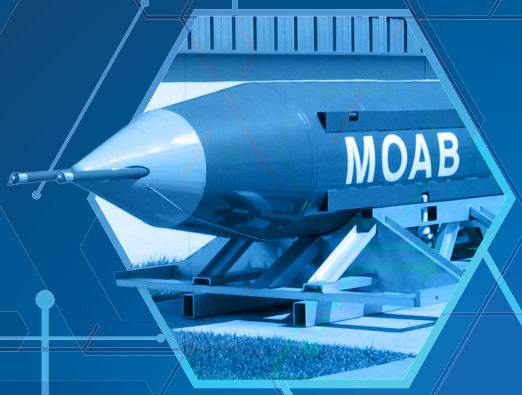

EMERGING TECHNOLOGIES INSTITUTE

NDIA

Accelerating the Adoption of Emerging Capabilities

NDIA Emerging Technologies Institute
November 2024

Authors

Wilson Miles
Associate Research Fellow, Emerging Technologies Institute, National Defense Industrial Association

Jacob Winn
Former Associate Research Fellow, Emerging Technologies Institute, National Defense Industrial Association

Tom Driggers
Former Public-Private Talent Exchange Fellow

Arun Seraphin
Executive Director, Emerging Technologies Institute, National Defense Industrial Association

Production

Hannah Meushaw
Associate Director, Graphic Design

Zachariah Chou
Copywriter / Editor

Alexander Feeser
Graphic Designer

Eve Dorris
Director, IPO

Acknowledgments

The authors are grateful to Stephanie Halcrow, Matthew McGregor, Jeff Kojac, Kathy Harger, and Mike Madsen, who all provided valuable feedback and suggestions on earlier drafts of this report. The report was made possible with the generous support of Schmidt Futures.

November 2024
First published in 2024 by NDIA's affiliate, the Emerging Technologies Institute. 2101 Wilson Blvd, Suite 700, Arlington, VA 22201, United States of America. (703) 522-1820

This report is made possible by general support to NDIA and the Emerging Technologies Institute. No direct sponsorship contributed to this report. This report is produced by NDIA, a non-partisan, non-profit, educational association that has been designated by the IRS as a 501(c)(3) nonprofit organization and was founded to educate its constituencies on all aspects of national security. Its research is nonpartisan.

For more information please visit our website: EmergingTechnologiesInstitute.org

MEDIA QUERIES:
Rachel Sunderland, Director of Public Affairs & Communications at rsunderland@NDIA.org

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Executive Summary

United States advancements in defense technology have historically been supported by significant government research and development investment, often in response to international or security crises. Department of Defense (DoD) laboratories and traditional defense companies have historically driven the capabilities that the U.S. fielded through the Cold War and into the 21st century. Much of the advancements in defense technology were supported by significant government research and development investment, often in response to international or security crises. Today, the current defense acquisition system is not suitable for ingesting innovation at the speed that the commercial sector transitions new technology. Changing how DoD adopts, develops, and transitions technologies will result in a better ability to respond to unanticipated events and technological opportunities, such as upgrading existing systems or leveraging commercial technology advances.

There are multiple recent efforts attempting to review DoD's acquisition process, with the recently concluded Commission on Planning, Programming, Budgeting, and Execution (PPBE) Reform and the Atlantic Council's Commission on Defense Innovation Adoption as the most notable. There *are* examples of DoD accelerating and quickly fielding technologies since the turn of the 21st century. Notable instances include the GBU-43/B Massive Ordnance Air Blast (MOAB) weapon, Mine Resistant Ambush Protection Vehicle (MRAP), and Operation Warp Speed (OWS). The National Defense Industrial Association (NDIA)'s affiliate, the Emerging Technologies Institute (ETI), undertook a research initiative to evaluate what factors contributed to the success of MOAB, MRAP, and OWS. Specifically, this report explores current DoD acquisition challenges and investigates alternative methods to field capabilities faster. To do so, ETI conducted background research on the acquisition system and analyzed a variety of case studies. In addition to speaking with subject matter experts on the development and acquisition processes, ETI research staff interviewed a variety of current and former program staff who worked on successful rapid adoption initiatives to gather lessons learned based on their experience.

This research led to the identification of six underlying principles of rapid adoption: 1) High Level Political Support, 2) Few Regulatory or Policy Barriers, 3) Technology is Sufficiently Mature, 4) Technology is Manufacturable, 5) Technology can be Transitioned into Use Expeditiously, and 6) Funding is Available. These six principles can help frame if, and how, other programs are suitable for rapid adoption. Moreover, ETI proposes a new acquisition pathway that DoD could use to more quickly incorporate mature commercial technology.

Key Findings:

Six Principles for Rapid Capability Adoption

1. **High-Level Political Support for Moving Funding and Bureaucracy:** When efforts receive high-level political support from both Congress and the Department of Defense, they are much more likely to succeed. This type of support can lead to rapid and flexible funding, as well as adjustments to bureaucratic processes.

2. **No Major Policy or Regulatory Hurdles:** Programs are often better able to move technologies through development and into full-rate production when there are few or no legal or regulatory barriers. These might include financial management practices, laws governing reprogramming decisions, requirements processes, or laws and regulations governing competition in the acquisition process.

3. **Technology is Mature Enough to Warrant Rapid Adoption:** The technology is ready for the equivalent of TRL 6 and can get through operational test and safety certification processes in a timely fashion.

4. **Technology is Manufacturable:** Rapid capability efforts are more successful when programs have the latitude to secure access to necessary manufacturing and supply chain resources during development. Hallmarks of success include a ready manufacturing base and a variety of vendors willing to sign open contracts with the government.

5. **Can be Transitioned into Operational Use Expeditiously:** When technologies can be transitioned to operations, they are typically characterized by requiring limited new training of personnel, few disruptions to existing logistical processes, and existing supply chains.

6. **Funding Can be Provided for Transition Effort:** Drawing on political will, urgency, and bureaucratic flexibility, program offices that are provided access to funding sources early and steadily may often be less prone to work stoppages or uncertainties throughout the development process.

Key Recommendations:

- The Secretary of Defense should create a new acquisition pathway and associated efficient resourcing processes which bypasses the typical requirements validation stage and PPBE process, and instead offers opportunities to "push" prototypes into the acquisition process without a formal requirement. This should be administered by a designated individual from an existing or new office.
- DoD should take a fuller account of the acquisition authorities already available to it, as many flexibilities exist in statute. These authorities should be clearly stated in DoD guidance, clearly delegated to PEOs and PMs within each service, and both taught and encouraged.
- The Under Secretary of Defense for Acquisition and Sustainment should highlight underused acquisition and contracting authorities and ensure such authorities and their respective use cases are clearly described in DoD policy and instructions and, where appropriate, provide additional guidance or training to acquisition professionals and senior leaders' teams across OUSD(A&S) and the offices of the Service Acquisition Executives.
- Congressional appropriations and subsequent DoD financial management guidance should allow low-rate initial production (LRIP) to be funded by RDT&E appropriation accounts.
- The Under Secretary of Defense for Research and Engineering should create and maintain a database for DoD stakeholders to share the documentation of ongoing capability gaps as well as successful S&T products and initiatives.

Introduction

Acquisition reform is not new to the DoD. Although reform efforts such as the Weapons Systems Acquisition Reform Act, "Better Buying Power" initiative, and the development of the Adaptive Acquisition Framework have improved aspects of Pentagon acquisition processes, some perennial organizational, political, policy, and behavioral challenges that prevent the efficiency required to rapidly deploy new technological capabilities to the warfighter persist.[1] These challenges are well-documented. Critiques of the acquisition process range from rigorous discussions of issues such as program structures, contracting mechanisms, the so-called "colors of money,"[2] requirements that limit program offices' options, and an acquisition culture that does not incentivize well-planned risk taking.

Even while these barriers persist, to the frustration of policymakers and operators alike, it is striking that DoD has a history of "moving quickly" when it seems to matter most. When confronted with a true crisis or emergency warfighting need, DoD can rapidly move through the design, development, testing, and fielding processes. Yet, despite numerous efforts, including leveraging existing commercial capabilities, the Department has not been able to implement a systematic means of adopting new technologies, instead relying on one-off efforts and special organizations outside the traditional acquisition system.

Several examples of DoD rapid acquisition success during emergencies are especially notable. For example, in the early preparation for the 2003 invasion of Iraq, DoD officials suggested that the development of a powerful "large-yield" gravity bomb would be of significant value in operations against the Taliban. In a matter of a few months, the GBU-43/B Massive Ordnance Air Blast (MOAB) bomb was developed by the Air Force Research Laboratory, and promptly delivered to the theater of operations. It is the most powerful conventional bomb ever built in the United States. Although building on the legacy of weapons that were first developed during the Vietnam war, the MOAB demonstrated that a new weapon could be researched, developed, manufactured, and deployed in record time under urgent need. Separately, the rapid development and fielding of the Mine-Resistant Ambush Protected (MRAP) vehicle in response to the crisis posed by Improvised Explosive Devices (IEDs) also highlights that urgency can translate to rapid fielding.

More recently, Operation Warp Speed was a public-private partnership initiated to deliver vaccines, diagnostics, and treatments in response to the COVID pandemic. It was a combined effort that included DoD, the Department of Health and Human Services, and other federal agencies including the Food and Drug Administration, the Centers for Disease Control, and even the Department of Energy and Department of Veterans Affairs. The program was officially announced in May 2020, with the goal of deploying effective vaccines by the end of the calendar year. Historically, vaccine development has taken years, and often decades, so the Warp Speed goals were initially met with significant skepticism by members of the medical community and the public at large. Despite this, the program proved to be an overwhelming success, resulting in not one, but three separate vaccines, with initial distribution in the first weeks of 2021, and helping establish the manufacturing and distribution framework for global COVID response for the future. Like the MOAB effort described above, Operation Warp Speed built effectively on government and private sector investments that had been made in previous years.

Though inspiring, these examples are the exceptions that "prove the rule" and do little to dispel widely held perceptions of the pace and responsiveness of traditional defense acquisition processes. The dominant theme in defense acquisition today has been programs running over budget, behind schedule, and delivering capabilities to national defense that often lag behind commercially available products. As just one example, the USAF KC-46 Pegasus tanker was based on an existing commercial jetliner — the Boeing 767 — yet still required more than eight years from selection to first delivery and has been plagued with operational deficiencies. Even at the smallest scale, DoD is generally using microelectronic components in its weapon systems that are two generations behind the state-of-the-art ones used in commercial products. Many also feel that the Department's incorporation of advanced technologies, such as artificial intelligence/machine learning technology, lags behind parts of the commercial sector even for similar uses and applications, despite the fact that much of the early work in defense-relevant emerging technologies was funded by DoD.

What actually happens within DoD organizations during emergencies that enables them to deliver results? Do organizations leverage acquisition systems during crises, or bypass them? Are there any attributes of successful rapid capability adoption efforts that can be incorporated into the standard development, acquisition, and deployment process?

1 Laura H. Baldwin, and Cynthia R. Cook. "Lessons from a Long History of Acquisition Reform," RAND, July 2015, https://www.rand.org/blog/2015/07/lessons-from-a-long-history-of-acquisition-reform.html

2 The term 'colors of money' in the DoD context refers to the different categories of financial appropriations made for distinct purposes: Research, Development, Test, and Evaluation (RDT&E), Procurement, Operations and Maintenance (O&M), and Military Personnel (MILPERS).

Methodology

To characterize DoD when it's able to develop and transition new technologies, ETI conducted a series of interviews with leading stakeholders across the public and private sector, including from a number of NDIA member companies and organizations. These individuals included senior-level acquisition professionals, technical development experts, and those who succeeded in rapidly delivering new technologies through programmatic or leadership positions. In total, these interviews provided the foundation for this report. ETI used these findings to explore how available technologies can be quickly and effectively provided to meet critical defense needs and to identify examples of capabilities that are suitable for rapid development and adoption.

In addition to ETI-led interviews, this report reviews three examples of DoD's rapid development or deployment of new technologies, which provide historical precedent for successful rapid technology adoption. These are the Massive Ordnance Air Blast (MOAB) Program, Mine-Resistant Ambush Protected (MRAP) Vehicle Program, and the recent Operation Warp Speed (OWS) effort.

The interviews and research also helped ETI synthesize broad attributes of these programs' success into six principles that can be used as a framework for current and future programs. Both the interviews and internal research help set the stage for ETI's proposal of a new acquisition pathway as well as a multitude of recommendations across the legislative, policy, financial management, and acquisition dimensions that can enable more rapid and effective technology development and deployment.

Background: Current Acquisition Process

The current acquisition process is guided by numerous rules and systems. This section briefly describes some relevant features of today's acquisition system that pertain to rapid technology capability adoption.

