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Defense Primer: Under Secretary of Defense for Research and Engineering

Advances in science and technology have long played a critical role in ensuring the technological preeminence of the United States military. For this reason, the Department of Defense (DOD) is the largest funder of federal research and development. The Under Secretary of Defense for Research and Engineering (USD (R&E)) is a civilian official reporting directly to the Secretary of Defense. The USD (R&E) serves as the principal advisor to the Secretary of Defense for DOD research, engineering, and technology development activities and programs.

Over the last several years, policymakers and others have expressed concern that the long-held technological edge of the U.S. military is eroding due, in part, to the proliferation of technologies outside the defense sector, organizational and cultural barriers to DOD effectively incorporating and exploiting commercial innovations, and insufficient engagement with leading-edge companies that have not historically been a part of the DOD innovation system. The position of the USD (R&E) as the third highest ranking DOD official—behind the Secretary and Deputy Secretary—is intended to promote faster innovation and to increase risk-tolerance in the pursuit of new technologies.

Origin of the USD (R&E) Position

Leadership of DOD research, engineering, and technology development activities and functions within the Office of the Secretary of Defense (OSD) have varied over the course of DOD's history. For example, there was a USD (R&E) from 1977 to 1986. Reestablishment of the position of the USD (R&E) in 2016 through the National Defense Authorization Act for Fiscal Year 2017 (FY2017 NDAA, P.L. 114-328) represents the most recent realignment.

Specifically, P.L. 114-328 eliminated the position of the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)) and established the positions of USD (R&E) and the Under Secretary of Defense for Acquisition and Sustainment (USD (A&S)).

In reestablishing the position of USD (R&E) the Senate Armed Services Committee stated (S.Rept. 114-255)

> The committee expects that just as previous USD (R&E) incumbents led the so-called "Second Offset" strategy, which successfully enabled the United States to leap ahead of the Soviet Union in terms of military technology, the new USD (R&E) would be tasked with driving the key technologies that must encompass what defense leaders are now calling a "Third Offset" strategy: cyber and space capabilities, unmanned systems, directed energy, undersea warfare, hypersonics, and robotics, among others.

Furthermore, in the conference report (H.Rept. 114-840) for the FY2017 NDAA, the conferees stated their expectation that the USD (R&E) "would take risks, press the technology envelope, test and experiment, and have the latitude to fail, as appropriate."

Roles and Responsibilities of the USD (R&E)

The powers and duties of the USD (R&E) include

- serving as the chief technology officer of DOD with the mission of advancing technology and innovation for the military services and DOD;
- establishing policies on, and supervising all defense research and engineering, technology development, technology transition, appropriate prototyping activities, experimentation, and developmental testing activities and programs, and unifying defense research and engineering efforts across DOD; and
- serving as the principal advisor to the Secretary of Defense on all research, engineering, and technology development activities and programs in DOD.

Department of Defense Directive (DODD) 5137.02 specifies 45 key functions and responsibilities of the USD (R&E) and defines the authorities of the USD (R&E) and his or her relationships with other senior DOD officials. The responsibilities detailed in DODD 5137.02 include managing the DOD science and technology (S&T) portfolio to address near-term and far-term capability gaps against emerging threats and ensuring that DOD technical infrastructure, scientific and engineering capabilities, and associated resources align with DOD priorities.

In the FY2022 NDAA (S. 1605), Congress designated the USD (R&E) as the Chief Technical Advisor to the Joint Requirements Oversight Council (JROC) with the intent of assisting DOD "in taking full advantage of technological possibilities, on-ramping new technologies into military operations, and identifying new, affordable, and effective means of achieving military ends." S. 1605 also required an independent study and report to Congress on the role of the USD (R&E) in the JROC, including possible adjustments.

Organizational Structure of the OUSD (R&E)

The organizational and management structure of the office of the USD (R&E) (OUSD (R&E)) has evolved from the structure proposed in a 2017 DOD report to Congress required by P.L. 114-328 and from the structure approved by the Deputy Secretary of Defense in a memorandum dated July 13, 2018 (**Figure 1**). Currently, the OUSD (R&E) has three major components:

- A Director for Research and Technology responsible for setting the strategic technical direction and investment strategy for DOD to ensure technical dominance on the battlefield, integrating DOD's laboratory infrastructure, and providing stewardship of the technical community that conducts defense research.
- A Director for Advanced Capabilities responsible for prototyping and experimentation that is designed to increase understanding of a technology and its capabilities, drive down technical risk, and incorporate warfighter feedback to ensure concepts that transition to acquisition address the needed capability, and are timely and affordable.
- A Director for Modernization responsible for managing the capability analysis and investments for the modernization priorities outlined in the National Defense Strategy. The modernization priorities include 5G; artificial intelligence; autonomy; biotechnology; cyber; directed energy; fully networked command, control, and communications; hypersonics; microelectronics; quantum science; and space.

