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The Defense Innovation Ecosystem

A wide range of authorities, programs, and organizations across the U.S. government support and manage technological aspects of national defense. In particular, such efforts seek to preserve or expand the *defense innovation ecosystem*—the set of organizations, activities, functions, and processes that develop, produce, and field new or improved technologies and capabilities for military use.

Historically, the Department of Defense (DOD) has heavily influenced the trajectory of global technology development, largely because of the magnitude of its investments in research and development (R&D). However, DOD and the federal government, more broadly, are no longer the dominant funders of global R&D. From 1960 to 2020, the federal government’s share of global R&D fell from 45% to 6%. Today, private sector R&D investments, which account for nearly three-quarters of global R&D, and commercial markets drive much of the development of leading-edge technologies in fields such as artificial intelligence, robotics, advanced materials, and others important to national security and defense. This shift has substantial implications for how DOD maintains technological superiority. DOD’s challenges include developing or modifying its organizations and business models to acquire, adapt, and leverage commercial technologies for defense applications, especially critical and emerging technologies.

Examples of DOD Innovation-Related Organizations and Programs

Congress and the executive branch have undertaken a number of actions to improve the defense innovation ecosystem, including providing policy direction and establishing new innovation-related positions, organizations, and programs within DOD, some of which are described below.

Defense Innovation Unit

Created in 2015 by the Secretary of Defense, the Defense Innovation Unit (DIU) focuses exclusively on prototyping and fielding dual-use commercial capabilities that solve operational challenges across the U.S. military. DIU is currently focused on the following technology areas: artificial intelligence, autonomy, cyber, energy, human systems, emerging technology, and space. DIU has offices in California’s Silicon Valley; Boston, MA; Austin, TX; Chicago, IL; and Washington, DC.

Since creating DIU, Congress has increased its authority. The National Defense Authorization Act (NDAA) for Fiscal Year 2024 (P.L. 118-31) codified and expanded the responsibilities of DIU. For example, it directed DIU to serve as the principal liaison between DOD and individuals and entities in the national security innovation base,

including entrepreneurs, start-ups, commercial technology companies, and venture capital sources. It also directed DIU to coordinate and harmonize the activities of other organizations and elements of DOD on matters relating to commercial technologies and to use funds made available to the agency to select, support, and monitor the execution of projects that will be carried out by service-level innovation organizations (e.g., AFWERX).

In a February 2024 report, DIU Director Douglas Beck, outlined a plan for *DIU 3.0*—the next evolution of the agency. After demonstrating that commercial technology can solve defense innovation problems, the report states that DIU must now “ensure that [DOD] can leverage the best of commercial technology and innovation at speed and scale to deter major conflict or win if forced to fight.”

DIU is leading DOD’s Replicator initiative—an effort to field thousands of all-domain autonomous systems within 18 to 24 months. Exemplifying the aims of DIU 3.0, the initiative seeks to develop an accelerated process within DOD for rapidly scaling, fielding, and delivering operational capability.

Office of Strategic Capital

On December 1, 2022, Secretary of Defense Lloyd Austin established the Office of Strategic Capital (OSC), which seeks to “accelerate and scale private investment in critical supply chain technologies needed for national security.”

Section 903 of P.L. 118-31 formally established OSC to “(1) develop, integrate, and implement capital investment strategies proven in the commercial sector to shape and scale investment in critical technologies and assets; (2) identify and prioritize promising critical technologies and assets that require capital assistance and have the potential to benefit [DOD]; and (3) make eligible investments in such technologies and assets, such as supply chain technologies not always supported through direct investment.” P.L. 118-31 also authorized OSC to “carry out a pilot program ... to provide capital assistance” (i.e., loans and loan guarantees) in support of its mission.

On March 8, 2024, OSC released its first investment strategy. Then, in September 2024, OSC announced the availability of up to nearly \$1 billion for direct loans (each ranging from \$10 million to \$150 million) to finance the modernization of manufacturing equipment in covered technology categories listed at 10 U.S.C. §149(e)(2) (e.g., quantum computing and advanced manufacturing).