The Requirements Process

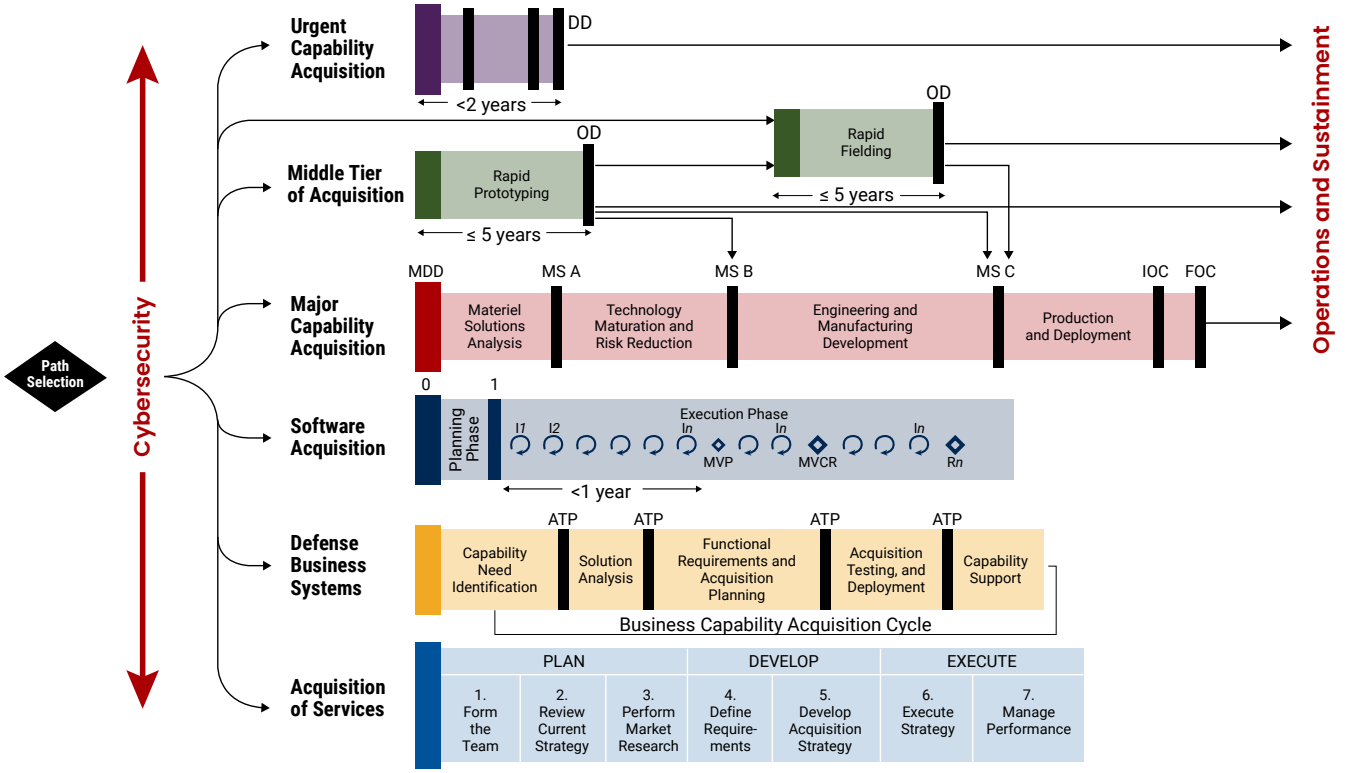
DoD's requirements process traditionally operates under the processes of the Joint Capabilities Integration and Development System (JCIDS), which is operated by the Joint Requirements Oversight Council (JROC). The process is responsible for the "documentation, review, and validation of capability requirements across the Department."[3] These can include requirements for the function and performance of a given capability.[4] According to the Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 5123.01I, operational needs are first identified by a Combatant Commander or Component Commander and requested through a Global Force Management request, via a Joint Urgent Operational Need (JUON, or UON if originating from a military department or agency) for urgent capabilities, or via a Joint Urgent Emergent Need (JEON or EON). Then, requirements are developed from these requests, which are typically threat-initiated. However, the system can also support technology "push" from the Science and Technology (S&T) community or other sources of game-changing emerging technologies when they are shown to meet an operational need.[5]

3 Joint Staff. "Charter of the Joint Requirements Oversight Council and Implementation of the Joint Capabilities Integration and Development System." October 30, 2021. p. D-1. https://www.jcs.mil/Portals/36/Documents/Library/Instructions/CJCSI%205123.01I.pdf

4 "DOD Requirements Development Process," AcqNotes, (Last Updated March 14, 2024), https://acqnotes.com/acqnote/tasks/requirements-development-overview

5 Joint Staff. "Charter of the Joint Requirements Oversight Council and Implementation of the Joint Capabilities Integration and Development System."

Adaptive Acquisition Framework[6]



Adaptive Acquisition Framework

The Adaptive Acquisition Framework (AAF) introduced a significant shift in acquisition policy, moving to a more flexible and tailorable framework, depending on specific program characteristics. It created six new acquisition pathways to enable program managers to tailor approaches to acquisition to a given type of capability. Each pathway provides guidance through the dense web of DoD authorities that underpin processes such as planning, development, requirements, procurement, operations, and sustainment. The AAF provides program offices with options on how to proceed throughout the acquisition lifecycle. The AAF is governed by DoD Instruction 5000.02, which creates and operationalizes the framework.[7] The AAF also provides opportunities to move between pathways, such as transitions from Urgent Capability Acquisition (designed to address an urgent operational need within two years) to the Middle Tier of Acquisition (designed to rapidly develop prototypes and/or rapidly field proven prototypes in response to a requirement).[8, 9] It is also notable that the Middle Tier of Acquisition waives the JCIDS process, instead allowing a DoD Component to develop a streamlined requirement within 6 months of determining an operational need relevant without the JROC; requirements approval is delegated to the identifying Component.[10]

6 Adaptive Acquisition Framework," DAU, https://aaf.dau.edu/

7 DOD Instruction 5000.02, "Operation of the Adaptive Acquisition Framework," January 23, 2020, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500002p.PDF

8 "Urgent Capability Acquisition," DAU, https://aaf.dau.edu/aaf/uca/ , DOD Directive 5000.71, "Rapid Fulfillment of Combatant Commander Urgent Operational Needs abd Other Quick Action Requirements," October 18, 2022, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/500071p.pdf

9 "Middle Tier of Acquisition (MTA)," DAU, https://aaf.dau.edu/aaf/mta/ , DOD Instruction 5000.80, "Operation of the Middle Tier of Acquisition (MTA)," December 30, 2019, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500080p.PDF

10 DOD Instruction 5000.80, "Operation of the Middle Tier of Acquisition (MTA)," December 30, 2019, p.4, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500080p.PDF

The Planning, Programming, Budgeting, and Execution Process[11]

The Planning, Programming, Budgeting, and Execution (PPBE) process is the system by which the White House, Department of Defense, and Congress determine, request, appropriate, and eventually spend financial resources on the organizations and capabilities that support DoD and national security missions.

The Planning phase attempts to ensure that the military's posture, including its end strength and capabilities, are consistent with the stated goals of the National Security Strategy (NSS), National Defense Strategy (NDS), and the National Military Strategy (NMS).[12] The classified Defense Planning Guidance (DPG) is prepared each year, which reviews and affirms existing plans and makes modifications as-needed in accordance with program performance and the global strategic environment.[13] The preparation of the DPG is led by the Under Secretary of Defense for Policy on behalf of, and for approval by, the Secretary of Defense.[14] Currently, the Deputy Assistant Secretary of Defense for Force Development and Emerging Capabilities has been tasked with executing this process.

During the Programming phase, senior leaders use the DPG, which goes to all DoD Components and guides development of their program and budget recommendations. Each of these organizations produces a Program Objective Memorandum (POM), which details each organizations' financial resourcing decisions over the next five years.[15] Based on these POMs and the DPG, the Office of the Under Secretary of Defense (Comptroller) (OUSD(C)) builds a five-year plan (known as the "FYDP", or Future Years Defense Plan) which sets the resource plans that the Department of Defense provides to the Office of Management and Budget (OMB) for review and approval.[16, 17]

During the Budgeting phase, OMB, CAPE, the Office of the Under Secretary of Defense (Comptroller) (OUSD(C)), and the Military Services make additional adjustments in response to White House guidance on priorities and OMB-provided "topline" levels for the Department of Defense. The final DoD budget request is integrated into the President's Budget Request alongside the associated Justification Books which provide program updates and explanations for requested funding to Congress.[18] The Congressional Defense Committees, particularly the Appropriations Committee's defense subcommittees, lead the process by which Congress appropriates funding for the Department of Defense based on the request. The President then signs the appropriations bill into law, creating an executable budget.

Each Fiscal Year's execution phase runs during that federal fiscal year, from October 1 to the following September 30. The OUSD(C) analyzes current DoD obligations and Congressional appropriations provided by law, whether they be full-year appropriations, supplemental appropriations, or Continuing Resolutions, and allocates the funding provided by Congress to the initiatives as described in the FYDP.[19] From time to time, the Military Services or the Office of the Secretary of Defense (OSD) may be legally authorized to execute appropriated funds for different purposes than what was explicitly prescribed by Congress, such as when a Joint Urgent Operational Need (JUON) is validated. In some cases, DoD can use a reprogramming process to reflect a need during the execution phase. This can take the form of a formal request to Congress to transfer funding if the proposed transfer is larger than a particular legally prescribed threshold (an "above-threshold" reprogramming, or ATR). Below this threshold, ("below-threshold" reprogramming) transfers can be executed by DoD without prior Congressional approval.

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11 For more information on the PPBE Process, see the PPBE Commission's overview within their Final Report: Commission on Planning, Programming, Budgeting, and Execution Reform, "Defense Resourcing for the Future," March 2024, https://ppbereform.senate.gov/wp-content/uploads/2024/03/Commission-on-PPBE-Reform_Full-Report_6-March-2024_FINAL.pdf

12 "Planning, Programming, Budgeting & Execution Process (PPBE)," DAU, https://www.dau.edu/acquipedia-article/planning-programming-budgeting-execution-process-ppbe

13 "Commission on Planning, Programming, Budgeting, and Execution Reform, Interim Report," August 2023, p. 12, https://ppbereform.senate.gov/wp-content/uploads/2023/08/PPBE-Commission-Interim-Report-Final.pdf

14 U.S. Department of Defense, "Deputy Assistant Secretary of Defense for Force Development and Emerging Capabilities, " Under Secretary of Defense for Policy, https://policy.defense.gov/OUSDP-Offices/ASD-for-Strategy-Plans-and-Capabilities/Force-Development-and-Emerging-Capabilities/

15 "Defense Primer: Planning, Programming, Budgeting, and Execution (PPBE) Process," Congressional Research Service, December 15, 2022, https://sgp.fas.org/crs/natsec/IF10429.pdf

16 Ibid.

17 "Defense Primer: Future Years Defense Program (FYDP)," Congressional Research Service, January 23, 2024, https://sgp.fas.org/crs/natsec/IF10831.pdf

18 "Commission on Planning, Programming, Budgeting, and Execution Reform," August 2023, https://ppbereform.senate.gov/wp-content/uploads/2023/08/PPBE-Commission-Interim-Report-Final.pdf

19 "Defense Primer: Planning, Programming, Budgeting, and Execution (PPBE) Process," Congressional Research Service, December 15, 2022, https://sgp.fas.org/crs/natsec/IF10429.pdf

Current Options for Appropriating Funds for Rapid Capability Adoption

There is a significant amount of flexibility inherent in most types of funding provided by Congress and this flexibility can be adjusted through law, regulations, or management and oversight practices. Examples of appropriations that can currently be used for flexible purposes such as rapid capability adoption include:

- **Research, Development, Test & Evaluation Budget Activity 7 (Operational System Development)**[20]**:** This funding can be used to support development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.[21] This funding could be used to modify existing fielded equipment for the purposes of rapid deployment, or initiate low rate initial production of items prior to their full rate production if the capability has been approved for developmental or operational testing by an operational test agency.[22]
- **"Other Procurement" accounts:** Each military department and some defense agencies annually receive appropriations for "Other Procurement" activities. Typically, these funds have more general justification descriptions in budget materials provided to Congress and appropriated with a broader set of allowable purposes. This funding would allow for rapid procurement of limited quantities of items.
  - For example, Army Other Procurement funds can be used for "construction, procurement, production, and modification of … equipment, including ordnance, spare parts, and accessories; therefore, specialized equipment and training devices; … and procurement and installation of equipment, appliances, and machine tools in public and private plants; … and other expenses necessary for the foregoing purposes."[23]
- **Operations and Maintenance (O&M) funding:** O&M funds can be used for DoD civilian salaries, supplies and materials, maintenance of equipment, certain equipment items, real property maintenance, rental of equipment and facilities, food, clothing, and fuel.[24] This funding could be used for the rapid procurement of a capability that could be delivered as a service provided by a non-DoD organization.

In addition to appropriations mechanisms there are also a variety of authorities that exist today that can be leveraged to support rapid capability adoption. These authorities, and ways that they and others might be used flexibly or innovatively, will be discussed in the Recommendations section of this report.

