DEFENSE, EMERGING TECHNOLOGY, AND STRATEGY PROGRAM

Is Replicator Replicable?

Assessing the Defense Innovation Unit's Ability to Transform U.S. Military Capability in an Era of Strategic Competition

Richard Haley
Michael Harteveldt
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HARVARD Kennedy School
BELFER CENTER
50 YEARS OF RESEARCH, POLICY, AND LEADERSHIP

SEPTEMBER 2025

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Table of Contents

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Executive Summary

In the current era of strategic competition, maintaining military advantage requires the U.S. Department of Defense (DOD) to employ unmanned and autonomous systems in the land, air, sea, and space domains to perform reconnaissance, logistics, and strike operations. All-domain unmanned systems (UxS) paired with autonomous capabilities function as a force multiplier, enhancing the effectiveness and strength of manned military forces while reducing the risk to personnel. Keeping pace with autonomous UxS technological advancement requires the acceleration of historically slow and complex DOD acquisition processes. Failure to do so risks the U.S. military's ability to deter, fight, and win.

The Defense Innovation Unit's (DIU) Replicator Initiative represents the DOD's latest significant effort to leverage the innovation and manufacturing capabilities of domestic private industry to accelerate the delivery of cutting-edge technologies to the warfighter. Announced in August 2023, the first iteration of Replicator, named Replicator 1, aims to deliver all-domain attritable autonomous (ADA2) systems to warfighters at a scale of "multiple thousands" within 24 months.[1] Achieving this goal requires significant collaboration between DOD, Congressional, and private industry stakeholders to overcome technical, budgetary, and institutional hurdles.

The dual nature of Replicator's goal is implied in its name: to use innovative and replicable *processes* to rapidly procure systems capable of replicating the warfighter's *capabilities* in the field. The initiative's ability to deliver on these goals has shown early promise, with DIU reporting that it is on track to deliver the planned quantity of ADA2 systems as of August 2025.[2] It remains to be seen, however, if the processes used to achieve its quantitative goal of procured systems are sustainable and repeatable.

Problem Statement: Is Replicator Replicable and Sustainable?

In an era of great-power competition, the employment of unmanned systems has become a critical strategic capability. However, rapid defense acquisition and employment of UxS requires overcoming two primary internal challenges:

- DOD acquisition processes are slow and heavily regulated, primarily due to acquisitions processes such as the recently disestablished Joint Capabilities Integration and Development System (JCIDS) and the Planning, Programming, Budgeting, and Execution (PPBE) system – both of which require extensive documentation, reviews, and approvals.
- Fielding new technologies requires the services to make extensive modifications across the Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, and Policy (DOTmLPF-P) framework to transition fielded systems to full operational capability.

The purpose of this report is to identify and discuss key challenges and enablers to Replicator's success in accelerating the acquisition of innovative defense technologies and develop concrete recommendations for DIU to promote Replicator's future sustainability as a reliable and repeatable process.

Through interviews with subject matter experts across Congress, DOD, industry, and academia, as well as analyses of previous rapid acquisition efforts, this report investigates how DIU can overcome bureaucratic challenges to accelerate the delivery of capable technologies to the warfighter through Replicator. While many dedicated and well-reasoned studies have addressed systemic defense acquisitions problems, this study endeavors to identify the factors that have contributed to a single program's successes and shortcomings, adding a focused perspective in contribution to a larger ongoing discourse.

This study identifies four key challenges and five key enablers that have contributed to Replicator's results. Analysis of these factors informs six recommendations for DIU to implement in future Replicator iterations, which may also have applicability to the greater DOD and innovation bureaucracy. These findings are displayed below:

Five Key Enablers

- Senior Leadership Direction and Involvement
- Streamlined Requirements
- Targeted Acquisition Focus
- Agile Budgeting and Acquisition Methods
- Increased Risk Tolerance

Four Key Challenges

- Budget Reprogramming
- Service Resistance and Coordination
- Hardware and Software Maintenance
- Testing Facilities, Ranges, and Simulators

