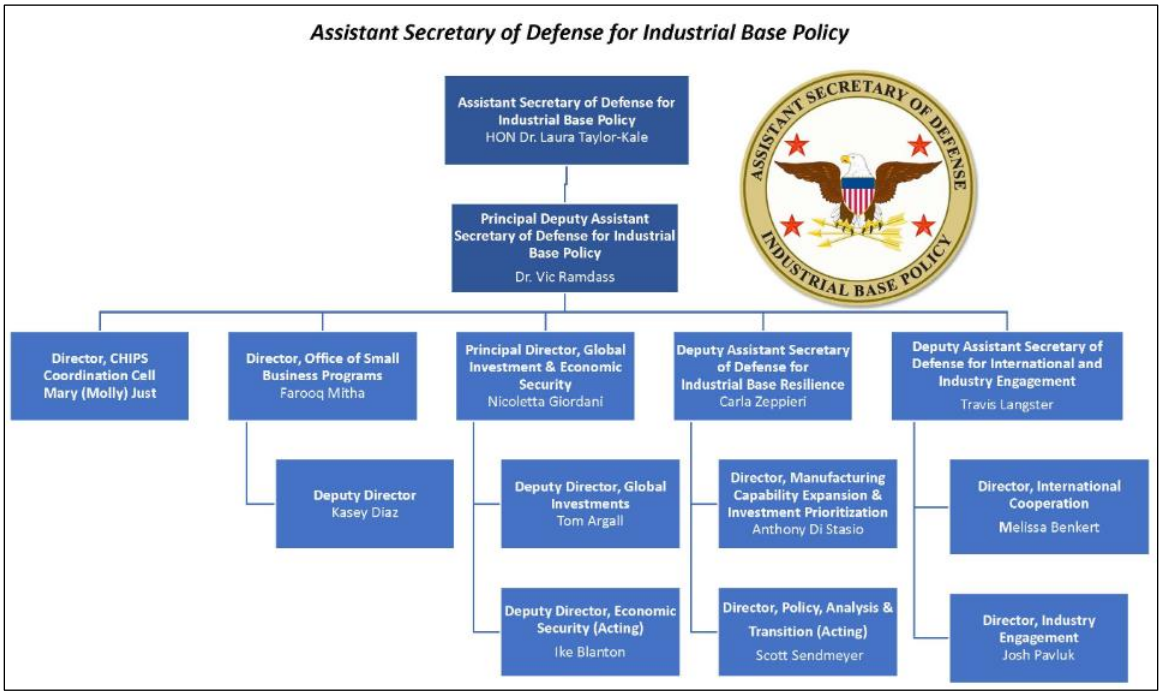
[89] Ibid., p. 2.

[90] Ibid., p. 2.

[91] DOD, "About Industrial Base Policy," accessed September 8, 2024. Available at https://www.businessdefense.gov/about-us.html.

vulnerabilities posed by adversarial capital, and supporting the DIB workforce.[92] The Deputy Assistant Secretary of Defense for International & Industry Engagement is responsible for managing partnerships and engaging with domestic DIB entities as well as foreign governments and industry.[93] The Office of Small Business Programs (OSBP) manages policy, administers funding, and coordinates programs intended to increase small business participation in the DIB.[94] Finally, the Director of the CHIPS Coordination Cell oversees DOD activities related to the CHIPS and Science Act (P.L. 117-167), the Defense Microelectronics Cross-Functional Team, and certain efforts involving microelectronics acquisition.[95]

Figure 7. ASD (IBP) Organizational Chart



Source: ASD (IBP), "About Industrial Base Policy," https://www.businessdefense.gov/about-us.html, accessed September 23, 2024.

Other DOD Organizations

Given the size, complexity, and military importance of the DIB, many other DOD organizations are also involved in industrial base matters. At the Office of the Secretary of Defense (OSD) level, these include the Offices of the Under Secretaries of Acquisition and Sustainment (A&S) and Research and Engineering (R&E), the Defense Logistics Agency (DLA), the Office of Strategic Capital (OSC), the Defense Contract Management Agency (DCMA), the Defense

[92] To execute these functions, DASD (IBR) conducts industrial base assessments, monitors and advises on foreign investment risks, and administers DPA Title III, Industrial Base Fund, and related activities. ASD (IBP), "DASD Industrial Base Resilience," https://www.businessdefense.gov/ibr/index.html.

[93] ASD (IBP), "DASD International and Industry Engagement," https://www.businessdefense.gov/icie/index.html.

[94] OSBP-managed programs include the Mentor-Protégé Program and the Indian Incentive Program. Relevant policy documents relating to OSBP's role include DOD Instructions 5134.04 ("Director of Small Business Programs") and 4205.01 ("DOD Small Business Programs." For more information, see Office of Small Business Programs, "About," https://business.defense.gov/About/.

[95] ASD (IBP), "Molly Just Official Bio," https://www.businessdefense.gov/leadership/docs/Just-official.pdf.

Counterintelligence and Security Agency (DCSA), the Defense Security Cooperation Agency (DSCA), and others. Each military department (MILDEP) also manages organizations that routinely handle industrial base policy, programs, and engagement in the course of executing their assigned RDT&E, procurement, logistics, planning, and related functions.[96] Publications and administrative mechanisms used to manage DIB issues include DOD forms, directives, instructions, and other issuances.[97] In addition, DOD uses several forums and working groups to coordinate and share information on certain DIB issues.[98]

Other Executive Branch Agencies

In addition to DOD, a number of other agencies and organizations in the executive branch play a role in managing the DIB. The Department of Commerce (DOC) Bureau of Industry and Security (BIS), for example, routinely assesses defense-related technologies, surveys aspects of the broader industrial base, and monitors DIB-related economic and trade developments.[99] DOC-DOD collaboration has also been formalized through a number of interagency agreements, including recent Memoranda of Agreement (MOAs) concerning semiconductors and space-related technologies.[100] Other agencies and organizations with DIB-related roles and responsibilities include the Department of Homeland Security, the members of the Intelligence Community, the Department of Justice and the Federal Trade Commission, and others.

The Defense Production Act of 1950

The Defense Production Act of 1950 (P.L. 81-774; codified as 50 U.S.C. §§4501 *et seq.*), provides the President with an array of authorities to "shape national defense preparedness programs and to take appropriate steps to maintain and enhance the domestic industrial base."[101] Over the past seven decades, successive Administrations have used the DPA as a tool to manage the nation's defense-related productive capacity, invoking its authorities to increase the domestic supply of goods and materials.

These authorities are grouped into titles: Title I allows the President to require private businesses to preferentially accept certain contracts and orders, as well as allocate materials, services, and facilities; Title III allows the President to provide loan guarantees, loans, purchases and purchase commitments, grants, and other financial assistance directly to private businesses (these are paid for by monies appropriated by Congress to the DPA Fund); and Title VII provides the President

[96] As an example, the MILDEPs operate various Program Executive Offices (PEOs) to manage the acquisition of particular weapons systems or categories of equipment.

[97] Industrial base matters tend to be addressed by DOD instructions in the '5000 series' (that is, those with issuance numbers between 5000 and 5100). For active DOD issuances, see Washington Headquarters Service, "DOD Issuances," at https://www.esd.whs.mil/DD/DoD-Issuances/.

[98] According to a 2022 GAO report, these include the Industrial Base Council, the Joint Industrial Base Working Group, and the Supply Chain Resiliency Working Group. See GAO, *DOD Should Take Actions to Strengthen its Risk Mitigation Approach*, July 2022, pp. 5-6.

[99] Department of Commerce, "Industrial Base Assessments," Bureau of Industry and Security, accessed August 9, 2023, https://www.bis.doc.gov/index.php/other-areas/office-of-technology-evaluation-ote/industrial-base-assessments.

[100] DOD, "Department of Commerce and Department of Defense Sign Memorandum of Agreement," press release, July 26, 2023, https://www.defense.gov/News/Releases/Release/Article/3470881/department-of-commerce-and-department-of-defense-sign-memorandum-of-agreement-t/; and Department of Commerce, "Department of Commerce and Department of Defense Sign Memorandum of Agreement," Press Release, September 9, 2022, https://www.commerce.gov/news/press-releases/2022/09/department-commerce-and-department-defense-sign-memorandum-agreement.

[101] 50 U.S.C. §4502.

with a variety of authorities, including the power to establish voluntary agreements with industry, block certain corporate transactions, and obtain industrial base information.