20 For more information, please see: "Defense Acquisitions: DOD's Research and Development Budget Requests to Congress Do Not Provide Consistent, Complete, and Clear Information," GAO U.S. Government Accountability Office, September 5, 2007, https://www.gao.gov/products/gao-07-1058

21 Volume 2B, Chapter 5: "Research, Development, Test, and Evaluation Appropriations," Financial Management Regulation, DoD 7000.14-R, September 2022, p.5-6, https://comptroller.defense.gov/portals/45/documents/fmr/current/02b/02b_05.pdf

22 Volume 2B, Chapter 5:" Research, Development, Test, and Evaluation Appropriations," Financial Management Regulation, DoD 7000.14-R, September 2022, p.44, https://comptroller.defense.gov/Portals/45/documents/fmr/Volume_02a.pdf

23 "Department of Defense Fiscal Year (FY) 2022 Budget Estimates," Department of the Army, May 2021, p. 3, https://www.asafm.army.mil/Portals/72/Documents/BudgetMaterial/2022/Base%20Budget/Procurement/OPA_BA_34_FY_2022_PB_Other_Procurement_BA3&4_Other_Support_Equipment.pdf

24 ABUS 055, "Operations and Maintenance (O&M) Funds," DAU, https://www.dau.edu/acquipedia-article/operations-and-maintenance-om-funds

Case Studies

Overview

The ETI team looked at three examples of past rapid development and deployment efforts since the turn of the 21st century, including the Massive Ordnance Air Blast (MOAB) Program, Mine-Resistant Ambush Protected (MRAP) Program, and the recent Operation Warp Speed (OWS) effort. Each case study demonstrates a time when DoD wanted to rapidly develop and transition a new technology at three different scales: the service, theater, and global levels.

Case Study #1

GBU-43/B Massive Ordnance Air Blast

The GBU-43/B Massive Ordnance Air Blast (MOAB) program built on existing Air Force Research Laboratory (AFRL) research on larger ordnances. Originally based on modifications to the older, Vietnam-era BLU-82, the GBU-43/B program came about from research efforts intended to build a larger ordnance that could navigate to its target using GPS. The program's inception came in the wake of the September 11 attacks and before Operation Iraqi Freedom, when senior leaders sought more powerful ordnance.

The capability was developed in-house at Eglin Air Force Base by the AFRL Munitions Directorate in response to a Joint Urgent Operational Need (JUON) notice, which provided substantial resources and alleviated bureaucratic hurdles in order to pursue the work. The project was able to use existing parts and infrastructure and effectively work with contractors to integrate new components, such as navigation fins and GPS systems. Ultimately, the quick development of the MOAB is one example of DoD — at the service level — finding ways to transition new technologies.

Urgency

The MOAB program was viewed as highly urgent in the lead-up to Operation Iraqi Freedom; DoD was committed to producing a heavier ordnance on a rapid timetable to fulfill a needed operational capability. Secretary of Defense Donald Rumsfeld stated the MOAB was created to put pressure on Iraqi dictator Saddam Hussein to surrender prior to, or soon after, the invasion. The issuance of a Joint Urgent Operational Need (JUON) indicated this urgency and bolstered efforts to provide both funding and bureaucratic resources toward the effort.[25]

DoD Leadership Support

Direct support and regular communication with the immediate office of the Secretary of Defense served as an instrumental piece to the development of the MOAB. In fact, the Secretary of Defense approved a DX rating for the MOAB program in 2007, enabling it to receive the highest priority for material delivery.[26] Additionally, funding was quickly allocated to development efforts, leadership was encouraged to expedite operational tests, and waivers were issued to permit rapid testing.

Broad Technical Requirements

The MOAB program's requirements included an ordnance weight (approximately 18,500 pounds) and GPS navigation. Beyond these two criteria, the program team responsible for work retained wide latitude to use any existing components that could achieve this goal quickly. For example, the MOAB Program Office leveraged existing components and designs from the BLU-82 and was able to quickly sign a contract for GPS guidance and navigation fins.

Mature and Well-Understood Technology

The primary reason for MOAB's rapid technology development was the MOAB Program Office's decision to leverage existing technology. The MOAB Program Office intentionally limited the number of "science projects," wanting to minimize the amount of development for every single component. The only truly new parts were the navigation fins and bomb casing. The main difference between the MOAB and previous munition experiments was the attached navigation system. To do this, the AFRL team leveraged existing control actuation kits from the Joint Direct Attack Munition (JDAM).

Identified Critical Material and Component Needs and Assigned Team Leads Early

Based on the urgency and available resources provided by the JUON, leadership was able to rapidly divide the project into parts and delegate more authority to team leads to move different parts of the project concurrently. These team leads were able to quickly identify key parts of the system (e.g., wiring) and engage contractors for these parts. This helped the system be ready for deployment at a moment's notice after testing was complete.

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25 Joint Urgent Operational Needs are primarily identified by Combatant Commanders to designate the need to accelerate a capability being developed for ongoing joint operations. See CJCSI 5123.01H or the discussion from the Defense Acquisition University: "Types of Urgent Operational Needs (UONs)," DAU, https://aaf.dau.edu/aaf/uca/uons/

26 All prime contracts, subcontracts, or purchase orders in support of an authorized program are given a priority rating; a DX rating is given to programs that are the highest national priority. The Secretary of Defense has the authority to approve a program DX rated, whose orders must be fulfilled before non-DX rating programs. Read more about the Defense Priorities & Allocations System (DPAS) here: "Defense Priorities & Allocations System (DPAS)," Defense Contract Management Agency, https://www.dcma.mil/DPAS/

Leveraged Existing Components

The MOAB Program Office knew that only a small number of the bombs would be produced, and therefore was able to procure many existing components from other systems without needing to spend time on dedicated contracting. Additionally, because so many parts were used by other munitions, little manufacturing was required.

Rapid Operational Testing

Combined with the high-level political support available to the program, the first operational test took place less than a year after formal program inception. The ability to rapidly gain approvals and gain testing data immediately supported rapid fielding.

Rapid Transition to Operational Availability

Because a significant part of the system was drawn from the BLU-82, and because of the small number of weapons built, the U.S. Air Force was prepared to deliver the MOAB to the theater using its existing procedures for transporting, operating, and deploying such a munition.

Streamlined Authorities

Because MOAB was identified as a JUON, several authorities were rapidly streamlined.[27] For example, a typical capability's path through the Joint Capabilities Integration and Development System (JCIDS) requires reviews of program requirements for compliance with Key Performance Parameters (KPPs), Key System Attributes (KSAs), and Additional Performance Attributes (APAs). Capabilities identified as JUONs do not require these reviews. The MOAB program was also able to avoid other activities, such as Analyses of Alternatives (AOAs) which are required to be completed within nine months. While AOAs help program offices evaluate alternative capabilities, schedule plans, or contracting options, circumventing the AOA phase can help programs move more quickly through the acquisition process.

Used Existing Research Budgets

Funding to develop and test was provided through the existing AFRL research budget, and existing Air Force procurement funding was allocated to purchase the initial units after successful testing.

Case Study #2

Mine-Resistant Ambush Protected Vehicle Program

The Mine-Resistant Ambush Protected (MRAP) program was a DoD initiative that aimed to rapidly develop and deploy heavily armored vehicles to protect military personnel from the threat of roadside bombs, improvised explosive devices (IEDs), and ambushes in Iraq. Because 75% of casualties were attributable to IEDs and other explosive devices in the mid-2000s, MRAP became the DoD's highest acquisition priority. With the goal of developing and delivering better vehicle platforms rapidly, DoD's effort required significant participation and collaboration between OSD, the Military Services, and various defense contractors. It took strong leadership and a coordinated effort to design and manufacture specialized vehicles with enhanced protection against explosions and ballistic threats at an accelerated pace.

Between February 2007 and October 2009, the program successfully developed and fielded more than 16,000 MRAP vehicles to both Iraq and Afghanistan.[28] The outcome of the MRAP effort was a dramatic reduction in casualties, providing enhanced protection for military personnel and improving their mobility and operational capabilities in hostile environments. The MRAP effort is one of the most well-known recent examples of DoD fielding a new solution on a theater-wide scale.

Urgency and Focus

The MRAP program was driven by a sense of urgency to protect military personnel from the then-increasing threat of roadside bombs and ambushes. This urgency created a focused environment that prioritized rapid technology adoption and deployment. Additionally, focusing on an operational outcome reduced the creation of detailed technical requirements that would have added complexity, thereby increasing time to delivery.

Leadership Support

The MRAP program received strong support from the highest levels of leadership, including the White House and Congress. The crisis-driven nature of the program, coupled with the recognition of its importance, led to dedicated support, enabling rapid decision-making and resource allocation.

Active leadership attention enabled: urgency, establishment of public-private partnerships, expedited funding, use of streamlined acquisition processes, leaders to choose experienced personnel for the project team, and external support, all of

27 See CJCSI 5123.01H for a detailed breakdown of waivers.

28 Andrew Feickert, "Mine-Resistant, Ambush- Protected (MRAP) Vehicles: Background and Issues for Congress," CRS Report for Congress, June 6, 2008, https://apps.dtic.mil/sti/tr/pdf/ADA482799.pdf

which contributed to the program's effectiveness. These attributes are crucial for adopting new technologies rapidly and effectively but require senior leader attention.

Clear Demand Signaling

DoD was effective from the beginning in its pursuit of an armored infantry vehicle, which can be attributed to its understanding of the threat environment: Warfighters needed a vehicle to better withstand IEDs. DoD shaped the acquisition process to fit this operational challenge. DoD awarded Indefinite Delivery, Indefinite Quantity (IDIQ) contracts to nine different commercial companies and agreed to buy at least four vehicles from each. The criteria for awarding a contract were simple: If the company could produce a vehicle that met the minimum operational requirements, they were given a production contract. An important aspect of the MRAP acquisition process was the clear communication of contract parameters to vendors. DoD thoughtfully shaped the market for the MRAP by continuously communicating its needs throughout its development process, while also preserving competition. Ultimately, five different truck manufacturers were awarded contracts.[29]

Broad and Responsive Requirements

The ability of DoD and industry to deliver the capabilities needed by warfighters was aided by requirements that defined a broad mission objective, rather than specific technical performance criteria. This mission objective was to limit deaths resulting from IED attacks on operational forces. Two requirements which significantly drove program activities were, first, the ability to withstand an underbody blast caused by the IEDs used in-theater and second, the ability to effectively operate on a slope of 45 – 60 degrees without tipping over.

The simplicity of the overall set of requirements influenced how the acquisition process was shaped. For example, the initial requirements document was only a few pages long, which provided the program with more decision trade space. This is unlike most programs, whose requirements documents can reach up to hundreds of pages.[30]

Those responsible for the MRAP's engineering were also in continuous communication with the requirements and operational communities as the MRAP systems evolved, allowing for direct feedback on system performance from operational users to design engineers. For example, initial vehicles were structurally rigid, but quickly received hardware modifications based on feedback in-theater warfighters submitted to an MRAP Executive Committee. The committee consisted of the acquisition, requirements, and in-theater warfighter communities and evaluated the program's challenges and successes. Problems were identified by warfighters in theater, who were in daily contact with the Program Office as well as MRAP manufacturers. The Program Office also participated in the medical autopsies of the killed-in-action to understand the physical effects of blasts. A team analyzed the weight and detonation patterns of every IED blast in theater. This information was shared with the manufacturing and engineering teams to ensure that system vulnerabilities were quickly identified and addressed. As soon as a new MRAP variant was developed, it was immediately put into production, oftentimes overnight.

Lead Service Identified Based on Mission Needs

Although the Army is historically DoD's executive agent for tactical wheeled vehicles, or combat service support vehicles, the Joint Program Office (JPO) for the MRAP program was placed within Marine Corps Systems Command, based on its history of taking calculated engineering risks and history of moving quickly when adapting vehicles for prior emergencies.[31] The Marine Corps also had design and operational experience with the Husky route clearance vehicle used by Marine Combat Engineers. This non-traditional program management decision was another example of prioritizing actual operational needs over standard bureaucratic practice.

Mature Technology

The program was able to leverage technical expertise from existing V-shaped hull vehicles such as the South African Casspir. The knowledge and experience gained from the Casspir, specifically regarding the armor and shock absorption designs, supported the construction of initial MRAP models. Additional existing technologies were used to iteratively improve MRAP vehicles based on operational feedback from warfighters. For example, the MRAP Buffalo version received a rear-door assist mechanism based on commercial, off-the-shelf hardware to improve crew survivability while reducing cost and not impacting production schedules.