In addition, a number of agencies within DOD's research and engineering enterprise are overseen by the OUSD (R&E). Specifically, the Defense Advanced Research Projects Agency, the Defense Innovation Unit, the Missile Defense Agency, and the Space Development Agency report to the USD (R&E).

USD (R&E) and USD (A&S) Relationship

A wide range of observers see a close and cooperative relationship between the USD (R&E) and the USD (A&S) as critical for the efficient and effective delivery of advanced technologies to the warfighter, especially at the fast pace many expect is needed to maintain the U.S. technological lead over potential adversaries.

Some have expressed concerns that dividing the roles and responsibilities of the USD (AT&L) into an USD (R&E) and an USD (A&S) will exacerbate the *valley of death* (i.e., the barriers and challenges that exist in bringing a new technology from the research laboratory to full scale deployment in the armed forces).

In the conference report (H.Rept. 114-840) for the FY2017 NDAA, the conferees acknowledged the potential challenges that exist in separating the roles and responsibilities of the USD (AT&L) into the positions of a USD (R&E) and a USD (A&S). However, the conference report asserts that elevating the missions of advancing technology and innovation within DOD, fostering distinct technology and acquisition cultures to better deliver superior capabilities, and providing greater oversight and management of DOD components outside the military services would best be addressed by the creation of two undersecretaries. Furthermore, the conferees indicated that any potential barriers or gaps could "be mitigated through effective leadership and management."

In an effort to bridge gaps between the two offices, DODD 5137.02 details their relationship, including requiring the USD (R&E) to advise the USD (A&S) on materiel development, milestone, and production decisions.

Relevant Statutes

Title 10, U.S. Code, Chapter 4—Office of the Secretary of Defense

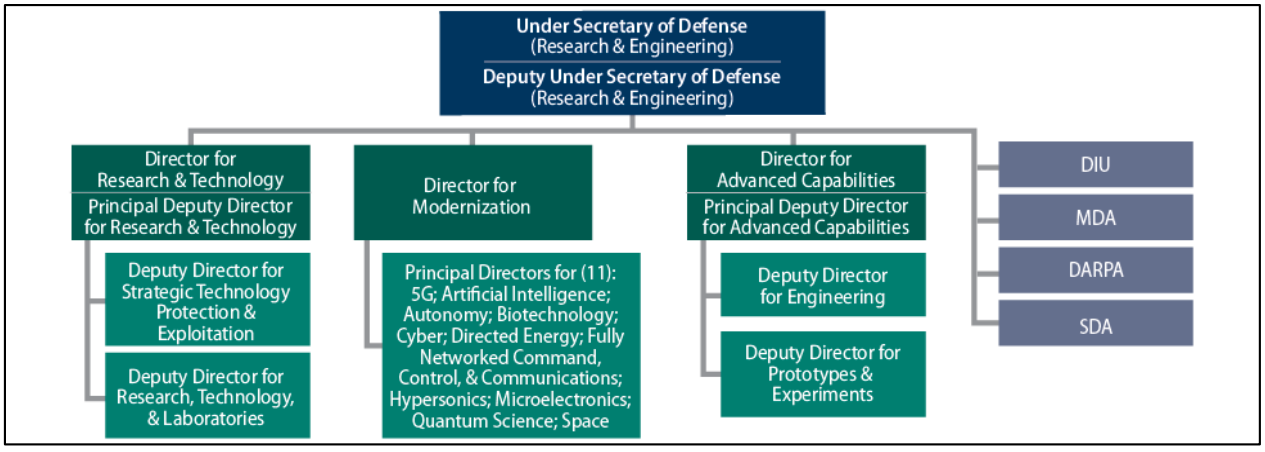
CRS Products

CRS In Focus IF10553, *Defense Primer: RDT&E*.
CRS Report R45403, *The Global Research and Development Landscape and Implications for the Department of Defense*.
CRS Report R45068, *Acquisition Reform in the FY2016-FY2018 National Defense Authorization Acts (NDAAs)*.

Other Resources

William D. O'Neil and Gene H. Porter, *What to Buy? The Role of Director of Defense Research and Engineering (DDR&E) Lessons from the 1970s*, Institute for Defense Analyses, IDA Paper P-4675, Alexandria, VA, January 2011.

Figure 1. Organizational Chart for Office of USD (R&E)



Source: Adapted from Attachment 1, Department of Defense, *Memorandum from Deputy Secretary of Defense on Establishment of the Office of USD (R&E) and the Office of the USD (A&S)*, July 13, 2018; and https://www.cto.mil/leadership/, accessed on December 20, 2021.

Notes: DIU = Defense Innovation Unit; MDA = Missile Defense Agency; DARPA = Defense Advanced Research Projects Agency; SDA = Space Developmental Agency

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