DOD is the executive department most commonly associated with the DPA, and has been consistently involved in the majority of both Title I and Title III actions.[102] However, successive presidential Administrations have delegated DPA-related roles and responsibilities to a variety of executive departments and agencies (the current pattern of delegation was largely established by Executive Order 13603 of March 2012).[103] DOD utilizes the Defense Priorities and Allocations System (DPAS) to exercise Title I authorities, and Title III actions are overseen by ASD (IBP)'s Manufacturing Capability Expansion and Investment Prioritization (MCEIP) office.

The number and variety of DPA actions increased significantly beginning in 2020. The Trump and Biden Administrations used Title I and Title III authorities extensively to respond to the COVID-19 pandemic, including through the prioritization of vaccine-related contracts and the provision of financial assistance and incentives to domestic producers of medical supplies.[104] The Biden Administration has also used Title III authorities to respond to the 2022 Russian invasion of Ukraine (through assistance to munitions and strategic/critical materials producers), as well as to accomplish other policy priorities such as investing in clean energy technologies and expanding the production of strategic/critical materials.[105] By way of historical illustration, the number of Title III projects reported as active by DOD—the largest user of Title III authorities—was 4 in 1994, 37 in 2013, and 56 in 2024.[106]

The Role of Congress

Congress makes appropriations for both acquisition contract actions and the direct funding of government facilities and organizations, meaning that it exercises a high degree of influence over the resourcing of the entire DIB. It also considers and passes legislation to establish or modify statutes, programs, and policy related to industrial base matters. Additionally, Congress oversees both the DIB itself—through hearings, studies, etc.—and the DIB-related actions of DOD and the executive branch as whole.

Resourcing the DIB

The congressional armed services committees and the congressional appropriations committees (particularly the subcommittees on defense) play the largest roles in authorizing and appropriating

[102] The Secretary of Defense is also designated by E.O. 13603 as the DPA Fund manager. Executive Order 13603 of March 16, 2012, available online at https://www.federalregister.gov/documents/2012/03/22/2012-7019/national-defense-resources-preparedness.

[103] Executive Order 13603 of March 16, 2012, available online at https://www.federalregister.gov/documents/2012/03/22/2012-7019/national-defense-resources-preparedness.

[104] Government Accountability Office, *COVID-19: Agencies Are Taking Steps to Improve Future Use of Defense Production Act Authorities*, December 2021. Available online at https://www.gao.gov/assets/gao-22105380.pdf.

[105] DOD, "DPA Title III Status of Funds," February 6, 2024; and Department of Energy, "President Biden Invokes DPA to Accelerate Domestic Manufacturing of Clean Energy," June 6, 2022, available online at https://www.energy.gov/articles/president-biden-invokes-defense-production-act-accelerate-domestic-manufacturing-clean.

[106] The 1994 figure comes from GAO; the 2013 figure comes from testimony by Frank Kendall, then-Under Secretary for Acquisition, Technology, and Logistics, given before the Senate Committee on Banking, Housing, and Urban Affairs on July 16, 2013; and the 2024 figure comes from information provided to the author by DOD's Manufacturing Capability Expansion and Investment Prioritization office. GAO, "Defense Production Act: Foreign Involvement in Title III"; Senate Committee on Banking, Housing, and Urban Affairs, "Oversight of the Defense Production Act: Issues and Opportunities for Reauthorization," July 16, 2023; and DOD, "DPA Title III Status of Funds," February 6, 2024.

funds related to the DIB.[107] Taken in the aggregate, congressional funding decisions for thousands of individual DOD programs and activities constitute a critical factor in determining the size, composition, and function of the industrial base.

Historically, there has been a positive correlation between changes in top-line defense budgets and changes in overall industrial base production. When annual defense spending, especially for RDT&E and Procurement, is trending upward in real terms, DIB output tends to rise as well; conversely, flat or shrinking defense budgets tend to correlate with static or declining industrial output.[108] This has been attributed not only to the short-term impact of providing more funds to suppliers, but also to the perception of budget increases as a longer-term 'demand signal' for the commercial DIB: if contractors believe Congress will continue to raise spending, they may choose to invest in expanding their ability to provide materials, products, and services.[109]

Beyond funding individual acquisition programs, Congress also makes appropriations intended to support the broader DIB. Examples include

- Production Base Support, a budget activity under the Procurement of Ammunition, Army appropriation that funds capital projects at public and private industrial facilities performing ammunition-related functions;[110]
- The DPA Fund, which funds DPA Title III activities;[111] and
- The Industrial Base Fund, which funds efforts to monitor and expand the DIB, address urgent operational needs, and mitigate supply chain vulnerabilities by resourcing DOD's Industrial Base Analysis and Sustainment (IBAS) program element.[112]

Statute, Programs, and Policy

Congress routinely considers and passes legislation focused on managing the DIB. This may involve the creation, modification, or elimination of statutory authorities (e.g., multi-year procurement for certain weapons), programs (e.g., expanding the functions of the Industrial Base Fund), or policies (e.g., issuing a statement of policy regarding the shipbuilding industrial base).

The legislation Congress uses to manage the industrial base varies widely in scope, purpose, and form. The annual National Defense Authorization Act (NDAA) is frequently used as a vehicle for DIB-related provisions, and typically features a subtitle devoted to "industrial base matters" (in the enacted FY2024 NDAA, this was listed as Subtitle E of Title VIII). The topics of industrial base provisions are diverse: recent enacted and proposed NDAA legislation has included provisions intended to incentivize investment in expanding DIB capacity, strengthen supply chain

[107] For more information on the defense appropriations process generally, see CRS In Focus IF10514, *Defense Primer: Defense Appropriations Process*.

[108] For a visual illustration of this trend, compare the depiction of historical defense outlays in **Figure 1** with that of historical DIB production output in **Figure 2**.

[109] They may, for instance, hire more workers, expand facilities, or devote more of their own resources to developing new products or improving existing ones.

[110] Such capital projects may include construction, land acquisition, and the procurement and installation of equipment, appliances, and machine tools. For more information, see DOD, "FY2024 Budget Estimates: Procurement of Ammunition, Army," March 2023, p. 1-748. Available at https://www.asafm.army.mil/Portals/72/Documents/BudgetMaterial/2024/Base%20Budget/Procurement/Procurement%20of%20Ammunition%20Army.pdf.

[111] The DPA Fund is established and described at 50 U.S.C. §4534.

[112] The Industrial Base Fund is established and described at 10 U.S.C. §4817. It is administered by the Innovation Capability and Modernization (ICAM) office within ASD (IBP). ASD (IBP), "Innovation Capability and Modernization," https://www.businessdefense.gov/ibr/mceip/icam/index.html.

resilience and domestic sourcing requirements, and promote competition and diversification among the defense industry.[113]

Oversight

To oversee the DIB, Congress convenes hearings and commissions reports and studies.[114] These serve to furnish Congress with information regarding both the industrial base itself and executive branch management. They also provide opportunities for Members to signal their priorities and intent to DOD, other executive agencies, and private industry.

Issues for Congress

'Right-Sizing' the Industrial Base

Assessing and Managing Capacity

One of the most fundamental DIB-related matters for Congress to consider is the level of industrial capacity required to meet the defense needs of the United States. As defined by the Federal Reserve, industrial capacity is a measure of "the amount of resources available to enable an industry to produce goods."[115] Such resources may include production facilities and equipment, labor, and raw materials; some definitions also include less tangible assets such as intellectual property.[116] One issue for Congress is whether or not the current defense industrial capacity of the United States is sufficient to meet U.S. national security goals.

Because productive output is ultimately a function of capacity, an appropriately sized industrial base is essential to the United States' ability to supply and equip its military forces. In addition to supporting current military needs, the resources available to the DIB must be able to accommodate future demand. This latter requirement makes *surge capacity*—the ability to quickly expand output in response to sudden upticks in demand—an important dimension of broader industrial capacity.

If the DIB is too small, it will be unable to supply all of the materials, products, and services necessary to accomplish U.S. strategic objectives, and the military may lack the ability to execute its assigned missions. On the other hand, an industrial base with excess capacity could impose unnecessary financial costs on the U.S. government, requiring cuts to other programs, increased

[113] For discussion of industrial base provisions in recent NDAAs, see CRS Insight IN12221, *FY2024 NDAA: Defense Industrial Base Policy* and CRS Insight IN12406, *FY2025 NDAA: Defense Industrial Base Policy*.

[114] For an example of a recent DIB-focused hearing, see House Armed Services Committee, "State of the Defense Industrial Base," February 8, 2023, video and statements available at https://armedservices.house.gov/hearings/full-committee-hearing-state-defense-industrial-base.