Managing Potential Engineering Risks

The severity of the need for a new infantry support vehicle led to strategic decisions regarding engineering risk-taking, the speed

29 Michael E. Bulkley; Gregory C. Davis, "The Study of the Rapid Acquisition Mine Resistant Ambush Protected (MRAP) Vehicle Program and Its Impact on the Warfighter," Monterey, California: Naval Postgraduate School, June 2013, https://apps.dtic.mil/sti/tr/pdf/ADA582916.pdf

30 Browne, Ryan. "After 10-Year Effort, Army Selects New Pistol Maker". CNN. January 20, 2017. https://www.cnn.com/2017/01/19/politics/ army-new-pistol-sig-sauer/index.html

31 Seth T. Blakeman; Anthony R. Gibbs; Jeyanthan Jeyasingam, "Study of the Mine Resistant Ambush Protected (MRAP) Vehicle Program as a Model for Rapid Defense Acquisitions," Monterey, California, Naval Postgraduate School, December 2008, https://apps.dtic.mil/sti/tr/pdf/ADA493891.pdf

of deployment, and the funding allocated for the MRAP program. The effort used expedited testing and granting of safety certification waivers to quickly bring any benefit to the Iraq and Afghanistan theater rather than delaying deployment in order to develop perfect capabilities. The MRAP Program Office understood that low speed, and engineering decisions that were made to fit that development process, could result in more risk to the warfighter. System improvements were deployed in increments because the need for new, more survivable vehicles improved the operational situation and outweighed potential engineering risks.

Early Identification of Supply Chains

Due to the urgent need to produce MRAPs, DoD identified gaps in the supply chain early and quickly began to address them. There were several key sub-systems for which DoD and Congress worked to identify foreign suppliers to alleviate domestic production shortfalls — such as for steel and vehicle tires. Identifying supply chains early is atypical for a program office in the research & development phase; supply chains are infrequently mapped or built in anticipation of future full-rate production and procurement. Most development efforts focus on proving technology readiness, so most time is spent on the research, development, prototyping, and testing processes. Because building a successful prototype does not require building supply chains and networks of lower-tier subcontractors, these activities typically do not occur until the prototype developer or licensed prime contractor has secured a procurement contract that entails significant production.

Clear and constant communication with industry supported DoD efforts to address supply chain issues for the MRAP program. During the development process, DoD kept in regular contact with the manufacturers to ensure they received timely information to support preparations for full-rate production. The Secretary of Defense's staff directly and continuously communicated with first-tier suppliers. The MRAP vehicle Program Manager was responsible for communicating with the second- and third-tier suppliers. These conversations were held to help industry build their own manufacturing supply chains. Industry received an indication that contracts would be awarded promptly and were able to make the proper investments into workforce and manufacturing capability.

There was also considerable communication between DoD organizations on these efforts. For example, the Army and Navy Service Acquisition Executives offices remained in communication with OSD staff. Additionally, the Program Manager's office regularly discussed supply chain constraints with OSD industrial policy experts.

MRAP Program Received a DX Rating

To accelerate the manufacturing process, the Secretary of Defense approved a DX rating for the MRAP program.[32] By giving the MRAP program a DX rating, DoD assured priority access to available raw materials for MRAP manufacturers, enabling industry to respond more rapidly and meet production requirements.

Experienced Acquisition Workforce

The success of the MRAP program was facilitated through the specific selection of highly experienced individuals across the acquisition workforce. These professionals possessed deep knowledge of the acquisition process, understood the urgency of the situation, and navigated through the various authorities and procedures efficiently. In addition to the rotation of professionals from Marine Corps System Command, the Army Tank-automotive and Armaments Command (TACOM) supported the Program Office.

Streamlining Traditional Acquisition Steps

The Secretary of Defense has general legal authority to waive various acquisition processes related to design, production, delivery, and performance, and did so for the MRAP program.[33] For example, the MRAP was allowed to begin procurement before a systems engineering management plan was in place. In some cases, standard program documentation processes were also reduced. Not all processes were waived however, such as the Technology Readiness Assessment (TRA).[34]

There were also associated challenges with purchasing high-end steel from Israel and melt from Mexico, as there are legal requirements associated with how the U.S. buys armor. Specifically, it must be produced in either the U.S. or Canada. Through a certification submitted to the Congressional Appropriations Committees, these restrictions were waived.[35]

Transparency with Congress

The MRAP program received significant funding and support from Congress, who recognized the critical need for enhanced protection for combat support vehicles in theater. The speed and level of funding provided was in response to the perceived

32 Michael J. Sullivan, "Defense Acquisitions Rapid Acquisition of MRAP Vehicles." U.S. Government Accountability Office, October 8, 2009, https://www.gao.gov/assets/gao-10-155t.pdf

33 U.S. General Services Administration. (2024, February 15). 225.871-4 Statutory waivers. Defense Federal Acquisition Regulation Supplement. https://www.acquisition.gov/dfars/225.871-4-statutory-waivers

34 Seth T. Blakeman; Anthony R. Gibbs; Jeyanthan Jeyasingam, "Study of the Mine Resistant Ambush Protected (MRAP) Vehicle Program as a Model for Rapid Defense Acquisitions," Monterey, California, Naval Postgraduate School, December 2008, https://apps.dtic.mil/sti/tr/pdf/ADA493891.pdf

35 "225.7011-2 Waiver," DFARS, https://www.acquisition.gov/dfars/225.7011-2-waiver

operational need. The transparent relationship between the MRAP Program and Congress helped minimize delays and ensured continued support of the streamlined acquisition process. When provided with a clear request and justification, Congress was consistently willing to ensure the project had full support.

The transparent relationship between the MRAP Program and Congress created trust that directly contributed to the speed of the acquisition process through obtaining waivers for traditional acquisition documentation. The Armed Services committees recognized the need for speed within the acquisition process. In addition to Congressional recognition of the urgent operational threat, the ability of the Program Manager and team to clearly communicate their needs gave Congress the confidence to provide waivers when requested.

Appropriate Contract Types Selected to Meet Program Goals

Recognizing that one producer did not possess the capacity to produce MRAPs in the required quantities, the DoD awarded IDIQ contracts to nine different vendors and agreed to buy at least four vehicles from each. The IDIQ contracts allowed the rapid delivery of a small number of prototype units for evaluation at an agreed-upon price to the government, which set up DoD to both meet mission needs quickly and establish streamlined ordering procedures for future requirements reduces lead time to award.

Based on the evaluations, the follow-on contract vehicles used for the MRAP Program were Undefinitized Contract Actions (UCAs) so contractors could immediately begin delivering supplies and performing services with full expectation of reimbursement before the terms and conditions of the contract were finalized. In the case of MRAP, UCAs enabled multiple companies to begin work on many aspects of the program in order to rapidly field the systems.

"Colorless" Money

In addition to providing both expedited and continuous funding for the acquisition and fielding of MRAP vehicles, Congress also made the funding "colorless." This allowed the Program Office to allocate funds to research and development, procurement, operations & maintenance, and upgrades as required, with appropriate congressional notifications.

Case Study #3:

Operation Warp Speed (OWS)

Operation Warp Speed was a joint effort between the Department of Health and Human Services (HHS) and DoD to speed up the development and delivery of multiple COVID vaccine candidates.[36] The OWS effort launched in May of 2020 with the goal of producing 300 million doses of safe and effective COVID vaccines with initial doses available by January 2021. The first dose was ultimately authorized by the Food and Drug Administration on December 11, 2020.

OWS mechanisms provided significant funding, resources, and logistical support to several vaccine manufacturers to expedite clinical trials, manufacturing processes, and distribution plans. The initiative also established partnerships with private sector companies and research organizations to facilitate the development and production of medical countermeasures.

By facilitating unprecedented public-private partnerships, the U.S. federal government enabled the rapid development and authorization of multiple COVID vaccines. The OWS initiative played a pivotal role in supporting the emergency use authorization of vaccines such as the Pfizer-BioNTech, Moderna, and Johnson & Johnson vaccines.[37]

DoD Leadership Support

Leadership's top priority was ending the considerable human and financial costs caused by the COVID pandemic. All appropriate funding and staffing resources were aligned to enable the effort to move quickly. Senior leader attention across the White House, DoD, and HHS served to quickly route problems to a decision-maker for resolution across DoD or across the interagency.

Congressional Support

The broad authorities provided to the executive branch by Congress in response to the crisis enabled all actors to move quickly in contracting and grantmaking. Resources and funding provided to the Defense Production Act Title III Office were critical for this effort. Where DoD is routinely subject to public and private critique over its spending practices, the nature of the legislation, authorities, and high levels of appropriations enabled multiple contractors to pursue different vaccine development and manufacturing approaches. The intention was to reduce the possibility of failure by providing significant funding.

36 In addition to DoD and HHS, the interagency effort involved numerous government and non-government partners: the Centers for Disease Control, the Food and Drug Administration, the National Institutes of Health, the Biomedical Advanced Research and Development Authority, and private firms.

37 "Operation Warp Speed: Accelerated COVID-19 Vaccine Development Status and Efforts to Address Manufacturing Challenges," U.S. GAO, February 11, 2021. https://www.gao.gov/products/gao-21-319

Straightforward Technical Requirements

Operation Warp Speed's broad criteria for funding and support to many companies supporting a variety of vaccination modalities (mRNA, recombinant proteins, killed virus, and attenuated live virus) was atypical.[38] Most government acquisition programs include well-defined and specific requirements that shape the nature of the development and acquisition process. By clearing away that specificity, the remaining criteria for contractors to receive additional funding and full rate production became successfully executing safe and effective clinical trials.

Leveraged Existing Research, Networks, and Partnerships

As a result of decades of research spurred by early government intramural and extramural research and development activities, messenger RNA (mRNA) technology had been developed to the point that existing facilities across dozens of companies were prepared to synthesize the initial vaccines for clinical trials.

OWS capitalized on existing networks, processes, and partnerships, and leveraged existing pharmaceutical production and distribution infrastructure. For example, HHS relied heavily on DoD for its robust logistics network. U.S. Transportation Command provided instrumental support and infrastructure by distributing approved vaccines widely.

Initially, the U.S. government engaged twelve domestic and international companies with a total of twenty-seven production sites.[39] The intent was to ensure that if one company or production site failed to produce a viable vaccine candidate, there were alternative suppliers available. In fact, due to the compressed timeline of OWS, some companies could not meet the goal of delivering a viable vaccine candidate by the end of 2020.[40]

Responsibility for the Entire Process

The interagency team assigned to oversee OWS was responsible for development, manufacturing, and distribution process, which was an important element for a few reasons. First, OWS developed a clear acquisition strategy and communications plan that was provided to all stakeholders and leadership involved in the effort. Second, high-level stakeholders understood the acquisition authorities and were prepared to clear bureaucratic bottlenecks that otherwise would have prevented certain contractors from receiving funds to perform work that often falls later in the program lifecycle. For example, contracts were approved for simultaneous work on various stages of drug research, development, testing, and manufacturing. Typically, these phases of the program occur sequentially, with later phases not beginning until milestones are met.

Adapting Vaccine Production

OWS recognized that traditional vaccine production methods would not meet the urgent timeline. Therefore, HHS and DoD, in conjunction with the vaccine manufacturers, took steps to ramp up vaccine production capability. They prioritized speed by reducing regulatory burden while maintaining adherence to essential FDA regulatory processes to ensure safety with emergency use authorizations (EUAs) rather than full approvals. The Defense Production Act was used to support production of items such as vials, syringes, and refrigerators prior to the provision of these EUAs to ensure that there would be no delay in production and distribution upon authorization.

Leveraging Interagency Acquisition Experience and Appropriate Skillsets

High-level leadership resulted in OWS programmatic teams with members hand-picked from other roles based on their appropriate backgrounds. These teams paired highly experienced medical professionals with government logisticians and acquisition professionals. This helped OWS maintain an accelerated schedule toward the rapid development and delivery of vaccines. For example, DoD provided significant contracting support to HHS by facilitating the timely transfer of funds between the two agencies and established a permanent office in October 2020 to support interagency needs.[41] The experienced contracting officers were important to navigating the complexity of the required contracting actions as well as the frequent use of Other Transactions Authorities (OTAs). Additionally, Army Materiel Command supported logistical deliveries across the U.S.[42] The interagency effort heavily leveraged DoD's logistical reach and deep expertise. Simply, no other agency had the trained personnel needed. Bureaucratic processes were also aided by the use of data services which are not commonly used in program management.[43] These include systems which collected and analyzed logistics information in conjunction with dose delivery management systems.

38 "Operation Warp Speed, Accelerated COVID-19 Vaccine Development Status and Efforts to Address Manufacturing Challenges," U.S. GAO, February 2021, https://www.gao.gov/assets/gao-21-319.pdf

39 Margo, "Story of Emergent BioSolutions," p. 83.

40 Ibid., p. 85.

41 "COVID-19: Agencies are Taking Steps to Improve Future Use of Defense Production Act Authorities," Government Accountability Office, December, 2021, https://www.gao.gov/assets/gao-22-105380.pdf

42 David Vergun, "Army General to Co-Lead 'Operation Warp Speed' for COVID-19 Vaccine," U.S. Department of Defense News, May 15, 2020, https://www.defense.gov/News/News-Stories/Article/Article/2188680/army-general-to-co-lead-operation-warp-speed-for-covid-19-vaccine/

43 Paul Mango, *Warp Speed*, 1st edition. (United States: Republic, 2022).

Alternative Contracting Approaches

OWS deviated from traditional federal contracting processes, which entail prescribed and often cumbersome practices that follow a strict interpretation of Federal Acquisition Regulations. (FAR). Instead, it leveraged other contracting mechanisms, such as OTAs and Technology Investment Agreements (TIAs), allowing for greater flexibility and partnerships with non-traditional suppliers to support research and development efforts.