Six Policy Recommendations

- Increase Joint Staff and Service Pre-Coordination
- Streamline Technical Feedback Loops
- Maintain a Dedicated Replicator Budget
- Spread Acquisitions & Technical Knowledge Across DOD
- Employ Automated and Shareable Budgeting Tools
- Reform the DICE (Defense Innovation Community of Entities)

1. Introduction

The military balance of power in the Indo-Pacific is at a tipping point. After exercising military dominance in the Indo-Pacific for decades, the United States is credibly challenged by the People's Republic of China's (PRC) rapid military expansion and modernization. Numerically, the PRC has the largest navy in the world, and Beijing has asserted its newfound maritime might in enforcing regional territorial claims and militarizing artificial islands in the South China Sea. As the PRC increases both its military size and defense cooperation with other U.S. adversaries, the U.S. faces a heavily contested security environment in the Indo-Pacific, requiring a recalibration of its military to maintain strategic advantage.[3]

The 2022 National Defense Strategy (NDS) recognizes the pacing challenge posed by the PRC and directs the DOD to "act urgently to build enduring advantages across the defense ecosystem – the Department of Defense, the defense industrial base, and the array of private sector and academic enterprises that create and sharpen the Joint Force's technological edge."[4] Maintaining the technological edge requires innovation, and leveraging private sector-created innovative technologies requires updated processes that enable the DOD to acquire and employ them more rapidly. Failure to match the pace of defense acquisitions with that of technology development risks the U.S. military's ability to fight and win. As stated by Eric Schmidt, the first chairman of the Pentagon's Defense Innovation Board: "The DOD does not have an innovation problem; it has an innovation adoption problem."[5]

Since February 2022, the Russia-Ukraine war has provided a vivid picture of the changing character of modern warfare. Cheaply produced small unmanned systems (UxS), otherwise known as drones, have become a central weapon used by both sides for reconnaissance, logistics, and strike operations. The prodigious use of unmanned systems incorporating varying levels of autonomy has, until now, enabled Ukraine to overcome a significant numerical force disadvantage to limit a Russian military invasion from land, sea, and the air. Lessons learned from the war in Ukraine about the employment of unmanned systems have prompted the DOD to view unmanned and autonomous systems as an increasingly crucial and adaptable tool of modern warfare.

On August 28, 2023, former Deputy Secretary of Defense (DepSecDef) Kathleen Hicks announced the Replicator Initiative. Led by DIU, the Replicator Initiative aims to field thousands of all-domain, attritable autonomous (ADA2) systems by August 2025. Hicks stated that the ADA2 systems fielded are intended to help the U.S. "overcome the PRC's biggest advantage, which is mass. More ships, more missiles, more people."[6] Just over a year later, on September 27, 2024, former Secretary of Defense (SecDef) Lloyd Austin announced another iteration of the Replicator Initiative, Replicator 2.[7] The focus of Replicator 2 is acquiring systems to counter the threat posed by small uncrewed aerial systems (C-sUAS) to critical installations and force concentrations, a mission now rolled into Joint Interagency Task Force 401 reporting to the DepSecDef.

As the latest effort to accelerate DOD acquisitions, the Replicator Initiative reflects the DOD's recognition of the growing importance of unmanned and autonomous technologies in modern warfare. It represents an effort to enhance the U.S. military's capabilities by creating a more agile, resilient, and technologically advanced force that can counter emerging threats effectively while reducing costs and reliance on traditional platforms. Fast-tracking the acquisition and fielding of new systems at scale on a relatively short 18 to 24-month timeline represents a significant challenge for a department across which various stakeholders must cooperate and adjust to accomplish Replicator's goal. Replicator's success is not a foregone conclusion – many previous efforts to speed up acquisitions have failed due to over-ambitious timelines, underdeveloped technologies, shifting requirements, or poor integration strategies.[8]

Purpose

The purpose of this report is to assess Replicator's success in accelerating the acquisitions of innovative defense technologies and develop concrete recommendations to ensure its future sustainability as a reliable and repeatable process. This report considers the following two questions:

1. What key factors and challenges have enabled Replicator's results?
2. What changes can DIU make to improve Replicator and positively influence DOD rapid acquisitions in the longer term?