[115] Board of Governors of the Federal Reserve System, "Industrial Capacity: Total Index," August 15, 2023 at https://fred.stlouisfed.org/series/capb50001sq#. Another Federal Reserve publication defines capacity as "the maximum sustainable output of an industry." Charles Steindel, "Industrial Capacity & Industrial Investment," Federal Reserve Bank of New York, May 1995, https://www.newyorkfed.org/medialibrary/media/research/staff_reports/research_papers/9510.pdf.

[116] One analysis of the defense industry cited six major "factors of production": (1) production buildings, machinery, and equipment; (2) RDT&E buildings, machinery, and equipment; (3) hourly production labor; (4) scientists, engineers, and technicians; (5) management; and (6) entrepreneurship. Peck and Scherer, *The Weapons Acquisition Process*, p. 160.

borrowing, or higher taxes.[117] An oversized DIB may also distort the functioning of the country's market economy by diverting resources from other commercial applications.[118]

If Congress assesses that the DIB is undersized, a number of measures are possible. It could appropriate more funds to acquisition programs for specific capabilities, for instance, or to more general industrial base programs like the IBF or DPA Title III. Congress could also establish or modify programs to provide direct economic assistance to defense firms, incentivize private investment, or facilitate workforce recruitment, retention, and job training programs. It could also change DOD contracting and acquisition practices, or expand government-owned capacity directly through the creation or expansion of organic industrial base facilities.

If, conversely, Congress views DIB capacity as excessive, it might enact spending cuts, reduce the scope and resourcing of industrial base programs, modify DOD contracting and acquisition strategies, and close or shrink government-owned entities.

The DIB and Great Power Competition

Some analysts and policymakers have argued that the current capacity of the industrial base is insufficient for the demands of great power competition.[119] As Seth Jones of the Center for Strategic and International Studies (CSIS) framed the issue in a 2023 study

> The U.S. defense industrial base is not adequately prepared for the competitive security environment that now exists. It is currently operating at a tempo better suited to a peacetime environment. In a major regional conflict—such as a war with China in the Taiwan Strait—the U.S. use of munitions would likely exceed the current stockpiles of the U.S. Department of Defense, leading to a problem of "empty bins."[120]

Some think tanks, periodicals, DOD officials, and Members of Congress have voiced similar concerns.[121] These arguments often center on the role the industrial base would play in a great power war, and make reference to studies, wargames, and forecasts suggesting the United States could run short of critical defense equipment in a conflict (especially one involving China).[122] Industrial capacity could help determine the outcome of such a contingency in two broad ways: (1) enabling production in advance, so equipment could be stockpiled and prepositioned; and (2) allowing materiel to be replenished after hostilities have begun. In addition to conditioning U.S. military performance during a conflict, advocates of expanding industrial capacity have touted it

[117] For one perspective on the potential costs of excess capacity, see "The Rising Costs of Militarism Fact Sheet," Quincy Institute, April 2023, https://quincyinst.org/wp-content/uploads/2023/04/CrossOfIronFactSheet.pdf.

[118] See, for instance, Gholz and Sapolsky, "Restructuring the Defense Industry," pp. 12-16.

[119] For more information on great power competition, see CRS Report R43838, *Great Power Competition: Implications for Defense—Issues for Congress*.

[120] Seth G. Jones, *Empty Bins in a Wartime Environment*, CSIS, January 2023, p. 1, https://csis-website-prod.s3.amazonaws.com/s3fs-public/2023-01/230119_Jones_Empty_Bins.pdf.

[121] See for example, Caroline Coudriet, "Lawmakers Worry About Weapons-Makers' Ability to Meet Demand," *Roll Call*, February 6, 2023, https://rollcall.com/2023/02/06/lawmakers-worry-about-weapons-makers-ability-to-meet-demand/.

[122] In one of the most frequently cited wargames simulating a U.S.-China conflict, the U.S. military used all of its LRASMs [long range anti-ship missiles] in the initial days of the conflict, and tended to expend "about 5,000 long-range precision missiles, primarily JASSMs [joint air-to-surface standoff missiles] and LRASMs." Mark Cancian et al., "The First Battle of the Next War," CSIS, January 2023, p. 136, https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/230109_Cancian_FirstBattle_NextWar.pdf.

as a means of strengthening deterrence. If potential adversaries believe U.S. industry can sustain a war effort indefinitely, this argument runs, they may be less likely to risk conflict.[123]

Among advocates of expanding capacity, some have called for prioritizing precision-guided munitions, citing their military importance, technological complexity, and high expenditure rates.[124] Some commentators and policymakers have also identified production issues for less sophisticated munitions (e.g., 155 mm artillery rounds).[125] According to DOD, the munitions that are "most relevant for deterring and, if necessary, prevailing over aggression in the Indo-Pacific" include the Tomahawk cruise missile (together with its maritime strike variant), the Extended-Range Joint Air-to-Surface Standoff Missile (JASSM-ER), the Long Range Anti-Ship Missile (LRASM), and the SM-6 naval missile.[126] Beyond munitions, some policymakers and analysts also advocate expanding the capacity to produce larger weapons platforms, such as nuclear-powered attack submarines, as well as other items ranging from rocket motors to microchips.[127]

Other analysts and policymakers maintain that existing capacity more than suffices to deter or win a great power conflict. Some cite the economic and production advantages the United States enjoys over its potential adversaries, and assert that, when it comes to defense industrial capacity, "the overall picture is one of stability and health, not decline."[128] Still others argue that calls to drastically increase production reflect the incentives of defense contractors, rather than independently existing military requirements, and caution that the establishment of new DIB facilities inherently creates "pressure to keep them open in perpetuity, at a cost of untold billions of dollars."[129]

[123] For an example of this argument, see remarks made on March 22, 2022 by Under Secretary of Defense for Acquisition and Sustainment William LaPlante during a Senate Armed Services Committee hearing ("I believe we need multiple hot production lines, whether it be munitions, [unmanned aircraft systems], and the like. They, by themselves, are a deterrent."). Video available at https://www.armed-services.senate.gov/hearings/nominations_-laplante-raven-johnson-adams.

[124] See, for instance, Tyler Hacker, "Money Isn't Enough: Getting Serious About Precision Munitions," *War on the Rocks*, April 24, 2023, https://warontherocks.com/2023/04/money-isnt-enough-getting-serious-about-precision-munitions/.

[125] See Patrick Tucker, "Army Aims to Make 1 Million Artillery Shells a Year," *Defense One*, August 7, 2023, https://www.defenseone.com/technology/2023/08/army-aims-make-1-million-artillery-shells-year-starting-fiscal-2025/389202/.

[126] Deputy Secretary of Defense Kathleen Hicks, "Press Briefing on President Biden's Fiscal 2024 Defense Budget," DOD Press Briefing, March 13, 2023, transcript available at https://www.defense.gov/News/Transcripts/Transcript/Article/3327914/deputy-secretary-hicks-and-vice-chairman-adm-grady-hold-a-press-briefing-on-pre/.

[127] See, for example, Sen. Roger Wicker (MS), "The U.S. Navy Needs More Attack Submarines," *The Wall Street Journal*, July 16, 2023. Available at https://www.wsj.com/articles/the-u-s-navy-needs-more-attack-submarines-china-aukus-missile-repair-9f5965f, and Sen. Blumenthal (CT), "Blumenthal Applauds Wins for Connecticut in Senate-passed NDAA," Press Release, July 27, 2023, https://www.blumenthal.senate.gov/newsroom/press/release/blumenthal-applauds-wins-for-connecticut-in-senate-passed-national-defense-authorization-bill.

[128] Scott Lincicome, "Manufactured Crisis: 'Deindustrialization,' Free Markets, and National Security," Cato Institute, January 27, 2021, https://www.cato.org/publications/policy-analysis/manufactured-crisis-deindustrialization-free-markets-national-security. For another assessment of the defense industry as "financially healthy," see DOD, "Contract Finance Study Report," April 2023, https://www.acq.osd.mil/asda/dpc/pcf/docs/finance-study/FINAL%20-%20Defense%20Contract%20Finance%20Study%20Report%204.6.23.pdf.

[129] William Hartung, "New Spending Bill Squanders Billions on Dysfunctional Weapons Systems," *Responsible Statecraft*, December 9, 2022, https://responsiblestatecraft.org/2022/12/09/new-pentagon-bill-squanders-opportunity-to-rein-in-the-military-industrial-complex/.

An Arsenal of Democracy?

Providing large-scale support for U.S.-aligned governments—as the DIB is currently doing for Ukraine—is also frequently cited as a rationale for increasing capacity (for discussion of defense production for Ukraine specifically, see CRS Report R48182, *Defense Production for Ukraine: Background and Issues for Congress*).