OWS is a recent example of the power of the consortia model, which brought together government agencies, academic institutions, and pharmaceutical companies that allocated an ecosystem of resources and knowledge to develop, produce, and distribute a vaccine. Consortia are organized around technology focus areas and primarily rely on OTAs to execute agreements. DoD leveraged its existing relationship with the Medical Chemical, Biological, Radiological, and Nuclear (CBRN) Defense Consortium (MCDC) to reach MCDC's members and network.[44] This allowed DoD to survey the pharmaceutical industry and send out a solicitation for advanced research and manufacturing of 100 million doses of a vaccine for COVID. The consortia model provided DoD with a pre-existing group of organizations, who have a ready-to-go network of suppliers and an established communication process. Ultimately, this network was instrumental in responding to a large-scale and unanticipated emergency.

Defense Production Act (DPA)

The DPA is the primary source of Presidential authorities to expedite and expand the supply of resources from the U.S. industrial base to support national security needs, including military, energy, space, and homeland security programs. There are three major sections: Title 1: Priorities and Allocations; Title III: Expansion of Productive Capacity and Supply, and; Title VII: General Provisions.[45] Through September 2021, federal agencies used DPA and other actions over 100 times to respond to COVID and stabilize the medical supply chain.[46] According to GAO, a Title I priority rating was triggered 73 times as of September of 2021.[47] DPA Title I priority ratings helped expedite the delivery of supplies to replenish the U.S. Strategic National Stockpile and support vaccine development.[48] Title III authority was used to fund projects focused on medical supplies as well as the development and production of vaccines. In total, the CARES Act provided DoD with $1 billion specifically for DPA purchases.

44 Stephanie Halcrow and Moshe Schwartz, "The Power of Many: Leveraging Consortia to Promote Innovation, Expand the Defense Industrial Base, and Accelerate Innovation." Center for Government Contracting. School of Business. George Mason University. July 20, 2022. https://business.gmu.edu/news/2022-07/power-many-leveraging-consortia-promote-innovation-expand-defense-industrial-base-and

45 "DPA Title I Defense Priorities & Allocations System (DPAS)," Office of the Deputy Assistant Secretary of Defense for Industrial Policy, October 14, 2021, https://www.dau.edu/sites/default/files/Migrate/EventAttachments/447/DPA%20Title%20I%20Overview%2010.20.21.pdf
Title I authorizes the President to require priority performance on contracts or orders and allocate materials, services, and facilities as necessary or appropriate to promote national defense. Title III authorizes the President to provide a variety of financial incentives (loans, loan guarantees, direct purchases, and purchase commitments) to companies to meet national defense goals, including maintaining, restoring, and expanding the domestic industrial base. The financial incentives may be used only when certain conditions are met. Title VII provides for a range of authorities, which include giving private firms that participate in voluntary agreements for preparedness limited protection from aspects of the antitrust laws.

46 Government Accountability Office, *Agencies are Taking Steps to Improve Future Use of Defense Production Act Authorities*, Report to Congressional Committees, December, 2021. https://www.gao.gov/assets/gao-22-105380.pdf

47 Ibid.

48 Ibid.

Discussion

Across the three case studies, six overarching attributes of successful rapid acquisition emerge that meaningfully contributed to their rapid and successful development and deployment. They provide a methodology for identifying suitable technological candidates for rapid acquisition.

These six principles are:

- There is high-level support for moving funding and bureaucracy
- There are few major policy or regulatory hurdles
- Funding can be provided for transition effort
- The technology is mature enough to warrant rapid adoption
- The technology is manufacturable at required scale
- The technology is suitable for operational use

Six Principles for Rapid Acquisition

1. High-Level Support for Moving Funding and Bureaucracy

When efforts receive high-level bipartisan support from Congress and from across Military Services and agencies within the DoD, they are much more likely to succeed. First, prioritized and widespread support from senior officials and their staff can often enable more rapid reallocation of resources to meet program needs. This allows program managers to make decisions to address schedule and performance issues and take advantage of technological opportunities that may normally be more constrained by cost. Second, high-level support is essential for addressing sometimes time-consuming processes and standard practices that develop in all bureaucracies, especially those that are risk-averse in nature. That could include expediting decisions to move personnel between teams or departments, expediting acquisition decisions or processes, and waiving appropriate statutory and regulatory requirements.

All three case studies are examples where there was an unusually high level of support from key stakeholders. For example, in the post-9/11 environment in the lead-up to the 2003 invasion of Iraq, the Secretary of Defense took a personal interest in the successful development of the MOAB on a timetable relevant to the impending operation. With respect to the MRAP and OWS, both programs were driven by crisis circumstances that could be measured in human lives. These crisis conditions motivated Congressional and Executive Branch senior leaders to support quicker development and delivery decisions by dedicated teams.

2. Few Major Policy or Regulatory Hurdles

Even with the acceleration of a program's funding and acquisition processes, rapid technology efforts can also be slowed if other policy or regulatory hurdles stifle program managers. These could include financial management practices, laws governing reprogramming decisions, requirements processes, or laws and regulations governing competition in the acquisition process. These could also include other issues inside or outside the typical defense sphere, such as those addressing environmental, ethical, economic, or even treaty obligations. In cases where these barriers do exist, high-level and broad support will be required to overcome them expeditiously. Transitioning the capability to a full program of record is eased by using more outcome-based requirements during development rather than stringent and specific technical requirements.

The priority level of the three case study programs encouraged senior leaders to use existing authorities to reduce policy and regulatory barriers, or be more willing to change authorities to ensure mission success. By issuing a JUON, the Pentagon enabled the MOAB project team to skip key regulatory steps prior to testing. Due to the perceived need for the weapons system, this was understood as a necessary step to ensure that a suitable number of MOABs would be ready for delivery if the need arose. Even more significantly, the MRAP program received active and regular attention from the Office of the Secretary of Defense, White House, and Congress, due to the human costs of IEDs. As a result, deliveries to operational users were more frequent in an effort to deliver even a partial solution to the warfighter while gathering additional data from operational use. As a result, less developmental testing occurred than is typical for a program of this nature.

3. Funding can be Provided for Transition Effort

Programs require responsive access to funding to enable rapid development and deployment of new capabilities. Program offices and industry suppliers are prone to work stoppages and other uncertainties when they are not provided access to early and steady funding sources throughout the development process. Additionally, funding that can be used for a spectrum of potential program needs (research, prototyping, testing, production, maintenance, and upgrade) supports rapid development and adoption. The use of flexible contract vehicles to quickly fund program or industry

activities, or vehicles that guarantee reimbursement for industry outlays, can shorten the time from design to fielding.

Also, the MOAB, MRAP, and OWS programs all benefited from high funding levels. Political support was crucial when requesting additional appropriations for the MRAP program. For its part, Operation Warp Speed was specifically funded by the CARES Act with express authorization for the rapid delivery of funds. These funding levels gave program offices more flexibility and higher risk tolerance as they strove to meet program objectives.

4. Technology is Mature Enough to Warrant Rapid Adoption

Rapid acquisition programs are most successful when the underlying technology is already sufficiently mature by the time the effort has begun. Using mature technologies allows program offices to significantly reduce the development activities and time needed before testing and fielding. Simultaneously, supply chains and supporting infrastructure can be engaged and expanded more easily as production requirements grow.

In each case, the technology under development was mature enough to limit the need for significant science experiments for subcomponents. MOAB, MRAP, and OWS leveraged existing research that enabled each effort to quickly deliver minimum viable, operationally effective capabilities. Whether it be the armor technology used by the MRAP program or existing guidance systems and the BLU-82, existing platforms were used as a baseline for new capabilities. In the case of Operation Warp Speed, Congressional support and interagency activity significantly shortened the exploratory and preclinical phases of the trials, enabling clinical tests to occur concurrently with production, even ahead of formal emergency use authorizations.[49]

5. Technology is Manufacturable at Required Scale

Rapid capability efforts are more successful when programs have access to prioritized manufacturing and supply chain capabilities that are already capable of producing required systems and technologies, as well as suppliers willing to contract with the government. This should include increased use of Manufacturing Readiness Levels (MRLs) to evaluate the maturity of technologies being developed inside and outside of the Department of Defense. This is also critical for developing and adjusting supply chains, including optimizing sub-tier supplier arrangements, in support of both operational prototypes and rapidly scalable manufacturing for production.

The OWS, MOAB, and MRAP efforts all share the attribute that program managers reached out to manufacturers suppliers concurrently with development to begin the production process as soon as possible. In all three cases, clear demand signals, proactive contracting, and active collaboration with manufacturers already producing the necessary parts were critical attributes of success. In the cases of MRAP and OWS, example, UCAs and the DPA Title III authorities respectively were used to ensure production of pre-identified materials, such as the metals required for MRAP armor or the vials required for COVID vaccines.

6. Suitable for Operational Use

When technologies are easily transitioned into operational use, they are typically characterized by requiring limited new training of personnel, few disruptions to existing logistical processes, consistency with current concepts of operations, and existing supply chains. Where possible, common parts from the existing inventory can be used to reduce logistics tails and enable rapid delivery to operational customers. Of course, actual utility to operational users is the catalyst to enable this transition.

Throughout all three case studies, design decisions were made to ensure straightforward and consistent delivery. For example, a very early decision was made to ensure that the MOAB would be deployed from a C-130. Thus, the weapon would follow similar loading and unloading procedures to the BLU-82. Warfighters would be trained in a similar fashion to deploying the BLU-82. Because MRAP involved the modification and armoring of existing platforms, the logistical changes for the modified units only involved the modified components — though the large number of different platforms that were included in the MRAP program did complicate the logistics. Finally, the OWS interagency effort was able to prepare for nationwide delivery to pharmacies and doctors' offices by pre-positioning transportation resources and associated infrastructure, mostly through public-private partnership and collaboration.[50]

49 "Operation Warp Speed: Accelerated COVID-19 Vaccine Development Status and Efforts to Address Manufacturing Challenges," Government Accountability Office, https://www.gao.gov/assets/gao-21-319.pdf, p. 16.

50 C. Todd Lopez, "Military to Play Logistics-Only Role in COVID-19 Vaccine Effort," U.S. Department of Defense News, October 24, 2020, https://www.defense.gov/News/News-Stories/Article/Article/2393298/military-to-play-logistics-only-role-in-covid-19-vaccine-effort/

The Role of Requirements and Funding

Traditionally, DoD budgeting process for an acquisition effort depends on the identification of a formal requirement to initiate the bureaucratic processes that lead to programming funds into a budget request for Congress. This means that it is more difficult for emerging technological opportunities that are not directly responsive to a formal requirement to be given priority status for programming of funds. The case studies evaluated in this report are no different; all three successful rapid adoption efforts responded to a formal requirement for a new capability, though each program possessed a high degree of latitude into which capabilities would fulfill the operational requirement. As such, making rapid capability adoption more frequent and successful could involve changes to the requirements process which expand the acceptable technological solutions to formal requirements. For example, developing operational requirements that do not dictate specific technical solutions could increase the flexibility available to program managers and private sector partners.

The case studies described in this report show that resources must be available in a timely fashion to support a variety of activities, including financing logistics and distribution, manufacturing, prototyping, and testing and qualification activities. Funding also supports the necessary services and materials for personnel, as well as their required training related to the capability being accelerated.

Additionally, resources need to be provided with appropriate regulations and guidance to allow their use, in a responsive manner, for required activities. This could include appropriate oversight and reporting mechanisms that permit senior leadership, oversight entities, and auditors to adequately track and control spending without driving up bureaucratic costs and slowing program activities.

The nature of projects well-positioned for rapid adoption should limit the amount of funding required for research and prototyping, as the bulk of these activities would have been carried out prior to the acceleration effort. Unlike traditional execution of DoD appropriations, it may not be possible to adequately predict the full details of the development required to support capability acceleration. As a result, it may not be possible to plan for and predict the exact financial resources, both in terms of amount of funding and the appropriate colors of money, required to support activities as they are traditionally categorized by budget processes and financial management systems (e.g., procurement, research, development, test and evaluation, operations & maintenance).

Market Shaping During Operation Warp Speed

The federal response to COVID was unique due to the scale to which policymakers employed market shaping efforts to address the crisis at hand. Market shaping involves "using market mechanisms and economic instruments to address market failures."[51], [52] Market shaping instruments can promote innovation by channeling the creativity of the private sector toward specific high priority challenges. Simply, the federal government uses its purchasing power to create demand, and the private sector leverages its resources to address the demand the government creates. Both buyers and sellers may face inefficiencies such as high transaction costs or other risks that can lead to market shortcomings.[53] Market shaping policies might remove barriers that prevent firms from undertaking a particular innovative effort, create a profit incentive where one may otherwise not exist, or even shift risks onto the government — all creating reward systems that increase the likelihood of corporate revenue once innovation is delivered, potentially leading to the creation of new companies.