Through analysis of these questions, specific and actionable policy recommendations are provided to DIU to improve processes related to current and future Replicator iterations.

This study is not meant to address the wider implications of autonomous weapons and associated risks, nor does it analyze other DIU lines of effort beyond Replicator.

In preparing this report, the authors conducted 29 expert interviews to include nuanced perspectives from a diverse set of stakeholders across Congressional Defense Committees, the Office of the Secretary of Defense (OSD), DIU, the Services, Combatant Commands (CCMDs), private industry, and academia.[9]

The unclassified nature of this report precludes the discussion and analysis of some aspects of the Replicator Initiative, specifically an all-inclusive list of types, quantities, manufacturers, and operational employment of systems procured by DOD under Replicator. All identified technologies, systems, and private vendors in this report have been publicly announced by DOD officials. Additionally, quantitative data related to the size and number of contracts or investments is not publicly available. It is thus impossible to fully assess Replicator's impact on domestic manufacturing and defense innovation investment except for insights gained from interviews.

At the time of publication, the execution and results of Replicator 1 continue to unfold as the results achieved by the August 2025 delivery deadline become clear. The only public update for this deadline at the time of publication is one DIU official's statement on the delivery of "hundreds" of Switchblade systems to the DOD.[10] The longer-term impacts of the initiative, including the services' ability to operationally employ procured systems, will be better understood with time. Additionally, the change of administration and lack of FY2025 appropriated funding underscore the uncertainty surrounding Replicator's future.

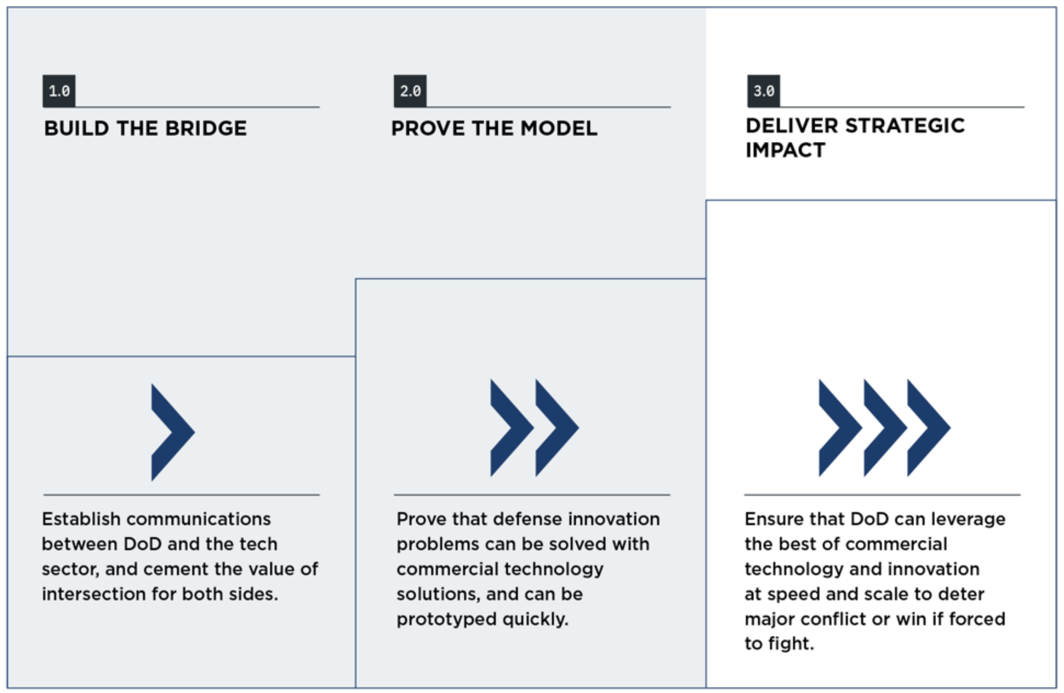
2. The Defense Innovation Unit

Founded by former Secretary of Defense Ash Carter in 2015, the Defense Innovation Unit, based in Mountain View, CA, is one of the Pentagon's foremost efforts to accelerate commercial technology adoption, procurement, and scaling across the DOD.[11] Originally named DIUx, or "experimental," the first iteration of DIU (DIU 1.0) focused on building the bridge between the public and private sectors.[12] In 2023, SecDef elevated DIU to a direct report, whereas it was previously located under the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)). This marked the start of DIU's third and current form, DIU 3.0.[13] As of August 2025, Undersecretary of Defense for Research and Engineering Emil Michael is serving as acting director of DIU following director Doug Beck's resignation.[14]