Some analysts and policymakers argue that, rather than just supplying U.S. needs, the DIB should function as an 'arsenal of democracy.'[130] To accomplish this, the industrial base would need enough capacity to produce a wide array of defense equipment for allies and partners: in addition to Ukraine, Taiwan and Israel are also frequently identified as high-priority recipients of U.S. security assistance.[131] While certain advocates of integrating partner requirements into industrial planning maintain that the United States has the ability to "both arm Ukraine and bolster deterrence in Asia," others argue that capacity constraints require the prioritization of one partner or region over others.[132]

Conversely, some lawmakers and commentators take the position that the industrial base should focus primarily or exclusively on supplying U.S. forces. In an April 2023 letter to President Biden, three Senators and 16 Representatives asserted that the production and delivery of defense equipment for use by Ukraine was leaving the U.S. military "woefully unprepared" for a potential conflict.[133] Other analysts have also argued that the best way to support U.S. partners would be to "use existing defense industrial bandwidth more efficiently," rather than to expand capacity.[134]

Some observers have viewed the performance of existing security assistance programs (especially efforts to arm Ukraine) as a 'stress test' for the DIB. A number of stakeholders have claimed that U.S. efforts to supply Ukraine have exposed capacity shortfalls; from this premise, some have made the further claim that resourcing Ukraine assistance may therefore provide an effective means of strengthening the U.S. industrial base more generally.[135]

[130] See, for example, "The West is Struggling to Forge a New Arsenal of Democracy," *The Economist*, February 19, 2023, https://www.economist.com/briefing/2023/02/19/the-west-is-struggling-to-forge-a-new-arsenal-of-democracy.

[131] For more information, see CRS In Focus IF12481, *Taiwan: Defense and Military Issues*, by Caitlin Campbell and CRS Report R47828, *Israel and Hamas Conflict In Brief: Overview, U.S. Policy, and Options for Congress*, by Jim Zanotti and Jeremy M. Sharp.

[132] For an example of the first argument, see Michael Allen and Connor Pfeiffer, "The U.S. Can Help Ukraine and Deter China," *The Wall Street Journal*, July 18, 2023, https://www.wsj.com/articles/the-us-can-help-ukraine-and-deter-china-javelin-stinger-nat-sec-taiwan-9779ada5?; for an example of the second, see Elbridge Colby and Alex Velez-Green, "To Avert War with China, the U.S. Must Prioritize Taiwan over Ukraine," *The Washington Post*, May 18, 2023 at https://www.washingtonpost.com/opinions/2023/05/18/taiwan-ukraine-support-russia-china/.

[133] Sen. Mike Lee (UT) et al., "Letter to President Biden," April 20, 2023, https://www.lee.senate.gov/services/files/582d6601-a680-45a0-90e4-a92e91b4e2b3.

[134] Jennifer Kavanagh, "Why the United States Doesn't Need An 'Arsenal of Democracy,'" *Georgetown Journal of International Affairs*, May 22, 2023, https://gjia.georgetown.edu/2023/05/22/why-the-united-states-doesnt-need-an-arsenal-for-democracy-and-what-to-do-instead/.

[135] For an example of the first claim, see House Armed Services Committee Chairman Rep. Mike Rogers' 2023 assertion that arming Ukraine had "laid bare many of our vulnerabilities, especially with respect to our ability to rapidly produce and field munitions." Rep. Mike Rogers (AL-03), "Opening Statement At Hearing on U.S. Defense Industrial Base," February 8, 2023, https://armedservices.house.gov/news/press-releases/rogers-opening-statement-hearing-us-defense-industrial-base. For an example of the second, see Elizabeth Hoffman, Audrey Aldisert, Cynthia Cook, Gregory Sanders, and Shivani Vakharia, "How Supporting Ukraine is Revitalizing the U.S. Defense Industrial Base," CSIS, April 18, 2024, https://www.csis.org/analysis/how-supporting-ukraine-revitalizing-us-defense-industrial-base.

Other commentators have argued that the efficacy with which Ukraine has used U.S.-origin equipment to inflict losses on Russian forces is proof that leveraging existing capacity can achieve outsized results.[136]

Regulating Private Industry

Competition and Consolidation

Another issue for congressional consideration is the prevalence of competition and consolidation within the defense industry. Some Members of Congress and successive presidential Administrations have viewed the existence of economic competition within the commercial DIB as an important policy priority. Proponents of competition have noted that it may produce a number of desirable outcomes for the customer (i.e., the U.S. government), frequently citing the following three in the context of defense:

- Lower costs, accelerated schedules, and improved performance;
- Expanded capacity; and
- Technological innovation.[137]

Because consolidation concentrates the supply of defense products and services among fewer entities, some experts maintain that it weakens competition and thus creates adverse outcomes for the U.S. government.

Addressing competition and consolidation in the DIB poses unique challenges as compared to other industries. As a former chairman of the Federal Trade Commission put it in a 1997 SASC hearing

> The analysis of mergers in the defense industry is challenging because of [its] many special characteristics.... [DOD] is often the only buyer for the products and services of the merging firms, and its procurement processes are different from those in most industries. The products (e.g., weapons systems) being procured are often complex and heterogeneous systems that are frequently purchased on a winner-take-all basis. Finally, national security may be implicated in a defense industry merger.[138]

Beginning in the early 1990s, the defense industry underwent significant consolidation, decreasing the number of firms competing for DOD contracts. As noted in the "Historical Development" section of this report, the primary cause was a shift in U.S. defense spending: given the changing geopolitical conditions of the post-Cold War era, Congress made fewer resources available to DOD for defense contracts.[139] Both government and industry saw

[136] See, for example, Timothy Ash, "It's Costing Peanuts for the U.S. to Defeat Russia," Center for European Policy Analysis, November 18, 2022, https://cepa.org/article/its-costing-peanuts-for-the-us-to-defeat-russia/.

[137] See, for example, DOD, "State of Competition within the Defense Industrial Base," February 2022, p. 1. Available at https://media.defense.gov/2022/feb/15/2002939087/-1/-1/1/state-of-competition-within-the-defense-industrial-base.pdf. For a similar summary of the benefits of competition, see also the opening statement of Sen. Jack Reed (RI) in "The Health of the Defense Industrial Base," SASC Hearing, April 26, 2022, video available at https://www.armed-services.senate.gov/hearings/to-receive-testimony-on-the-health-of-the-defense-industrial-base.

[138] Robert Pitofsky, "Mergers and Acquisitions in the Defense Industry," Statement delivered before the SASC Subcommittee on Acquisition and Technology, April 15, 1997, text available at https://www.ftc.gov/news-events/news/speeches/mergers-acquisitions-defense-industry.

[139] Other contributing factors include the prevalence of low interest rates, which can make mergers and acquisitions more attractive, and an intellectual property regime that allows suppliers of defense equipment and services to retain rights to data without which those products cannot be produced or maintained. See DOD, "State of Competition within the DIB," pp. 4-5.

consolidation as a way of limiting the economic impacts of budget cuts while preserving capacity. Through engagement with industry and targeted policies, DOD encouraged mergers and acquisitions, with the result that the number of private businesses active in the DIB decreased markedly.[140] Consolidation was particularly pronounced among suppliers of certain weapons system categories (e.g., tactical missiles, fixed-wing aircraft, and satellites), and ultimately reduced the number of major U.S. defense prime contractors from 51 to 5 (see **Figure 8** for a visual representation of this process).[141] As of 2023, these 5 companies (Lockheed Martin, Boeing, RTX, General Dynamics, and Northrop Grumman) were prime contractors on over 74% of DOD's major defense acquisition programs.[142]

Although DOD policy changed and the pace of consolidation began to slow in the late 2000s, defense mergers and acquisitions have continued through the present. Some high-profile corporate combinations concluded in the past five years include

- The acquisition of Aerojet Rocketdyne by L3Harris (2023);
- The merger of Raytheon (now RTX) with United Technologies (2020); and
- The acquisition of Orbital ATK by Northrop Grumman (2018).