As groups such as the Institute for Progress have explained, Operation Warp Speed employed several market shaping efforts.[54] These included:[55]

Advance Market Commitments

Operation Warp Speed included a series of guarantees to buy an established number of doses from any company which successfully produced a vaccine that was safe and effective against COVID.[56] These guarantees, on the scale of millions of doses, were seen as credible due to the clear availability

51 "A-Z of Market Shaping," The University of Chicago Market Shaping Accelerator, https://marketshaping.uchicago.edu/glossary/

52 See Investopedia: "Market failure refers to a situation defined by an inefficient distribution of goods and services in the free market. In an ideally functioning market, the forces of supply and demand balance each other out, with a change on one side of the equation leading to a change in price that maintains the market's equilibrium. In a market failure, however, this balance is disrupted."
"Market Failure: What It is in Economics, Common Types, and Causes," Investopedia, updated June 25, 2024, https://www.investopedia.com/terms/m/marketfailure.asp

53 "Healthy Markets for Global Health: Market Shaping Primer," USAID Center for Accelerating Innovation and Impact, Fall, 2014, https://www.usaid.gov/cii/market-shaping-primer

54 Arielle D'Souza, "How to Reuse the Operation Warp Speed Model," IFP, February 7, 2023, https://ifp.org/how-to-reuse-the-operation-warp-speed-model/#what-could-be-the-next-operation-warp-speed

55 Ibid.

56 "Innovating With Procurement: Solving Market Failures & Creating Industries," Day One Project, https://uploads.dayoneproject.org/2022/02/14125252/Market-Shaping-Primer.pdf

of appropriations via the CARES Act. Several such advance purchase commitment authorities exist within Title III of the Defense Production Act.

Milestone Payments
Contracted companies received payments as a reward for reaching certain milestones of the vaccine development process; these rewards did not need to be repaid if the vaccine was unsuccessful, shifting risk away from individual private stakeholders.[57]

Other activities, most of which are governed by existing authorities, can induce similar market-shaping effects:[58]

Prize Competitions
Private and non-profit stakeholders can be offered substantial monetary or nonmonetary reward, or "prize," for providing solutions to difficult technical problems.[59]

Volume Guarantees
The government can create new demand for companies to deliver existing products for fielding by committing to the purchase of a certain number of units. IDIQ contracts include these types of guarantees, allowing private companies to make arrangements for the delivery of a number of units between a minimum and maximum number.

Results-Based Financing
This entails rewarding firms for meeting certain desired milestones.[60]

Multi-Year Contracting
The option for programs to offer the potential for multi-year contracts may garner interest from a larger set of potential vendors, thus expanding the market on the supply-side. However, the actual award of a multi-year contract serves to constrain the market by increasing the difficulty of non-selected vendors to offer their products and services to the program. This reduces incentives for other vendors to invest in the same area.

Where traditional funding inputs, such as research grants, "push" outputs, market shaping instruments "pull" outcomes by signaling to firms that there will be a demand for militarily useful innovations. The use of these mechanisms requires political and bureaucratic leadership to accept a certain degree of risk, redundancy, and expense to achieve certain goals that benefit military objectives.

Acquisition Workforce

In cases of rapid technology development and deployment, an experienced and competent workforce stands out as a common feature. Successful transition requires expertise throughout the program lifecycle to ensure the acquisition of a technology meets the appropriate benchmarks. Similarly, culture can influence how organizations approach critical factors such as risk tolerance, commitment to the project, or leadership buy-in. To an extent, crises impact the rigid nature of DoD's acquisition processes, and thereby create conditions that lead the acquisition workforce to behave differently than during peacetime. Ultimately, translating those behaviors, which enable DoD to move fast, into peacetime processes is unlikely to be realistic.

During their educational and training activities, acquisition professionals should study "best practices" which pull from historical cases where DoD could quickly transition technologies. Training professionals on past successes gives necessary context to both bringing innovative approaches into standard practice and avoiding past mistakes. The goal should be to encourage acquisition professionals, for example, to take risks based on historical precedent and to encourage leveraging existing, yet underused authorities while making use of flexibility in existing acquisition regulations and procedures.

57 Konnor von Emster and Stuti Upadhyay, "Funding Scientific Research and Product Development for COVID-19 Innovation," Berkeley Center for Health and Technology, January. 2021, https://bcht.berkeley.edu/sites/default/files/funding_research_development_covid-19_innovation_1.21.pdf, p.5.

58 "Innovating With Procurement," Day One Project.

59 "About Challenge.Gov," Challenge.gov, https://www.challenge.gov/about/

60 "Market Shaping Accelerator," University of Chicago, https://bfi.uchicago.edu/wp-content/uploads/2023/01/Market-Shaping-Accelerator-coming-soon.pdf

Recommendations

A New Acquisition Pathway

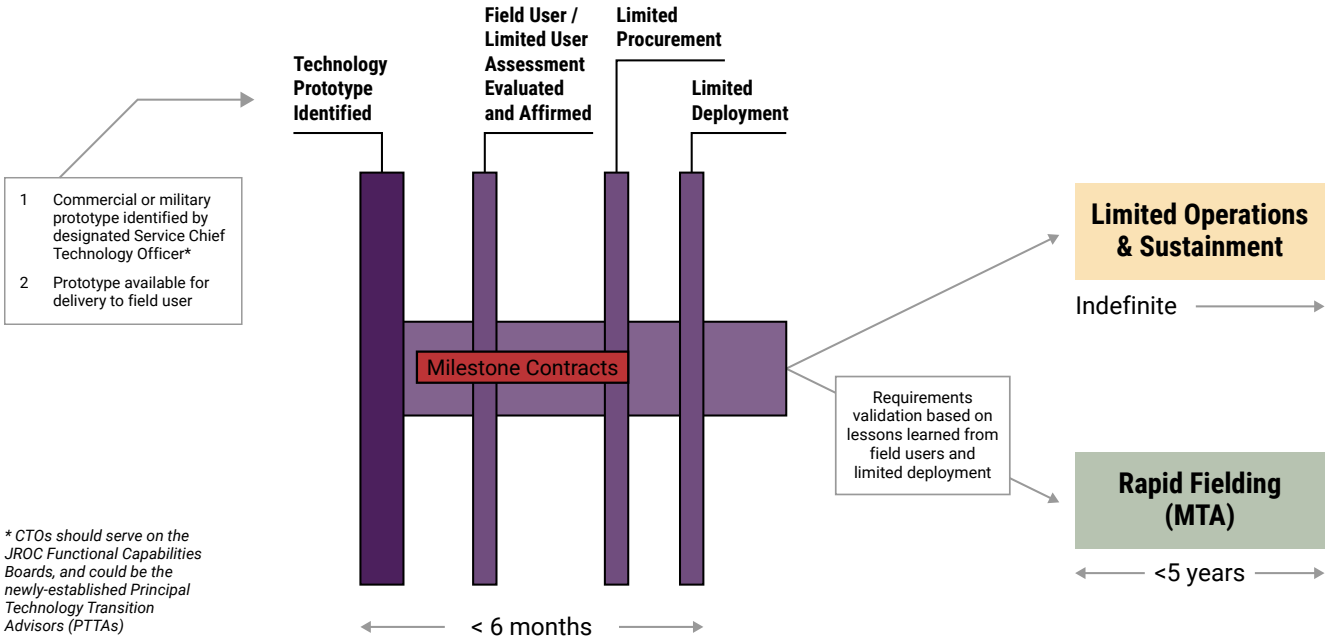
Outside of an emergency or a requirements "pull," even a program consistent with the six principles would require a high-level mechanism to enable an emergent capability to be "pushed" to operators. The MOAB, MRAP, and OWS development efforts all were able to take advantage of technologies that were fairly mature and manufacturable. In the case of OWS, high-level political support and the clearing of policy hurdles enabled these development and manufacturing constraints to be overcome. All three case studies were driven by a major crisis (invasion of Iraq, high casualty rate from IEDs, and COVID). It is unlikely that a capability required for a non-crisis purpose would be able to move more rapidly through another method besides the Urgent Capability Acquisition (UCA) pathway.

Despite that fact, it is significant that across all three case studies, decision-makers were able to move more quickly by removing the regular requirements validation processes and assessments. For that reason, a mechanism that enables a capability to be "pushed" to operators rather than "pulled" by their stated requirements might allow certain mature technologies to cut through bureaucracy and reach deployment.

1. As such, the Secretary of Defense should create a new acquisition pathway and associated efficient resourcing processes, which bypasses the typical requirements validation stage and PPBE process, and instead offers opportunities to "push" prototypes into the acquisition process without a stated requirement. This "Immediate Opportunity" Pathway would enable a ready commercial or DoD-developed prototype to enter limited production for short deployments to relevant operators for field assessment. Then, the prototype would follow the typical Adaptive Acquisition Framework guidance and move into the existing Rapid Fielding path of the Middle Tier of Acquisition (MTA) pathway. The creation of this new pathway and all necessary authorities would require Congressional authorization. An example of how that authorization could be provided can be found in Appendix A.

The end-users of capabilities — such as combatant commanders via the Joint Capabilities Integration and Development System (JCIDS) system — are chiefly concerned with developing requirements that address an operational or mission need. This can lead to prototypes that could improve mission performance, even incrementally, entering the acquisition system. The use of the Immediate Opportunity Pathway would require the early identification of technologies to "push" a capability into the acquisition system.

Immediate Opportunity Pathway



Source: ETI

2. This should be conducted by a designated individual, perhaps the Principal Technology Transition Advisor established by Section 806 of the FY24 NDAA within each Military Service (U.S. Congress, 2023). This designation could be provided to an existing or new office. CTOs should proactively identify advanced commercial or military prototypes, or systems and subsystems actively used in the commercial world, that could be immediately provided to operators for field assessment, regardless of whether or not a requirement has been formally established. These CTOs should be represented on the Functional Capabilities Boards (FCBs) of the Joint Requirements Oversight Council (JROC) to remain apprised of joint needs and to inform the requirements community about emerging capabilities.

To be eligible, the technology in question should possess a Technology Readiness Level at or above TRL 4 (AcqNotes, n.d.). It should also be assessed as readily manufacturable by the vendor. A number of authorities exist to access experimental prototypes including Cooperative Research and Development Agreements (CRADAs), Basic Ordering Agreements, and Procurements for Experimental Purposes (DAU, n.d.-c). These authorities can allow DoD to buy the initial field prototypes from the vendor for validation. Vendors should then be provided with Milestone Contracts, a series of contracts based on the achievement of technical and performance milestones, to support the Limited Production and MTA phases as efficiently as possible if their capability is assessed and affirmed by field users. As a result of this process, vendors should be retained and funded along the MTA pathway as long as they continue to achieve agreed-upon technical milestones.

Next, field users would have the opportunity to assess the prototype and affirm mission value. These activities should be funded via a line item within either Budget Activity 7 (Operational System Development) or Budget Activity 5 (System Development and Demonstration) within each Military Service's Research, Development, Test, and Evaluation (RDT&E) account.

Upon affirmation of value to operators and ability to be integrated into mission activities, the CTO and Military Service leadership should be authorized to immediately enter into a limited procurement contract to support a condensed deployment of the capability. These activities, including initial operations and sustainment, could be funded by several sources depending on the timing of the capability discovery. First, if the Immediate Opportunity is discovered during the annual build of the President's Budget Request, authorities should be provided to allow DoD to request funding within the appropriate appropriation titles. Second, if the opportunity is discovered after the budget has been sent, a mechanism should exist to tailor the budget request through dialogue between DoD and the Congressional authorizing and appropriating committees to request money via the Military Service's Other Procurement appropriations category. Alternatively, existing mechanisms such as reprogramming authorities could be used to transfer money into the desired program. Finally, if the opportunity occurs outside those windows for modification, the capability should be prioritized for funding through rapid development and procurement initiatives, such as the APFIT program (Accelerate the Procurement and Fielding of Innovative Technologies).

The service CTO should simultaneously work with the appropriate requirements authorities and combatant commanders to formalize and validate requirements and begin the Rapid Fielding path of the Middle Tier of Acquisition Pathway. This process would provide opportunities to iterate on the original technology — incorporating operator feedback — that was provided to the field and allow the capability producer to scale up production based on the already agreed-upon Milestone Contract. Ideally, this market-shaping activity has already enabled the vendor to ready its supply chain and scale up production in a manner that allows MTA Rapid Fielding to take place.

This Pathway should be evaluated as part of DoD's modernization of the requirements development process mandated by Section 811 of the FY24 NDAA. This pathway broadly matches the intentions of that provision, and 811(b)(3) calls for re-aligning pathways to fit the mission of a more flexible, technology-forward requirements process.