DIU serves as an entry point for private sector companies to compete for DOD contracts through a solicitation process known as Commercial Solutions Opening (CSO) and houses the relatively small team behind the Replicator Initiative.[15] Outside of the Mountain View headquarters, DIU operates offices in the Pentagon, Boston, Chicago, and Austin.[16] It also operates in seven distinct functional areas outside of Replicator, with portfolios covering Artificial Intelligence, Autonomy, Cyber and Telecommunications, Emerging Technology, Energy, Human Systems, and Space.[17]

In 2019, DIU became responsible for overseeing the National Security Innovation Capital (NSIC) and the National Security Innovation Network (NSIN), two other innovation organizations within the DOD. In addition to NSIC and NSIN, DIU also chairs the DICE.[18] In FY 2024, DIU devoted 15 percent of its nearly $1 billion budget to "help accelerate work pioneered by other members of the DOD's innovation community" and streamline the innovation pipelines throughout the DOD.[19] Of the roughly 200+ innovation organizations that exist within the DOD, CCMDs, and Services, DIU convened a representative group of 15-20 organizations representing each Service, the Joint Staff, and key OSD offices for the first iteration of DICE under its management.[20]

Figure 1: DIU's Evolution from 1.0 and 2.0 to 3.0



Source: "DIU 3.0: Scaling Defense Innovation for Strategic Impact." Defense Innovation Unit

3. The Replicator Initiative

Purpose and Objectives

When DepSecDef Hicks announced the Replicator Initiative in August of 2023, the goal was threefold:

1. **Overcome the PRC's advantage in mass** by producing "multiple thousands" of all-domain, autonomous, lower costs, and attritable systems.
2. **Create a spark in the domestic industrial base and supply chain** to inject urgency into the system during peacetime, enabling rapid development and procurement of systems.
3. **Effect cultural change across the DOD bureaucracy** to accelerate the acquisition of innovative and capable technologies.

Each Replicator iteration focuses on acquiring capabilities that meet an urgent operational need within 18-24 months. Replicator 1's commercially manufactured ADA2 systems were developed in two "tranches," or groups of systems. DIU has announced that Replicator 1 is on track to deliver intended system quantities within 24 months from its initial announcement; however, specific system quantities are classified and out of the scope of this study.[21]

Many Replicator systems contained capabilities for which the services already maintained funded programs, but some systems require the services to establish new programs. Moreover, senior DOD leadership by August 2023 saw those capabilities as "orphans" within each of their respective services – less prioritized than major platforms such as ships and submarines in the Navy, fighter jets in the Air Force, or long-range fires in the Army. The Replicator process gave these ADA2 programs and the non-traditional vendors a boost from the DepSecDef. As one former DOD official said, Replicator "turned those autonomy orphans into winners."[22]

Deputy's Innovation Steering Group (DISG)

The DISG is the senior-level decision-making body overseeing Replicator and various broader DOD innovation initiatives. It is chaired by the DepSecDef and the Vice Chairman of the Joint Chiefs of Staff (VCJCS).[23]

- **History and Purpose:** Originally established in 2021 under a different name, the DISG's mission was clarified in August 2023, consolidating oversight and governance of wider innovation initiatives while reducing systemic barriers across the Department. This encompassed DIU's efforts on Replicator, as well as the broader objective of addressing gaps in DOD innovation efforts at the scale and speed demanded by an evolving threat environment.[24]
- **Membership** includes all Service Secretaries, Combatant Commanders, senior Office of the Secretary of Defense and Joint Staff leaders,[25] and the directors of DIU, Strategic Capabilities Office (SCO), Joint Staff J7 and J8, and the Defense Advanced Research Projects Agency (DARPA), along with additional representatives from innovation and rapid acquisition organizations across the DOD.[26] DIU provides substantial staff support to the body, including preparing materials and collaborating with DISG leadership to align on meeting priorities and objectives, informed by the outcomes of the Defense Innovation Working Group (DIWG). Regular meetings occur quarterly.[27]