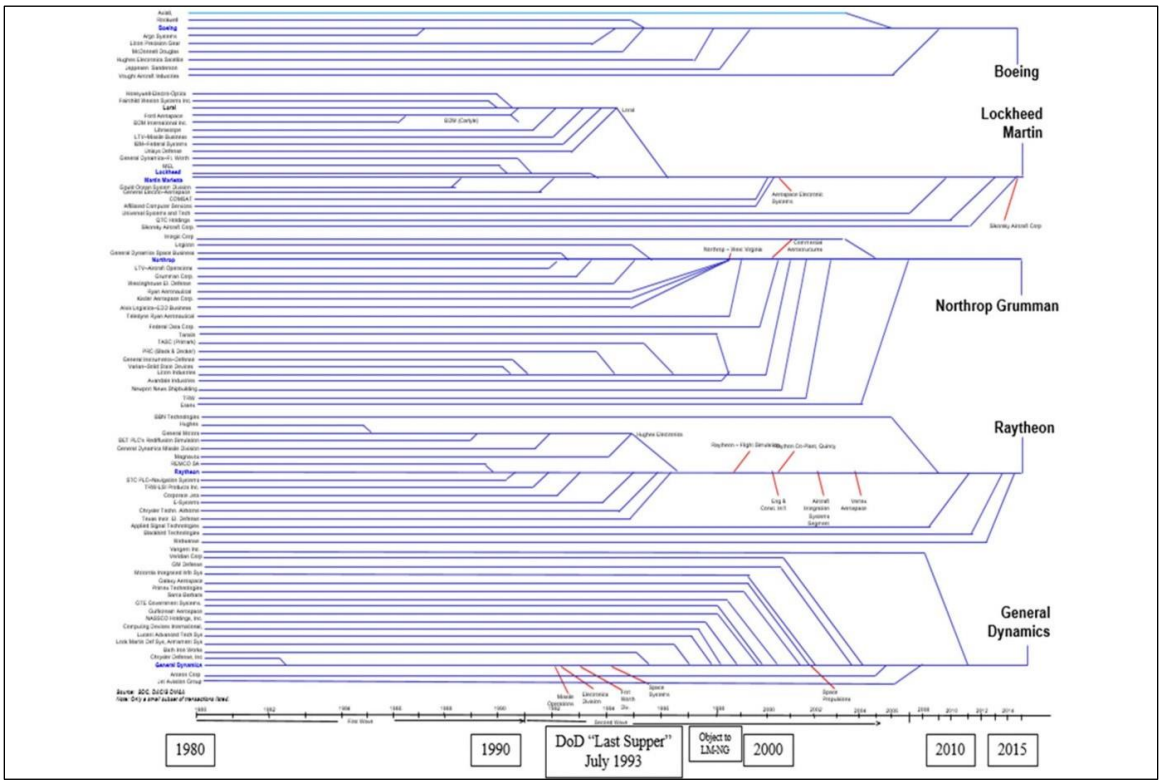
[140] Perhaps the most famous engagement between government and industry on this topic was a 1993 dinner known as "The Last Supper," at which the Secretary of Defense told the executives of more than 12 large defense firms that DOD could not support the existing number of major defense suppliers, and advised them to pursue consolidation. DOD also encouraged mergers and acquisitions through policies that, among other things, allowed contractors to be reimbursed by the federal government for certain corporate restructuring costs incurred under merged contracts. Jonathan Chang and Mghna Chakrabarti, "'The Last Supper': How a 1993 Pentagon Dinner Reshaped the Defense Industry," *WBUR*, May 29, 2023 at https://www.wbur.org/onpoint/2023/05/29/the-last-supper-rebroadcast-1993-pentagon-dinner-reshaped-defense-industry; and Gholz and Sapolsky, "Restructuring the U.S. Defense Industry," p. 24.

[141] DOD, "State of Competition within the DIB."

[142] CRS analysis of information provided in DOD, "FY2024 Program Acquisition Costs by Weapon System," March 2023, https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2024/FY2024_Weapons.pdf.

Figure 8. Consolidation in the Defense Industry

Corporate Mergers and Acquisitions, 1980-2015



Source: Graphic from DOD, "State of Competition within the Defense Industrial Base," February 2022, https://media.defense.gov/2022/feb/15/2002939087/-1/-1/1/state-of-competition-within-the-defense-industrial-base.pdf.

The impact of this process on the performance of the DIB remains unclear. Some analysts have argued that it led to a real decline in industrial capacity, weakened the resilience of defense-related supply chains, and—by decreasing competition—negatively affected the cost, schedule, and performance of defense acquisition projects.[143] Others have held that the capacity impacts of these mergers and acquisitions were minimal, as the capital assets and workforces of acquired firms were often retained by their new owners, and that consolidation has not been proven to have led to increases in acquisition costs.[144]

Following the reorientation of U.S. strategy around great power competition in the 2010s and early 2020s, the extent of industry consolidation has attracted attention from defense officials. In a 2022 report, DOD found that consolidation had made it "increasingly reliant on a small number of contractors for critical defense capabilities," and observed that further "consolidations that reduce required capability and capacity and the depth of competition would have serious

[143] See, for example, Michael Brenes, "How America Broke Its War Machine," *Foreign Affairs,* July 3, 2023, https://www.foreignaffairs.com/united-states/how-america-broke-its-war-machine.

[144] For an example of this argument regarding capacity, see Gholz and Sapolsky, "Restructuring the U.S. Defense Industry," pp. 26-28. For an assessment of consolidation's effect on acquisition costs, see Rodrigo Carril and Mark Duggan, "The Impact of Industry Consolidation on Government Procurement: Evidence from Department of Defense Contracting," National Bureau of Economic Research, October 2018. Available at https://www.nber.org/system/files/working_papers/w25160/w25160.pdf.

consequences for national security."[145] The current Under Secretary of Defense for Acquisition and Sustainment has also identified consolidation as an enduring area of concern.[146]

The issue has also been the subject of congressional deliberation. In a February 2023 hearing, for instance, Representative Chris Deluzio (PA-17) stated that consolidation is "leaving us unprepared and harming our national security and readiness."[147] And in an April 2022 hearing Senate Armed Services Committee chairman Senator Jack Reed (RI) stated that he was "concerned by the impact of the consolidation of private [defense] companies," while Senator Mike Rounds (SD) made reference to "a very disturbing trend of consolidation within the defense industrial base over the last 20 to 30 years."[148]

Members of Congress also have cited potentially deleterious effects of consolidation in opposition to specific mergers and acquisitions. In a July 2023 letter opposing the acquisition of Aerojet Rocketdyne by L3Harris, for instance, four Members argued that "waves of merger activity and consolidation have transformed our nation's defense industry from a competitive market … into an oligopoly," and alleged that this was partly responsible for the solid rocket motor sector "failing to meet U.S. national security needs."[149]

Not all experts agree that consolidation has exclusively negative effects, or that its current extent among the defense industry represents a crisis. As former Secretary of the Army Eric Fanning put it in a recent congressional hearing

> I don't think consolidation is what's to blame for the shrinking number of companies doing business with the Department of Defense … consolidation can be a very important tool for growth for large companies. It can be an important tool for small companies to access capital, to access workforce processes, expertise or so forth to continue to develop what it is that they're growing. And it's an important part of every industry's evolution.[150]

Some analysts have also argued that consolidation improves the efficiency of the defense industry, lowering costs by eliminating excess capacity and enabling economies of scale.[151]

If Congress assesses that consolidation is a problem within the commercial DIB, it may consider a number of options. Congress could statutorily establish new requirements for merger oversight within the commercial DIB, or direct DOD and the antitrust agencies (the Federal Trade Commission and the Department of Justice) to change the criteria they use to assess proposed mergers and acquisitions by defense firms. Congress could also create or modify programs intended to incentivize new entrants into the DIB—including small businesses and nontraditional defense suppliers—or modify the legal and policy governance of DOD contracting practices to

[145] DOD, "State of Competition within the DIB," p. 1.

[146] "Stenographic Transcript—SASC Hearing," March 22, 2022, p. 63, https://www.armed-services.senate.gov/imo/media/doc/22-15_03-22-2022.pdf.

[147] "State of the Defense Industrial Base," HASC Full Committee Hearing, February 8, 2023, video available at https://armedservices.house.gov/hearings/full-committee-hearing-state-defense-industrial-base. Comments start at 1:58:00.

[148] "Stenographic Transcript—SASC Hearing," April 26, 2022, pp. 3 and 73, https://www.armed-services.senate.gov/imo/media/doc/22-28_04-26-2022.pdf.

[149] Sen. Elizabeth Warren and Representatives Chris Deluzio, John Garamendi, and Mark Pocan, "Letter to Secretary Austin," July 9, 2023, https://www.warren.senate.gov/oversight/letters/senator-warren-representatives-deluzio-pocan-garamendi-urge-dod-to-tighten-up-the-merger-review-process-and-publicly-disclose-merger-risks.

[150] "State of the Defense Industrial Base," HASC, February 8, 2023. Comments start at 2:00:00.