Pilot Program to Accelerate the Procurement and Fielding of Innovative Technologies

The pilot program to Accelerate the Procurement and Fielding of Innovative Technologies (APFIT)—led by the Under Secretary of Defense for Research and Engineering—was established by Section 834 of the FY2022 NDAA (P.L. 117-81). According to DOD, the purpose of the program “is to expeditiously transition technologies from development into production, and to accelerate the fielding of those technologies to the warfighter.” Specifically, the pilot program provides between \$10 million and \$50 million to competitively selected projects to accelerate initial production and reduce the overall procurement timeline. The projects must be performed by a small business or nontraditional defense contractor. DOD recently announced five new APFIT awards, bringing the total number of awards under the pilot program to 22. Section 861 of the FY2025 NDAA (P.L. 118-159) makes the program permanent and modifies it to allow no more than two solicitations for proposals from any type of business with less than \$400 million in contracts and subcontracts from DOD in the preceding year (i.e., traditional defense contractors would be eligible).

NavalX

NavalX was established in 2019 to “connect relevant solutions from small businesses, startups, and academia to address the Department of the Navy’s most pressing challenges and operational needs faster.” NavalX operates through three main lines of effort: (1) Tech Bridges, a decentralized network of 18 regional sites that serve as tech scouts and local networking hubs between government, industry, and academia; (2) the Navy Small Business Innovation Research program, which provides non-dilutive investments in small businesses to stimulate technological innovation; and (3) the Navy Tech Transfer program, which facilitates partnerships and licensing agreements with industry and academia to share Navy personnel, facilities, equipment, and intellectual property.

Issues for Congress

Despite recent efforts, defense experts and others remain concerned that DOD is not adopting and transitioning innovative technologies at the speed and scale necessary to deter strategic competition from the People’s Republic of China and to address other acute and persistent threats. The following describes select issues for consideration.

Coordination Across DOD Components

DOD’s innovation organization directory currently includes 294 entities. Many of these entities are focused on connecting private sector companies to DOD and accelerating the identification, development, and adoption of commercial technologies by military departments and DOD components. While some level of redundancy and duplication may be necessary, the sheer number of DOD innovation-related organizations and their potentially overlapping missions, functions, and responsibilities can pose challenges both within and outside of the department.

For example, a 2023 RAND study noted that DOD innovation organizations lack an institutionalized approach to outreach both to DOD components regarding their needs

and to the private sector regarding potential solutions, suggesting that this oversight contributes to duplication of effort, inefficiencies, and missed opportunities. In addition, businesses cannot easily locate an initial point of entry into DOD, and if they do, they struggle to understand requisite processes and to identify subsequent funding and support, which may stall technology development and adoption.

Congress may consider examining the effectiveness and efficiency of individual defense innovation organizations and how such organizations interact with one another, to better align responsibilities and resources and to improve collaboration and coordination across the defense innovation ecosystem.

Senior Leadership and Culture

Reports from the Defense Innovation Board (DIB) and the Center for a New American Security (CNAS) both emphasize the importance of DOD senior leadership in fostering innovation. Specifically, according to the DIB, “leaders who provide top cover play a vital role in creating a space that empowers individuals to take calculated risks, share ideas, collaborate, and learn from failures.”

Further, CNAS recommends that senior leaders use “clear, public updates and success metrics” to “hold themselves personally accountable for specific innovation initiatives.”

In addition to strengthening the role of senior leaders in DOD’s innovation efforts, the DIB and CNAS both reference the need to develop innovation talent across the department. Specifically, CNAS suggests the creation of “talent management and career development pathways for innovation leaders that rotate promising individuals through, at a minimum, operational, R&D, and acquisition assignments.” Similarly, the DIB notes that the establishment of a “credible, practical, and recognized career path for innovators” may provide a number of benefits to DOD and its employees, including enhancing employee engagement and satisfaction, improving talent retention rates, and facilitating succession planning.

Flexible Funding and Other Processes

Defense experts commonly recommend flexible processes, especially flexible funding, as a means to increase the speed and scale of innovation adoption. For example, RAND calls for the establishment of an unrestricted funding pool that can be used to support any development or early production activity. RAND says that such funds should not be tied to the normal planning, programming, budgeting, and execution (PPBE) process or specific requirements and that DOD should prioritize support for activities that have a significant impact on fielding new technologies, including prototype demonstrations and participation in live exercises designed to enable evaluation for military use.

CNAS and the DIB identified consolidation of budget program elements, higher reprogramming thresholds, and the use of capability portfolio management as actions that could increase DOD’s flexibility in the year of budget execution and the adoption and integration of new technologies. In particular, CNAS notes that “the recommendations of the PPBE Commission represent one

way to achieve these goals and create more iterative processes within [DOD].”

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