Defense Innovation Working Group (DIWG)

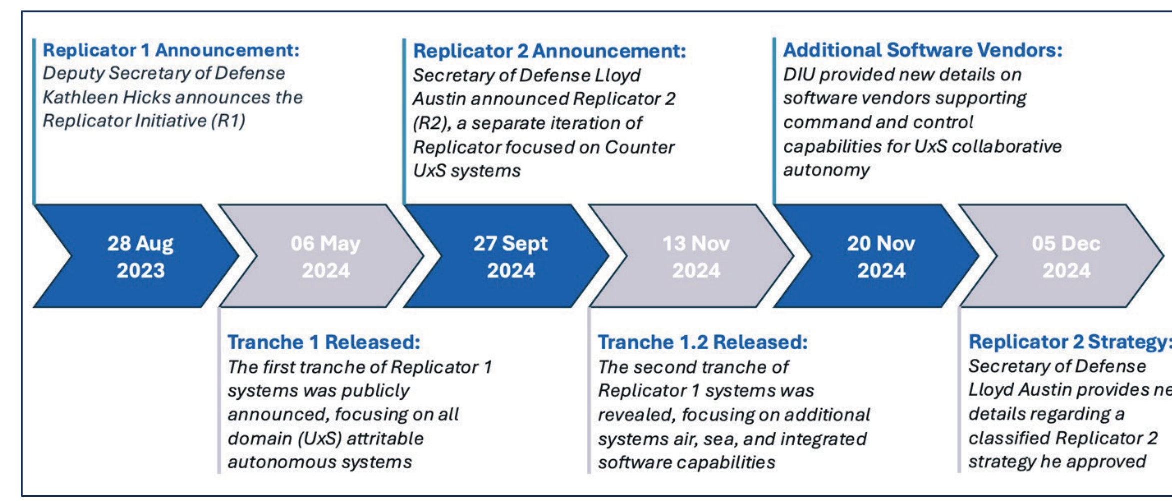
In support of the DISG, DIU chairs the DIWG.[28]

- **Purpose:** The DIWG operates at a level below the DISG and brings suggestions to the DISG for execution.
- **Membership** includes "components from OSD, Joint Staff, CCMDs, and the services to accelerate delivery of innovative capabilities."[29] The DIWG meets monthly and is responsible for collecting inputs for the DISG from across the DOD and wider innovation community.[30] All members of the DISG, apart from the DepSecDef and VCJCS, are part of the DIWG.[31]

Timeline

Since Replicator's announcement, DIU has published periodic updates concerning Replicator's progress as shown in the below timeline.

Figure 2: Timeline of Key Replicator Events



Source: "The Autonomous Arsenal in Defense of Taiwan: Technology, Law, and Policy of the Replicator Initiative," Rosenbach, Lee, and Russell

Announced Systems and Programs

As of August 2025, the following systems and programs have been publicly announced by DOD officials as part of Replicator.

Figure 3: List of publicly announced systems and programs under Replicator[32]

Tranche	System	Domain	Contractor	Service
One	Switchblade-600	Aerial (Loitering)	AeroVironment	USA
One	Production-Ready, Inexpensive, Maritime Expeditionary (PRIME)	Maritime (sUSV)	TBA	USN
Two	Altius-600	Aerial (Loitering)	Anduril Industries	USMC
Two	Ghost-X (Company Level Small UAS)	Aerial (Reconnaissance)	Anduril Industries	USA
Two	C-100 (Company-Level Small UAS)	Aerial (Reconnaissance)	Performance Drone Works (PDW)	USA
Two	Enterprise Test Vehicle (ETV)	TBA	TBA	USAF

*DIU also awarded contracts to various software vendors under Replicator, which play a key role in advancing resilient command and control (C2) and collaborative autonomy solutions for ADA2 systems.