[151] See, for instance, Maiya Clark, "Promoting Defense Industry Competition for National Security's—Not Competition's—Sake," Heritage Foundation, October 19, 2022, https://www.heritage.org/defense/report/promoting-defense-industry-competition-national-securitys-not-competitions-sake.

require or incentivize more competition for contract awards.[152] Finally, Congress could consider broader changes to DOD acquisition strategies, such as encouraging the development of service-specific weapons systems over joint acquisition programs.[153]

Business Practices and the Role of Government

Congress may also consider the relationship between other defense industry practices and the performance of the DIB, as well as the public interest more generally. Two particular aspects of corporate behavior—the pricing of goods and services, and investment in capital projects—have attracted particular attention from Congress and other stakeholders. Each is discussed in detail below.

Pricing

Because many of the goods and services provided by the defense industry have no analogues in the broader commercial market, it can be difficult for DOD to determine fair market value for its purchases. To get around this, analysts and policymakers typically examine things like operating margins, competitor pricing, and historical data mapped against broader economic trends such as inflation (for more information on the processes used by the U.S. government to address contract pricing, see CRS Report R47879, *Department of Defense Contract Pricing*, by Alexandra G. Neenan).

Pricing is also closely connected to the issue of profits, with some critics of industry pricing practices alleging that an undue emphasis on profits drives overcharging on the part of contractors.[154] Although rates of profit vary across individual firms and DIB subsectors, several studies have found that the average margins for defense contractors range from 7%-13%.[155] At least one such study has also suggested that margins have increased over the past 20 years.[156]

Some stakeholders have alleged that defense firms have charged the U.S. government more than fair market value. A May 2023 broadcast by *CBS News* alleged that defense contractors had overcharged DOD for a wide array of defense equipment, potentially costing the U.S. government

[152] As an example, intellectual property rights are often cited as an area of contracting with wide implications for competition; Congress may consider modifying statute or policy governing the data rights which contractors and the government respectively possess. For more information, see DOD, "State of Competition Within the DIB," pp. 7-13.

[153] Some analysts suggest that allowing the Services to procure their own versions of weapon systems—fighter jets, for example—could provide a demand-side stimulus to competition and reduce the likelihood of dominance by a single supplier. See, for instance, John Ferrari and Charles Rahr, "The Pentagon is to Blame for Industrial Base Failures," *Defense News*, June 5, 2023; see also Gholz and Sapolsky, "Restructuring the Defense Industry," pp. 50-51.

[154] For examples, see the sources identified in Footnotes 152, 156, and 157.

[155] For example, in 2014 the Defense Business Board cited an average margin of 12.2% for the five largest defense contractors between 2010 and 2014, and a professor at New York University found an average margin of 9.71% for 70 aerospace and defense firms surveyed in 2023. Defense Business Board, "Innovation: Attracting and Retaining the Best of the Private Sector," July 24, 2014, Slide 34, https://dbb.defense.gov/Portals/35/Documents/Meetings/2014/2014-07/DBB%20Innovation%20presentation%20-%2024%20July%202014%20-%20FINAL.pdf; and Aswath Damodaran, "Operating and Net Margins by Industry Sector," New York University, January 2024, https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datacurrent.html.

[156] According to this study: "the performance of the [defense] industry, in aggregate, has improved over the past 20 years. Operating margins (profit as a percent of revenues) for the Defense companies in our analysis have increased from a range of 7% to 9% to a range of 11% to 13%." Martin Bollinger et al., "Examination of the Financial Health of the Defense Industry," University of Virginia, February 25, 2023, https://www.acq.osd.mil/asda/dpc/pcf/docs/finance-study/DoD%20Study%20Appendix%20A%20-%20E.pdf.

billions of dollars.[157] DOD's Inspector General has also found numerous instances of overcharging, including a pattern of behavior by the contractor TransDigm that the House Committee on Oversight and Accountability summarized in 2021 as "rampant price gouging on mission-critical aircraft parts."[158] Some experts have linked overcharging by defense companies to consolidation, claiming that the reduction of competition and suppliers among the DIB has reduced government leverage in negotiating contracts.[159] Overcharging has also been a subject of congressional concern: in May 2024, for instances, four Senators sent a letter to the Secretary of Defense expressing concern that DOD "is not obtaining timely cost and pricing information necessary to negotiate fair prices with DoD contractors because of these contractors' abusive practices"; similarly, in May 2023, five Senators alleged that some companies (including Lockheed Martin, Boeing, RTX, and TransDigm) had "abused the trust government has placed in them, exploiting their position as sole suppliers for certain items to increase prices far above inflation or any reasonable profit margin."[160]

On the other hand, a number of defense firms and analysts have argued that not all price increases amount to overcharging. Some claim that higher prices are partly the result of increased costs for suppliers stemming from broader economic trends, such as elevated inflation and supply chain issues.[161] Other have contested profiteering allegations by arguing that profit margins for defense firms are relatively low compared to those prevailing in other industries.[162]

Capital Investment

Capital investment refers to the acquisition of assets like land, buildings, or equipment to improve the long-term performance of a business. In the context of the defense industry, this may entail the construction of industrial facilities or the purchase of specialized machinery to expand production capacity or efficiency.

Some analysts and policymakers have claimed that defense firms tend to prioritize maximizing short-term financial returns over paying for capital investment projects, resulting in a weaker DIB and higher costs for the U.S. government. One 2023 study found that

[157] More specifically, *CBS News* cited a 2015 DOD review that "discovered Lockheed Martin and its subcontractor, Boeing, were grossly overcharging the Pentagon and U.S. allies by hundreds of millions of dollars for the Patriot's PAC-3 missiles." It also pointed to vast increases in pricing for the same equipment over time (for instance, an individual Stinger missile, which the report claims cost $25,000 in 1991 and $400,000 in 2023) as evidence of overcharging. Bill Whitaker, "Weapons Contractors Hitting Defense Department with Inflated Prices," *60 Minutes, CBS News,* May 21, 2023.

[158] House Committee on Oversight and Accountability, "After Oversight Committee Inquiry, Inspector General Finds Rampant Price Gouging by TransDigm in DOD Contracts," Press release, December 13, 2021.

[159] According to the former director of DOD's Defense Pricing and Contracting office: "In the '80s, there was intense competition amongst a number of companies. And so the government had choices…. We have limited leverage now." Whitaker, "Weapons Contractors Hitting Defense Department with Inflated Prices," *60 Minutes*.

[160] Senators Charles Grassley (IA), Elizabeth Warren (MA), Mike Bruan (IN), and John Fetterman (PA), "Letter to Secretary Austin," May 28, 2024, https://www.grassley.senate.gov/imo/media/doc/warren_grassley_braun_fetterman_to_dod_-_contractor_sweeping_practice.pdf; and Senators Bernie Sanders (VT), Charles Grassley (IA), Elizabeth Warren (MA), Mike Braun (IN), and Ron Wyden (OR), "Letter to Secretary Austin," May 24, 2023, https://www.sanders.senate.gov/wp-content/uploads/Letter-to-Secretary-Austin_5.24.2023.pdf.

[161] See, for instance, Joe Gould, "Defense Industry to Launch Inflation Relief Push in Congress," *Defense News,* September 1, 2022.

[162] See, for instance, William C. Greenwalt, "The Navy Secretary's Misguided War on Profits," *Breaking Defense,* May 14, 2024.

> Despite the increased profit and cash flow [experienced from 2010-2019], defense contractors chose to reduce the overall share of revenue spent on internal research and development and capital expenditures while significantly increasing the share of revenue paid to shareholders in cash dividends and share buybacks.[163]

For some, this trend reflects a systemic issue. One commentator has characterized the major prime contractors as "cash management machines," more concerned with channeling profits to shareholders than improving their ability to make and deliver products.[164] And in 2024, Secretary of the Navy Carlos del Toro said that many defense contractors were "making record profits," and "prioritiz[ing] stock prices that drive executive compensation rather than making the needed fundamental investments in the industrial base."[165] Such behaviors could complicate attempts to grow industrial capacity: if suppliers respond to increased cashflow by diverting ever larger percentages of revenue to shareholder remuneration, boosting government investment in the DIB may not translate effectively into capacity expansion.

Other stakeholders have argued that consistently increasing revenues will increase industry's willingness to accept the risks and costs of funding capital investment activities.[166] According to one commentator

> The profit motive and our national defense should go together. It allows our capitalist system to spur innovation in defense, leading to new platforms, new products, and new ways of doing business. Take profit out of the equation and you'd have a military with little innovation, unable to face threats today and badly underprepared for the conflicts of the future.[167]

If Congress assesses that practices such as overcharging and insufficient capacity investment are problems that require action, a number of options are available. Congress could consider requiring more cost and pricing data from contractors, or modifying acquisition policies and strategies to use approaches (such as progress payments) that may reduce incentives to overcharge. To encourage contractors to invest more of their own funds into capacity expansion, Congress could modify contracting policies or strategies that allow companies to bill the government for activities such as internal research and development.