Other Recommendations

1. The Under Secretary of Defense for Acquisition and Sustainment should ensure that the existence of, and use cases for, a series of underused acquisition and contracting authorities is clearly described in DoD policy and instructions. Where appropriate, provide additional guidance or training to acquisition professionals and senior leaders' teams across OUSD(A&S) and the offices of the Service Acquisition Executives.

DoD possesses a substantial number of authorities that it can use to rapidly develop and/or deploy capabilities, both during times of crisis and whenever various stakeholders encounter a capability that would provide value to a component or the joint force. Some options especially relevant to rapid capability adoption include:

10 U.S.C. § 3458[61]

Authorizes the Secretary of Defense and Service Secretaries to rapidly acquire innovative commercial products using fixed-price contracts as a result of a competitive general solicitations known as Commercial Solutions Openings (CSOs). Section 813 of the FY24 NDAA requires DoD to use CSOs no

61 10 U.S.C. § 3458 (2022) https://www.law.cornell.edu/uscode/text/10/3458

less than four times per year on behalf of geographic combatant commands, though guidance should recommend the use of CSOs on a more regular basis.

10 U.S.C. § 3601[62]
Provides authorities for the Urgent Capability Acquisition AAF pathway. These authorities allow for rapid development and contracting decisions once a JUON or JEON has been validated after its introduction by combatant and component commanders. As of FY24, this has been extended to the Secretaries of the Military Departments (see section 229 of the FY24 NDAA).

10 U.S.C. § 4004[63]
Contracts awarded by competitive selection may include a provision allowing for the development and production of system prototypes, including options to procure additional prototyping units as needed.

10 U.S.C. § 4022[64]
Provides authorities to competitively contract for prototyping projects, and to immediately convert successful projects into production contracts with the original contracted parties without the need for a competitive solicitation.

10 U.S.C. § 4023[65]
Authorizes the Secretary of Defense and Service Secretaries to procure capabilities from any source for the purpose of experimenting with, or testing, these capabilities for use in national defense.

10 U.S.C. § 4025[66]
Authorizes the Under Secretaries of Defense for Acquisition & Sustainment and Research & Engineering, as well as Service Acquisition Executives, to execute prize competitions for advanced technology development. Competition winners may receive cash prizes or procurement contracts, inducing innovation.

15 U.S.C. § 638(r)[67]
As part of a Phase II SBIR/STTR funding agreement, this provision authorizes program offices and prime contractors to agree to sole-source Phase III work from the small business award recipient upon its successful completion of Phase II contract activities. This funding can enable small, innovative companies to more rapidly scale their prototypes into finished systems that otherwise may or may not have been commercialized.

Several new authorizations in the FY24 National Defense Authorization Act (NDAA) are also notable[68]:

Section 211
Mandated the submission of a report on the unfunded priorities[69] of the Office of the Under Secretary of Defense for Research & Engineering (OUSD(R&E)).

Section 229
Authorities to urgently acquire emerging capabilities to address service-specific needs.

Section 230
Authorizes a pilot program to provide up to $10 million of funding from RDT&E budget activities 4 or 6 to entities seeking to commercialize a defense prototype in exchange for government purchasing priority.

Section 806
Requires the designation of a Principal Technology Transition Advisor within each military department. The PTTA will be a member of the Senior Executive Service or general officer charged with identifying promising technologies funded by RDT&E, especially Science & Technology research and development programs, that could transition into military operations. The PTTA will also review technology developments in the private sector, research institutions, and university ecosystem.

Section 811
Mandates that DoD modernize its requirements development process through revisions to the JCIDS system. The effort must streamline documents and reviews, especially for programs that are not major defense acquisition programs (MDAPs). It must also re-orient requirements language to

62 10 U.S.C. § 3601 (2023). https://www.law.cornell.edu/uscode/text/10/3601

63 10 U.S.C. § 4004 (2021). https://www.law.cornell.edu/uscode/text/10/4004

64 10 U.S.C. § 4022 https://www.law.cornell.edu/uscode/text/10/4022

65 10 U.S.C. § 4023. https://www.law.cornell.edu/uscode/text/10/4023

66 10 U.S.C, § 4025. https://www.law.cornell.edu/uscode/text/10/4025

67 10 U.S.C. § 638. https://www.law.cornell.edu/uscode/text/15/638

68 (U.S. Congress, H. Rept. 118-31, 2023)

69 Unfunded priorities are defined as programs or activities that would have been funded had additional resources been made available to the agency, service, or office in question. An unfunded priority can also be a requirement that emerged for the agency, service, or office in the period between the finalization and submission of the President's Budget Request.

avoid "prescriptive language," focusing instead on "mission outcomes and assessed threats."

Section 813
Requires that DoD use Commercial Solutions Openings at least four times per year on behalf of geographic combatant commands. CSOs function similarly to Broad Agency Announcements (BAAs) but allow for the procurement of innovative commercial technologies to meet mission needs.

Section 843
Permits combatant commanders to, in special circumstances, request that service senior contracting officers make rapid purchases in response to emergencies using streamlined contracts, including by allowing any purchased item to be considered a commercial product or service for the purpose of the rapid procurement.

DoD guidance must ensure that these authorities are well-understood by the appropriate decision makers, their offices, and acquisition professionals across program offices. Where applicable, DoD guidance should provide avenues to push interesting innovations across the S&T enterprise to the appropriate program offices to determine applicability for prototyping or procurements using one of these authorities.

2. Clearly communicate the planned use of underused budget and appropriation authorities and request necessary resources in the President's Budget Request and other communications with Congress to support intentional efforts to rapidly field capabilities. Additionally, request new authority as needed and modify internal DoD management practices in order to expedite allocation of funds to priority efforts.

Rapid technology capability adoption can be supported through a variety of sources of funding that are faster than traditional PPBE processes. Ideally, the funds are provided in such a way that they can support required activities in a timely manner. Not all of the sources need to be traditionally requested and appropriated funds, as this represents one of the slowest methods for providing funding for time-sensitive activities.[70]

Examples of sources of funding include:

Specific Appropriations for Rapid Procurement and Fielding Accounts
Examples of this kind of appropriations include the Rapid Development and Experimentation Reserve (RDER)[71], Rapid Innovation Fund (RIF)[72], Accelerate the Procurement and Fielding of Innovative Technologies (APFIT)[73], and the Joint Improvised Explosive Device Defeat Fund.[74] These funds were all appropriated by Congress to support purposes consistent with rapid development and procurement of new capabilities. In some cases, these funds were also specifically requested by the Department of Defense for these activities. In other cases, they were provided as funds earmarked for these purposes by Congress. Similar funds could be requested by the Department and appropriated by Congress. These kinds of appropriations should include reporting requirements that allow Congress to know how funding will be expended in a timely manner. They should also be coupled to funding that transitions the accelerated activity into the traditional budgeting and appropriations process as quickly as possible, through DOD programming funding for transition activities for successfully funded efforts. Because Congressional adds and cuts to the budget request are developed and finalized while the Administration's budget request is being considered by Congress, and long after the Administration has concluded its nearly two-year effort to develop a budget request, they can be timelier and more responsive to time-sensitive technology opportunities or program activities and events.

Working Capital Funds (WCFs)
Working capital funds are a type of revolving fund that is intended to operate as a self-supporting entity to fund activities of the DoD.[75] Typical activities funded using WCFs include acquiring parts and supplies, maintaining equipment, transporting personnel, and conducting research and development. The WCF is initially provided with a surplus of funds through a direct appropriation. A defense or non-defense "customer" can order products or services through a reimbursable agreement at agreed-upon rates of payments to cover direct, indirect,

70 Commission on Planning, Programming, Budgeting, and Execution Reform, "Defense Resourcing for the Future," March 2024, https://ppbereform.senate.gov/wp-content/uploads/2024/03/Commission-on-PPBE-Reform_Full-Report_6-March-2024_FINAL.pdf

71 Gill, Jaspreet, "After 2 Years of Experimenting, Pentagon to Evaluate RDER Tech," *Breaking Defense*, August 29, 2023, https://breakingdefense.com/2023/08/after-2-years-of-experimenting-pentagon-to-evaluate-rder-tech/

72 "Defense Innovation Marketplace," Rapid Innovation Fund, updated June, 2023, https://defenseinnovationmarketplace.dtic.mil/business-opportunities/rapid-innovation-fund/

73 " DoD Announces Second Set of Projects to Receive Funding From the Pilot Program to Accelerate the Procurement and Fielding of Innovative Technologies (APFIT)," U.S. Department of Defense (press release), May 22, 2023, https://www.defense.gov/News/Releases/Release/Article/3403601/dod-announces-second-set-of-projects-to-receive-funding-from-the-pilot-program/

74 "Procurement Programs. Committee Staff Procurement Backup Book Fiscal Year 2008/2009 Budget Estimates," Department of the Army, February 2007, https://www.asafm.army.mil/Portals/72/Documents/BudgetMaterial/20082009/base%20budget/justification%20book/jieddf.pdf

75 "Defense Primer: Defense Working Capital Funds," Congressional Research Service Reports, https://sgp.fas.org/crs/natsec/IF11233.pdf

hardware, operations, or other costs. A designated entity could be authorized to operate a WCF which would provide funding to organizations inside and outside DoD for time sensitive activities. The WCF would act as a "bank" in that the WCF funds would be paid back as the customer organizations gets funding, probably through future appropriations, sales, or reprogrammings.

Congressional Adds

Congress can earmark funding for specific purposes to ensure that an opportunity is funded at a level which it, ideally in conversation with DoD, sees as appropriate. Information pertaining to earmarks often comes from Service and Agency Unfunded Requirements Lists or from Members' priorities for their district. Earmarks can be used to fund newer ideas that have not yet been embraced by traditional service bureaucracy, including disruptive technologies and joint systems. They are also often informed by industry and have more technical awareness and sense of the market.

Supplemental Appropriations

In order to support emerging requirements, Congress has often provided supplemental appropriations to the Department of Defense. These have supported contingency operations, allowed DoD to respond to natural disasters, and deal with unexpected threats in operations, such as IEDs, or unexpected costs, such as fuel costs or unanticipated increases in production costs. These additional funds could also be requested by the Department to take advantage of and more rapidly transition an emerging capability into production and use in a timelier fashion.

Reprogramming Actions

Reprogramming action allows the Department to move funding from the activity it was originally appropriated for into another. Reprogramming actions below a threshold level can be executed by DoD without prior Congressional approval, while larger reprogrammings of funds need approval by the Congressional defense authorization and appropriations committees. These transfers use funds provided in previous appropriations as a source of funds. The identification of these sources usually reflects an analysis of activities that have more resources that can be executed effectively or efficiently, or that represent a lower priority effort relative to the capability that is being funded by the transfer. These sometimes result from errors in the estimates used to develop the original requests and appropriations or from events in programs or activities, such as contract cancellations or schedule delays. Identifying offsets from other ongoing activities' budgets is challenging, as those programs will likely have advocates within DoD, industry, and Congress who will oppose the budget transfers, unless a compelling case can be made justifying the reduction or the need for increased funding for the target activity.

Mid-Year Budget Adjustments

A formal mechanism by which DoD officials could partner with Congress to identify technological opportunities for high-priority activities, as well as appropriate offsets for the resources within the request. This would require senior leadership to provide guidance to DoD officials that they are permitted to propose alternatives to the formally delivered request. Those alternatives could be informally delivered, or be formally developed by DoD and OMB and result in formal amendments to the proposed budget. Today, the formal Administration budget request to Congress is developed in a nearly two-year process that makes it difficult to include funding for emerging technological opportunities without significant intervention by high-level decision makers. As the bureaucratic barriers to that type of action are high, time-sensitive and emerging opportunities are often not included in requests. During the nearly one-year process for Congress to receive and evaluate the budget request to develop final appropriations for DoD, there is very limited dialogue between DoD officials and Congress on potential adjustments to the budget request that might support the funding and rapid delivery of new technological capabilities.

Accelerating Funding through Undefinitized Contract Actions (UCAs)

UCAs allow work on an activity for the government to be initiated while the final contract terms for work are settled. This allows work to progress, including research, prototyping, testing, and production, and in some sense is the equivalent to the contractor providing a temporary loan of money to the government funding organization. Operation Warp Speed made significant use of UCAs as part of the attempt to accelerate the response to the COVID pandemic.[76]

Procurement Prizes

The promise of a significantly sized award for procurement of a desired system or service would provide enough incentive for a private sector entity to resource the technology development and manufacturing phases of the effort. The prize would need to be funded through an appropriation, reprogramming, or other similar process.