Figure 4: Publicly Announced Replicator Systems

Top Left: Switchblade-600 loitering munition; Top Right: C-100 small UAS; Bottom Left: Ghost-X small UAS; Bottom Right: Altius-600 loitering munition

Replicator 2

Announced in September 2024, Replicator 2 focuses on the rapid acquisition of Counter small Unmanned Aerial Systems (C-sUAS) systems. The threat of UAS against U.S. installations is well-documented, ranging from hobbyists flying systems too close to restricted airspace to espionage and electronic or kinetic attacks by adversaries.[33] The credible risk to personnel and operations posed by increased drone activity near installations and force concentrations drove the decision to pursue C-sUAS for Replicator 2.[34] Similar to Replicator 1, Secretary Austin announced that Replicator 2 will fill the critical capability gap by overcoming production, innovation, budgetary, and integration challenges.[35]

The DOD has not provided additional details on Replicator 2 scope (for example, the number of installations covered) or specific systems that will be procured. Whereas Replicator 1 was focused on meeting INDOPACOM demand, Replicator 2 C-sUAS acquisition involves all CCMDs. While defense innovation and rapid procurement remain important Pentagon priorities, it is yet to be determined if Replicator 2 will continue with C-sUAS or if the current SecDef will abandon the Replicator name in favor of a new, rebranded initiative.[36] As of August 2025, DOD has directed the Secretary of the Army to replace the Joint C-sUAS Office with a joint interagency task force that reports to DepSecDef and includes Replicator 2's resources, leaving DIU's role in the C-sUAS mission unclear.[37]

However, despite similarities to Replicator 1 in Secretary Austin's announcement, Replicator 2 is distinct from its predecessor in several ways.

1. **Different Funding Approach:** Replicator 2's 24-month timeline begins *once Congressional funding is appropriated,* whereas Replicator 1's 24-month timeline began upon announcement. Through reprogramming, Replicator 1 obtained funding from elsewhere in the DOD after the initiative was months underway. Replicator 2 is planned to start once FY2026 funding is appropriated.

2. **External Pressures:** Unveiled toward the end of the Biden Administration, Replicator 2 was announced to sustain bureaucratic momentum going into the next administration. This intent was evidenced by SecDef Austin's announcement on the direction and execution of Replicator 2, by including

the importance of "concentrated and sustained leadership attention" to accelerating the procurement of Replicator-like capabilities and substantiated in interviews with DIU personnel.[38]

3. **Competing for Time:** Replicator 2 integrates into the same DISG/DIWG process framework and forums that drove Replicator 1. Competing for the same airtime, both groups have prioritized Replicator 1 due to the more pressing deadline of August 2025, Replicator 2's current lack of funding, and uncertainty over the current administration's long-term strategy for UxS and C-sUAS acquisition.[39]

4. **Defining Success and Challenges in the Operational Gap:** Replicator 1's pursuit of ADA2 systems included a quantifiable goal and metrics. The initiative benefited services at different levels but primarily served INDOPACOM requirements. Replicator 2 faces more complex technical and bureaucratic hurdles relative to its predecessor due to the defensive nature of C-sUAS and the number of stakeholders and U.S. installations worldwide.

4. What Makes Replicator Different?

The DOD PPBE process requires budgets to be planned before future technical capabilities and limitations are assessed through development, prototyping, testing, and evaluation. Based on CCMD input, requirements for new capabilities are analyzed and validated by the Joint Staff using JCIDS before moving on to PPBE and acquisition. (JCIDS is set to be replaced with a new system for requirements as of August 2025.[40]) These systems are meant to ensure the DOD buys the right things, for the right reasons, and can defend those decisions under scrutiny. But they also make it difficult for the bureaucracy to iterate at a pace that matches technological development, resulting in time and capability gaps between the identification of a military need and its acquisition. Performance issues and delays persist for three reasons:

1. **Insufficient Leverage of Commercial Technology:** DIU's foundational premise is that the commercial sector has much to offer the warfighter yet faces too many hurdles in doing so within existing defense acquisition processes. Many explanations are offered for why U.S. defense "primes" have consolidated and resisted disruption, or why programs often fail to deliver at the cost, scale, speed, and quality desired by DOD. Drivers include the unification of inter-service purchases under the PPBE system after the 1950s, an ex-ante approach to risk mitigation, growth of the FAR and associated regulations