Supply Chains and Sourcing Requirements

Supply Chain Resilience

The strength and security of supply chains—the networks of processes and entities required to make and deliver products—is another defense industrial base issue that Congress may consider.[168] According to DOD, the United States needs "healthy, resilient, diverse, and secure supply chains to ensure the development and sustainment of capabilities related to national

[163] Office of the Under Secretary of Defense for Acquisition and Sustainment, "Contract Finance Study Report," DOD, April 2023, pp. 19-20. Available at https://www.acq.osd.mil/asda/dpc/pcf/docs/finance-study/FINAL%20-%20Defense%20Contract%20Finance%20Study%20Report%204.6.23.pdf.

[164] Matt Stoller, "The Military-Industrial Stock Buyback Complex," *BIG Newsletter*, April 15, 2023, https://www.thebignewsletter.com/p/the-military-industrial-stock-buyback.

[165] Patrick Tucker, "Navy Secretary Blasts Defense Industry's Stock Buybacks," *Defense One*, February 15, 2024.

[166] "Contract Finance Study Report," p. 33.

[167] William C. Greenwalt, "The Navy Secretary's Misguided War on Profits," Breaking Defense, May 14, 2024.

[168] For one framework used by DOD to approach supply chain management, see "Supply Chain Management Framework," Office of the Assistant Secretary of Defense for Sustainment, February 2023, https://www.acq.osd.mil/log/LMR/.scrm_report.html/DoD_SCRM_Framework_Report_Phase_I.pdf.

security."[169] In a 2023 report, the Office of the Assistant Secretary of Defense for Sustainment summarized the issue in the following way:

> Supply chain risks are not unique to the Department, but such risks take on greater urgency when considered in light of national security. For example, to keep aging weapon systems operational, [DOD] depends on a finite number of repair parts suppliers, some of which are precariously close to fiscal collapse. The proliferation of counterfeit items (particularly for microelectronics) increases the risk of mission delay or imperiled safety. Intellectual property vulnerabilities and lowered integrity of sensitive data and secure networks undermine the protections around weapon system designs. Dependence on foreign entities for critical items and cyber disruptions to the manufacturing and transportation domains likewise jeopardize mission support and success.[170]

Numerous observers have expressed concerns about vulnerabilities and inefficiencies within defense-critical supply chains. Some have highlighted an alleged lack of redundancy for certain kinds of equipment, arguing that dependence on a small number of private firms—or even a single source—leaves the United States highly vulnerable to supply disruption. The production of solid rocket motors, for instance, has attracted scrutiny from analysts and policymakers due to the small number of suppliers.[171] Others have criticized the extent to which DOD depends upon products and materials originating from strategic competitors (i.e., China and Russia). This dependence has been alleged to be particularly acute for certain strategic and critical materials, including antimony, lithium, and rare-earth minerals.[172]

As part of a 2022 action plan to secure defense-critical supply chains, DOD identified four "strategic enablers" and eight "cross-cutting recommendations" (provided as **Table 5** below).

Table 5. Supply Chain Enablers and Recommendations

DOD Findings from "Securing Defense-Critical Supply Chains"

Strategic Enablers	Cross-Cutting Recommendations
Workforce (Trade skills through doctoral-level)	1. Build domestic production capacity
Cyber posture (Industrial security, counterintelligence, and cybersecurity)	2. Engage with partners and allies
Manufacturing (Current manufacturing practices, as well as advanced technology like additive manufacturing)	3. Mitigate Foreign Ownership, Control, or Influence (FOCI) and safeguard markets
Small business (The role of key members of DOD supply chains)	4. Conduct data analysis
	5. Aggregate demand
	6. Develop common standards
	7. Update acquisition policies

Source: DOD, "Securing Defense-Critical Supply Chains," February 2022.

If Congress assesses that the resilience of defense supply chains is inadequate, it has a number of options. It could consider whether or not to increase use of industrial base programs, such as DPA Title III, to incentivize the expansion of existing U.S. sources or the establishment of new ones. It could also consider whether or not to expand or create partnerships with foreign suppliers to

[169] DOD, "Securing Defense-Critical Supply Chains," February 2022, p. 2, https://media.defense.gov/2022/feb/24/2002944158/-1/-1/1/dod-eo-14017-report-securing-defense-critical-supply-chains.pdf.

[170] "Supply Chain Management Framework," DOD, p. iv.

[171] See, for example, Doug Cameron, "Rocket Motor Shortage Curbs Weapons for Ukraine," *The Wall Street Journal*, April 18, 2023.

[172] Bryant Harris, "The U.S. is Heavily Reliant on China and Russia for Its Ammo Supply Chain," *Defense News*, June 8, 2022; and "Securing Defense-Critical Supply Chains, p. 19.

secure access to materials and products, such as certain critical minerals, that domestic suppliers are unable to provide. If Congress determines that it does not possess sufficient information regarding the condition of existing supply chains, it may also direct DOD or other entities to conduct further studies or reporting.

Onshoring and 'Friendshoring'

Some analysts and policymakers have identified *onshoring* (the transfer of production activities from abroad to the United States) and '*friendshoring'* (the transfer of production activities from adversarial or non-aligned countries to U.S. allies and partners) as potential means of strengthening supply chain resilience.[173] Although both onshoring and friendshoring represent attempts to respond to supply chain and sourcing problems, they are distinct policy approaches, and actions taken in support of one approach may not align with the goals of the other.[174]

Advocates of onshoring defense production maintain that locating defense industrial capacity within the United States provides greater assurance that the federal government will be able to access critical materials and products during a conflict or national emergency, and may act to stimulate the domestic economy more broadly.[175] Opponents criticize onshoring for its alleged potential to increase costs and exacerbate inefficiencies by requiring businesses to locate as many activities as possible within the United States, irrespective of market incentives.[176]

Defense-specific onshoring has been the focus of a number of recent NDAA provisions, and is frequently cited as a goal by DOD officials.[177] In addition, Congress and the executive branch have recently pursued several major policy and legislative initiatives intended to encourage a 'whole-of-government' approach to onshoring, including Executive Order 14005 of January 25, 2021 ("Ensuring the Future is Made in All of America by All of America's Workers") and the CHIPS Act of 2022 (Division A of P.L. 117-167).[178]

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[173] For a recent treatment of these topics in the U.S. media, see Sarah Kessler, "What is 'Friendshoring'?" *The New York Times*, January 3, 2023.

[174] For example, removing domestic procurement restrictions for defense equipment from friendly countries—as supporters of friendshoring might advocate—could lead some defense production to stay (or move) outside the United States, which may not be a desirable outcome for advocates of onshoring (especially if the latter count stimulating the U.S. economy among their objectives). On the other hand, strengthening domestic procurement practices or requirements could lead to less defense production in friendly countries, which might be seen as a negative outcome by advocates of friendshoring. For one discussion of this distinction (as well as related concepts such as 'nearshoring,' see Stefan Ellerbeck, "What's the Difference Between 'Friendshoring' and Other Global Trade Buzzwords?" World Economic Forum, February 7, 2023, https://www.weforum.org/agenda/2023/02/friendshoring-global-trade-buzzwords/.

[175] See, for instance, Mike McCormack, "Americanize the Defense Industry Supply Chain," *National Defense*, September 30, 2022.

[176] See, for example, Scott Lincicome, "Everything You Think You Know About 'Offshoring' Is (Probably) Wrong," Cato Institute, August 9, 2023.

[177] See **Table 6** for a summary of selected NDAA provisions relating to onshoring. For DOD discussion of the issue, see, for example, David Vergun, "DOD Official Discusses Strengthening the Industrial Base," *DOD News,* April 6, 2023, https://www.defense.gov/News/News-Stories/Article/Article/3354413/dod-official-discusses-strengthening-the-industrial-base/.

[178] E.O. 14005 established a new Made in America Office within the Office of Management and Budget, introduced new restrictions on agency use of waivers from domestic procurement laws, and directed the Federal Acquisition Regulations Council to consider strengthening domestic procurement regulations. See E.O. 14005 of January 25, 2021, https://www.federalregister.gov/documents/2021/01/28/2021-02038/ensuring-the-future-is-made-in-all-of-america-by-all-of-americas-workers. The CHIPS Act of 2022 contained provisions to incentivize the domestic manufacture of semiconductors; for more information, see CRS Report R47523, *Frequently Asked Questions: CHIPS Act of 2022 Provisions and Implementation*.