Private Capital Investment

Funding for acceleration of prototyping, scaling of manufacturing, and production can be provided by private sector sources through use of internal industry funds, investor funds,

76 "COVID-19 Contracting, Actions Needed to Enhance Transparency and Oversight of Selected Awards," United States Government Accountability Office, July, 2021, https://www.gao.gov/assets/gao-21-501.pdf

or third-party financing such as through bank loans. This funding can be extremely fast relative to traditional government funding. In order to create an incentive for the private sector to fund technology capability acceleration for DoD, the Government must clearly show that an addressable market which provides an acceptable return on private sector investment exists and can be accessed in a timely fashion. This market signaling can be done through direct dialogue with industry.

These mechanisms will more efficiently and responsively fund industry and government developers, manufacturing capacity, or the support of maintenance for upgraded fielded systems.

Additionally, Congress should raise the threshold for Below-Threshold Reprogramming (BTR) for Research, Development, Test, and Evaluation programs to increase program manager's flexibility to respond to changing circumstances. In line with the PPBE Commission's recommendations, the BTR threshold for RDT&E Should be raised to $25 million (PPBE Commission, 2024, p. 246).

As the PPBE Commission described, program managers often struggle to "ingest new technology and innovation" without substantial disruption to existing funds. Raising the BTR threshold would, in addition to generally increasing programmatic flexibility, allow for certain rapid procurements of promising commercial technologies for immediate deployment through the new acquisition pathway, or the purchase and testing of new prototypes via RDT&E.

Currently, funding within procurement accounts support low-rate initial production efforts. This means that program offices must often request a reprogramming to begin receiving units for test and evaluation, or wait until a future year's appropriation. Currently, the lack of flexibility creates some scenarios where leftover money is unnecessarily spent based on "use-it-or-lose-it" practices at the end of a fiscal year for potentially unnecessary R&D activities, even when the underlying technology has reached TRL 6 and would have benefitted from proceeding to LRIP ahead of schedule. Allowing programs to immediately use their existing resources to procure testable units by moving to Low-Rate Initial Production would allow promising technologies to be tested and validated for warfighting use in a shorter period of time.

3. The Under Secretary of Defense for Research and Engineering should create and maintain a database for DoD stakeholders which documents successful S&T and SBIR programs and initiatives and relevant performers.

This database should be accessible to stakeholders across DoD. The database would offer potential solutions for the Immediate Opportunity pathway described above. At the same time, the availability of well-documented success stories emerging from internal S&T activities can be an asset for decision-makers willing to commit resources to reacting to emerging threats and developing capabilities based on previous investments. This database could be matched with operational and technical gaps, such as those identified in urgent needs statements and unfunded requirements lists.

4. Congress should also require the Secretary of each service to solicit from the service labs a number of items that are suited for rapid capability development effort. These items should be listed and released annually as report materials within the submission of the President's Budget Request.

A greater view into the promising, early-stage work conducted by the service laboratories would provide DoD with an annual exercise, allowing it to take greater inventory of its projects, enabling it to recognize technology that could be transitioned into prototyping sooner. The report would also support service programmers' analysis of areas where more funding is required for transition of promising technology efforts, as well as to inform Congressional appropriations processes. The information in the database recommended under Recommendation #3 would likely be used to support this Congressional mandate.

5. The Military Services should program, within their RDT&E accounts, funding to transition promising S&T concepts into the prototyping process. These funds are most appropriately placed within each service as a Program Element (PE) for budgeting purposes. Within a service's PE, projects should resource money to each Program Executive Officer responsible for acquisition and fielding of relevant systems. Service Acquisition Executives, alongside OUSD(R&E), OUSD(A&S) and CAPE, should perform oversight to ensure that the Military Services are programming money for transition of their own successful S&T projects.

At present, Defense-Wide programs like the Accelerate the Procurement and Fielding of Innovative Technologies (APFIT) program rapidly transition prototypes from small businesses into procurement and the Rapid Defense Experimentation Reserve (RDER) program both expeditiously tests and funds initial production. These programs are beginning to fulfill their role in bridging a particular "valley of death." However, similar sources of funding within the Military Services could help to transition technologies into programs of record.

6. The Office of the Assistant Secretary of Defense for Industrial Base Policy (OASD(IBP)) should conduct studies on the efficacy of market shaping approaches for national security purposes. Where appropriate as a result of these studies, DoD should request funding for pilot

programs to explore innovative incentive arrangements and market signals to the private sector.

The DoD has many of the tools traditionally classified as "market shaping" available to it. These include progress payments, prize competitions, and various types of contract provisions to reward technology developers who reach certain technical milestones. However, OASD(IBP) is well-positioned to look across the industrial base toward promising sectors or companies that would benefit from a more coordinated regime of market-shaping push- and pull-mechanisms to rapidly move a compelling warfighting capability, when it achieves an appropriate TRL, to the field. Market signaling by DoD entails clear intent and visible funding by a government customer.

7. The Under Secretaries of Defense for Research and Engineering (R&E) and Acquisition and Sustainment (A&S) should create a joint program to increase temporary transfers and details of personnel within DoD between technical, acquisition, and operational organizations.

Exchange programs between program offices, S&T laboratories, warfighting components can support efforts to increase awareness by acquisition professionals of ongoing technological and product developments and capability needs that are not covered by a validated requirement. Experiential knowledge of the state of commercial industry can help contracting officers determine what incentive structures are correct to incentivize further system development, or to reach an agreement to procure an existing innovative commercial capability.

8. Increase the use of Commercial Solutions Offerings (CSOs), including making use of the expanded authorities provided by the FY2024 NDAA. The USD(A&S) and the Service Acquisition Executives should work to exceed the requirement to use Commercial Solutions Openings four times per year on behalf of geographic combatant commands, and Congress should require an annual report on opportunities for CSOs.

CSOs represent a form of solicitation that is well suited to fund the rapid transition of commercial technologies to operational use. Although their use is growing within DoD, including by the Small Business Innovation Research program, they are still used infrequently relative to their potential utility. For example, CSOs were used by a number of organizations during Operation Warp Speed. CSOs could be used by the Principal Technology Transition Advisor, or another designated individual, as part of the new Acquisition Pathway recommended in this report, to rapidly procure high-TRL commercial or defense technologies for warfighter use.

Conclusion

The DoD is frequently criticized for its slow pace in adopting promising technologies, as well as its inability to field new capabilities rapidly, including those already available in the commercial sector. At the same time, there are examples of rapidly fielded technologies delivered in extremely short order to meet some critical need. Many authorities exist to enable rapid capability development and adoption, but these tend to go underused. In fact, many analysts have opined that DoD has all of the authorities that it should need to move capabilities into operational use quickly.

This research does find underused avenues in the existing acquisition system. While these authorities are useful and should be leveraged more often, these authorities are not enough. They alone do not mitigate the need for service requirements, which leaves mature technology — whether from the commercial sector or within DoD — waiting for a user to seek out new capabilities. Therein lies an opportunity to force certain technologies into the warfighter's hands.

This report finds six conditions that appear necessary for quick development and deployment based on past cases when DoD did succeed in rapid development efforts. These attributes — high-level support, limited policy and regulatory hurdles, available and steady funding, mature technology, manufacturable technology, and operational suitability — enable programs to move programs to fielding at a higher rate, both by creating an environment which permits the standard use of more innovative acquisition authorities and removes other barriers to success across the acquisition lifecycle.

Outside of an emergency, there are exceedingly few situations where these six principles apply at the same time. However, various changes to the acquisition system would make it more likely to maximize as many principles as is feasible. The creation of an Immediate Opportunity Pathway, for example, would align funding, manufacturability, and operational suitability to allow stakeholders in DoD who see a promising technology to "push" it to a limited number of operational users by bypassing certain policy hurdles, such as the need for an urgent requirement to be issued. In other cases, various systems could be implemented that would increase information-sharing and, as a result, create new high-level advocacy to support development efforts of promising capabilities. A deliberate and sustained effort to seek promising capabilities — mature or emergent — will ensure that the United States retains a technological advantage and maximizes the outputs of its highly productive innovation ecosystem.

Appendix A. Draft NDAA and Appropriations Provisions

#1: NDAA Section to Authorize a New Acquisition Pathway Authority

Sec. XXX – Establishing an Immediate Opportunity Acquisition Pathway

(a) GUIDANCE REQUIRED.— The Secretary of Defense shall establish guidance for a new acquisition pathway as described under subsection (b) to provide for the efficient and effective acquisition, development, integration, and timely delivery of immediately available test assets to operational users for evaluation of military usefulness and development of requirements. Such a pathway shall include the following:

(b) PATHWAY.—The Secretary of Defense shall establish an acquisition pathway to:

1. provide for the accelerated testing and procurement of appropriate commercial or military prototypes suitable for immediate delivery to a field user for assessment and requirements validation;
2. use financial management authorities to streamline funding of limited testing, operation, and sustainment of prototypes by organizations to support streamlined of transition of prototyping programs into acquisition programs or operational use; and
3. support identification and fielding of mature technologies that are not specifically identified in existing requirements if such technologies are deemed as potentially increasing operational effectiveness or reducing operational or lifecycle costs.

(c) SELECTION OF SYSTEMS FOR USE OF PATHWAY.— The guidance issued under this section shall include guidance on selection of programs appropriate for the pathway, including prioritization of programs that can:

1. rapidly initiate the accelerated procurement of a full-scale, field-ready prototypes or capabilities developed for transition to an operational user;
2. rapidly demonstrate the viability and effectiveness of such capabilities for operational use through operational field testing; and
3. be supported with programming of resources and use of expeditious contracting methodologies to expedite production and sustainment of the product or service to meet a requirement developed in response to validation by operational users.

(d) SERVICE TECHNOLOGY OFFICERS.— The guidance shall require the designation of an individual in each military department to be responsible for identifying and recommending extant prototypes to Service Program Executive Officers for an immediate limited procurement and delivery to operational users.

(e) EXPEDITED TRANSITION PROCESS.—

1. **IN GENERAL.**— A pathway established under subsection (a) shall provide for—
   - **A.** a streamlined and coordinated process to support rapid delivery of extant prototypes to a field user for operational testing in a period of not more than one year from the time that the process is initiated;
   - **B.** the collection of data on system performance in support of requirements validation;
   - **C.** the allocation of resources to the continued operation and sustainment of test units provided to the field; and
   - **D.** a transition process for successful prototype to a follow-on procurement process.
2. **IMMEDIATE OPPORTUNITY REQUIREMENTS PROCESS.**—
   - i. **INAPPLICABILITY OF JOINT CAPABILITIES INTEGRATION AND DEVELOPMENT SYSTEM (JCIDS) MANUAL**.—Limited procurements, operations, and sustainment activities conducted under the authority of this section shall not be subject to the Joint Capabilities Integration and Development System Manual, except pursuant to a modified process specifically provided by the Vice Chairman of the Joint Chiefs of Staff, in consultation with Under Secretary of Defense for Acquisition and Sustainment and each service acquisition executive (as defined in section 101(a)(10) of title 10, United States Code), for the creation of requirements derived from evaluating immediate opportunities delivered by this pathway.

(f) DATA REQUIREMENTS.—

1. **Collection and analysis of data.**— The Secretary shall establish mechanisms to collect and analyze data on the execution of the pathway for the purpose of—
   - **A.** (A) developing and sharing best practices for achieving goals established for the pathway;
   - **B.** (B) providing information to the Secretary and the congressional defense committees on the execution of the pathway; and
   - **C.** (C) providing information to the Secretary and the congressional defense committees on related policy issues.
2. **Data strategy required.—The Secretary may not** establish the pathway prior to completion of a plan for—
   - **A.** meeting the requirements of this subsection;
   - **B.** collecting the data required to carry out an evaluation of the lessons learned from the pathway; and
   - **C.** conducting such evaluation.

(g) REPORT.—

1. IN GENERAL.— Not later than eighteen months after the date of enactment of this provision, the Under Secretary of Defense for Acquisition and Sustainment, in consultation with the secretaries of the military departments and other appropriate officials, shall report on the use of the authority under this section using the initial guidance issued under subsection (e).
2. **ELEMENTS**.— The report required under paragraph (1) shall include the following elements:
   - **A.** The final guidance required by subsection (d)(2), including a description of the treatment of use of the authority that was initiated before such final guidance was issued.
   - **B.** A summary of how the authority under this section has been used, including a list of the cost estimate, schedule for development, testing and delivery, and key management risks for each initiative conducted pursuant to such authority.
   - **C.** Accomplishments from and challenges to using the authority under this section, including organizational, cultural, talent, infrastructure, testing, and training considerations.
   - **D.** Recommendations for legislative changes to the authority under this section.
   - **E.** Recommendations for regulatory changes to the authority under this section to promote effective development and deployment of software acquired or developed under this section.

#2: Appropriations General Provision to Clarify Language on Low-Rate Initial Production

Sec. XXXX. Provided, that funds appropriated for XXXX (Program name) shall be used for the purposes of low-rate initial production, defined as production in support of operational test and evaluation, to establish an initial production base, or to increase production rates in advance of full-rate production upon successful completion of operational testing. Provided further, that such use is limited to not more than $10,000,000 or 5% of a program element, whichever is lower, and not more than $40,000,000 in a Fiscal Year across the Department of Defense.

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