(which raise entry costs), and attention by Congress and the public on waste, fraud, and abuse incidents that politically reinforce the above dynamics.[41] These dynamics all make timely integration of UxS and the commercial technology they leverage more difficult. Observers of Ukrainian forces have noted that existing UxS grow obsolete due to new jamming techniques or other countermeasures from Russian forces in as little as three months.[42]

2. **Mismatch Between Hardware-Centric Processes and Software-Centric Warfare:** The DOD's challenge in harnessing commercial technology is arguably more pressing now because software, powered by recent AI advances, has become even more central to warfare. Processes and systems oriented around the acquisition of hardware meant to serve for years or decades are deficient when software plays an ever-growing role in warfare.[43] As the bipartisan PPBE Reform Commission put it in 2024, "the security environment is rapidly evolving, and the current PPBE process is not capable of responding as quickly and effectively as needed to support today's warfighter."[44] Others have taken note, including Rep. Jim Banks in a recently proposed bill and SecDef Hegseth in his March 2025 memorandum "Directing Modern Software Acquisition to Maximize Lethality," which directs all DOD components to adopt the Software Acquisition Pathway (SWP) as the preferred pathway for all software development components of business and weapons system programs" and sets CSOs and Other Transactions Authority (OTA) as the default solicitation and award approaches.[45]

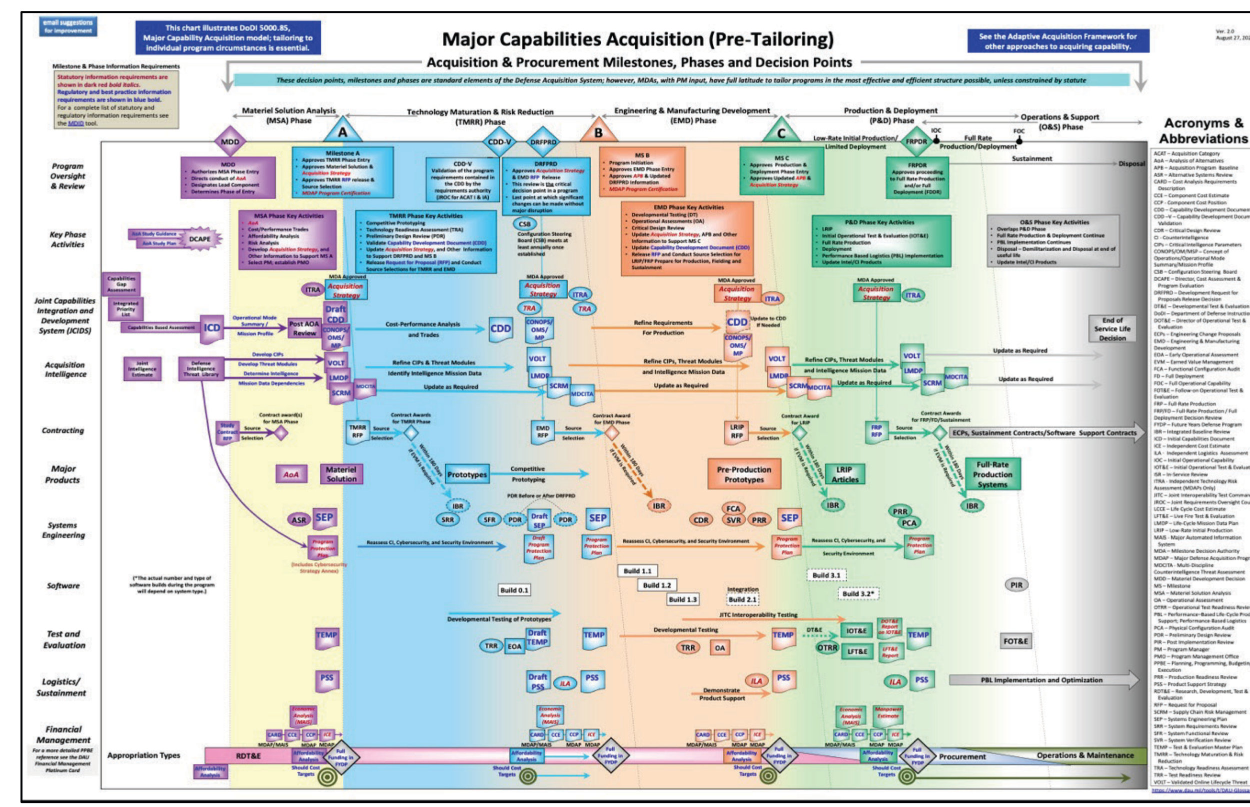
3. **Difficulty Adapting or Moving Fast Given Organizational Design:** Misaligned incentives foster dynamics within the services that frustrate the rapid acquisition of advanced systems.