Friendshoring is frequently identified as a tool to help accomplish the goals of multilateral security pacts such as AUKUS or NATO.[179] To encourage friendshoring, DOD is reportedly expanding the scope and scale of industrial collaboration with foreign governments and companies, including the co-development and co-production of weapons systems and other defense equipment.[180] Such cooperation may occur as part of institutionalized multilateral partnerships or on a narrower bilateral basis.

Domestic Content Requirements and Restrictions

Intertwined with the issues of supply chain resilience and onshoring/friendshoring are the statutory and policy authorities that apply to federal sourcing. At present, defense procurements are subject to numerous requirements intended to a) restrict the foreign sources from which the government may acquire goods and services; and b) encourage procurement from domestic sources. These requirements may be established by statute—for example, the Buy American Act of 1933 (codified at 41 U.S.C. §§8301–8305) and the Berry Amendment (10 U.S.C. §4862)—or by regulation or policy—for example, the enhanced domestic content threshold established pursuant to Executive Order 14005. **Table 6** provides a summary of selected sourcing requirements relevant to the DIB.[181]

Lawmakers have cited numerous reasons for sourcing and content requirements, including

- Ensuring that the United States has secure access to critical services, products, and materials during a war or national emergency;
- Avoiding the provision of financial or material support to entities working against U.S. interests, such as strategic competitors or terrorist organizations; and
- Supporting domestic producers and stimulating the U.S. economy.

Table 6. Selected DIB Sourcing Requirements and Restrictions

Authority	Organization(s) Covered	Requirement/Restriction
The Buy American Act (41 U.S.C. §§8301–8305); E.O. 14005; 87 FR 12780.[a]	All federal agencies	The U.S. government must apply a price preference for domestic end products and use domestic construction materials for covered contracts.[b]
Sec. 889 of the FY2019 NDAA (P.L. 115-232)	All executive agencies	No executive agency may acquire telecommunications and video equipment, systems, or services produced or provided by certain foreign suppliers.[c]
Sec. 5949 of the FY2023 NDAA (P.L. 117-263)	All executive agencies	No executive agency may acquire semiconductor products or services produced or provided by certain foreign suppliers.[d]

[179] See, for example, Jerry McGinn and Michael Roche, "A 'Build Allied' Approach to Increase Industrial Base Capacity," Baroni Center for Government Contracting (George Mason University), June 22, 2023, https://business.gmu.edu/news/2023-06/build-allied-approach-increase-industrial-base-capacity.

[180] See, for example, Doug Cameron, "U.S. Arms Makers Look Overseas to Boost Stockpiles," *The Wall Street Journal*, September 2, 2023, https://www.wsj.com/politics/national-security/u-s-arms-makers-look-overseas-to-boost-stockpiles-1e1d6eac. For more information on DOD's international partnerships, see CRS In Focus IF12425, *Defense Primer: International Armaments Cooperation*.

[181] For more information on existing federal sourcing requirements, see CRS Report R46748, *The Buy American Act and Other Federal Procurement Domestic Content Restrictions*.

Authority	Organization(s) Covered	Requirement/Restriction
Berry Amendment (10 U.S.C. §4862)	DOD	Textiles, clothing, footwear, food, hand or measuring tools, stainless steel flatware, or dinnerware procured by DOD must be 100% domestic in origin.
Specialty Metals Restriction (10 U.S.C. §4863)	DOD	DOD may not acquire certain weapons systems that contain any amount of a specialty metal not melted or produced in the United States (as defined by 10 U.S.C. §4863).
Sensitive Materials Restriction (10 U.S.C. §4872)	DOD	Sensitive materials or products containing sensitive materials (as defined by 10 U.S.C. §4872) may not be sourced from Russia, Iran, the PRC, or the DPRK.
Sec. 1211 of the FY2006 NDAA (P.L. 109-163), Sec. 1243 of the FY2012 NDAA (P.L. 112-81), and Sec. 1296 of the FY2017 NDAA (P.L. 114-328)	DOD	DOD may not acquire items covered by the U.S. Munitions List or the 600 series of the Commerce Control List from any Chinese military company.[e]
10 U.S.C. §2279	DOD	DOD may not contract for satellite services with certain foreign entities.
10 U.S.C. §4871(b)	DOD	DOD may not contract with a firm owned or controlled by a state sponsor of terrorism.
Sec. 855 of the FY2023 NDAA (P.L. 117-263)	DOD	DOD may not procure goods mined, produced, or manufactured by forced labor from China's Xinjiang Uyghur Autonomous Region.
Kissell Amendment (6 U.S.C. §453b)	DHS	Textiles, clothing, or footwear procured for national security purposes by DHS must be 100% domestic in origin.

Source: CRS analysis of relevant statutory and regulatory provisions.

Notes: Exceptions to the domestic content restrictions of the Buy American Act, the Berry and Kissell Amendments, and the Specialty Metals and Sensitive Materials Restrictions are possible under certain circumstances (e.g., the Trade Agreements Act of 1979 allows the President to waive restrictions on eligible items, and procuring agencies may waive restrictions under certain circumstances). See CRS products on these statutory restrictions for more information.

a. General 'Buy American' requirements are statutorily established (41 U.S.C. §§8301–8305), but the threshold for goods to qualify and other specific implementation requirements have been set by a rule (RIN 9000-AO22, published at 87 *Federal Register* 12780, March 7, 2022) implementing an Executive Order (E.O. 14005).

b. For a good to qualify as a domestic end product, a certain proportion of its value must be mined, produced, or manufactured in the United States. For products consisting mainly or wholly of steel and/or iron, this threshold is 95%; for non-steel/iron manufactured products, this threshold is 60% (unless it is a commercially available off-the-shelf item); and non-steel/iron unmanufactured products must be mined or produced in the United States. The content threshold for non-steel/iron manufactured products increased to 65% in 2024 and is scheduled to rise to 75% in 2029, consistent with 97 FR 12780 and Sec. 835 of the FY2024 NDAA (P.L. 118-31).

c. Including Huawei or ZTE.

d. Including Semiconductor Manufacturing International Corporation, ChangXin Memory Technologies, or Yangtze Memory Technologies Corporation.

e. Defined at 50 U.S.C. §1701.

There is considerable variance as to which sources may be considered domestic. The National Technology and Industrial Base (NTIB), for instance, is defined as "the persons and organizations that are engaged in research, development, production, integration, services, or information

technology activities conducted within the United States, the United Kingdom of Great Britain and Northern Ireland, Australia, New Zealand, and Canada."[182] Such persons and organizations receive preference for certain limited procurement actions and some NTIB entities may be exempted from certain Foreign Ownership, Control or Influence (FOCI) requirements.[183] However, for the purposes of other requirements—such as those created by the Buy American Act—sources must be located within the United States to qualify as domestic.[184]

Congress may consider the extent to which these content requirements suffice to meet its goals regarding the DIB. If it determines that further preferences are necessary to encourage procurement from U.S.-based suppliers, it may, for instance, consider raising the threshold required for a product to qualify as American for the purposes of the Buy American Act, or implement additional restrictions covering specific products or materials. If Congress assesses that current requirements are excessively restrictive, it may consider actions such as lowering domestic content thresholds or expanding the membership of the NTIB. If procurement—whether by the government or by prime contractors—from particular entities, countries, or regions of concern is determined to be an issue, Congress may also consider passing restrictions that specifically apply to those sources.

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[182] 10 U.S.C. §4801. In addition, "domestic sources," for the purposes of Title III of the DPA, are defined as business concerns that "perform substantially all of the research and development, engineering, manufacturing, and production activities required of such business concern under a contract with the United States relating to a critical component or a critical technology item in the United States or Canada; or, subject to [certain limitations], Australia or the United Kingdom." 50 U.S.C. §4552(7)(B)(i).

[183] Procurement of conventional ammunition can be restricted to NTIB sources and must be from the NTIB in certain circumstances (10 U.S.C. Ch. 223 note proceeding); fire-resistant rayon fiber in uniforms may only be procured from a non-NTIB member if NTIB sources are not available (10 U.S.C. §4862 (note)); and buses, chemical weapons antidotes, ball and roller bearings, satellite "star trackers," and certain components for naval vessels may only be procured from NTIB manufacturers, unless the Secretary of Defense waives this restriction (10 U.S.C. §4864). For more information, see CRS In Focus IF11311, *Defense Primer: The National Technology and Industrial Base*.

[184] For discussion of the Buy American Act and other domestic content restrictions, see CRS Report R46748, *The Buy American Act and Other Federal Procurement Domestic Content Restrictions*, by David H. Carpenter and Brandon J. Murrill.

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