    a. The services are generally hesitant to substantially shift procurement patterns to react to new technological developments because they must already allocate a certain amount of funding for expenses unrelated to major system procurement, such as unanticipated housing and environmental costs. The pot of money available for funding major acquisition programs has been further eroded by the lack of timely budget appropriations in recent years, with DOD starting the fiscal year with regular appropriations only once since FY2010.[46]

    b. The addition of requirements by Systems Commands often slows down acquisitions by expanding program scope and increasing complexity. Each added technical requirement can trigger design changes, additional testing, and revalidation steps, which delay development timelines, raise costs, and incentivize the addition of more requirements on future systems because fewer systems make it through the process at all.[47]

    c. Moreover, staff officers in DOD program offices (POs) face career, legal, and bureaucratic risks that disincentivize speed. Delivering programs quickly can backfire if mistakes occur, costs rise, or requirements shift since they may be blamed for failures more than rewarded for success. The pressure to avoid programmatic, ethical, or political missteps often leads POs to prioritize compliance and risk avoidance over rapid delivery, especially in complex or high-visibility programs.[48]

Figure 5: The Defense Acquisition Life Cycle Wall Chart



Source: "Defense Acquisition Life Cycle Objectives and Contributions with Tailoring," Defense Acquisitions University

DIU has sought to overcome these problems to meet Replicator's goal. In defining the requirement based on CCMD operational need, the DepSecDef bypassed the JCIDS process and shortened the typical acquisitions timeline. Additionally, emphasizing mature ADA2 technologies – reinforced with an explicit deadline – rather than the development of bespoke systems enabled DIU to accelerate system procurement.

There are innovation organizations in DICE beyond DIU that have experience with fast acquisition authorities, understand commercial technology's applications for service needs, and know many of the firms and leaders in the commercial technology sector.[49] Some examples include the Air Force's AFWERX, the Navy's NavalX, the Marine Corps Warfighting Lab, and the Army Futures Command, among others. For rapidly fielding UxS, however, DIU occupied a unique position in DICE because of its position within OSD and as a direct report to SecDef, allowing it to integrate joint needs and capabilities for joint use and elevate these to senior DOD leaders.[50]

Other rapid acquisitions initiatives, such as the Rapid Defense Experimentation Reserve (RDER), have complementary qualities to Replicator. Where Replicator focuses solely on procurement, RDER aims to close operational gaps by accelerating joint experimentation and prototyping using research, development, test, and evaluation (RTD&E) funding. Accelerate the Procurement and Fielding of Innovative Technologies (APFIT) comes further along in system development, providing OUSD(R&E) funding of $10 million to $50 million to small business or non-traditional performer contracts to accelerate initial production.[51]

Rapidly speeding up procurement highlights the tension between two tendencies in acquisition. On one hand, many acquisition reform experts have advocated a wholesale overhaul of defense acquisitions, arguing that fundamental aspects of the system such as JCIDS, PPBE, and central planning are the root causes of inefficiency and must be replaced before substantial improvements can be made.[52] On the other hand, DIU staff and others across the interviews emphasized that there is room to accelerate acquisition within current constraints.[53] Political pressure in the form of direct involvement by DOD leadership and more widespread use of existing authorities, like OTA contracting, illustrates the progress that can be made short of comprehensive legal reform.[54]

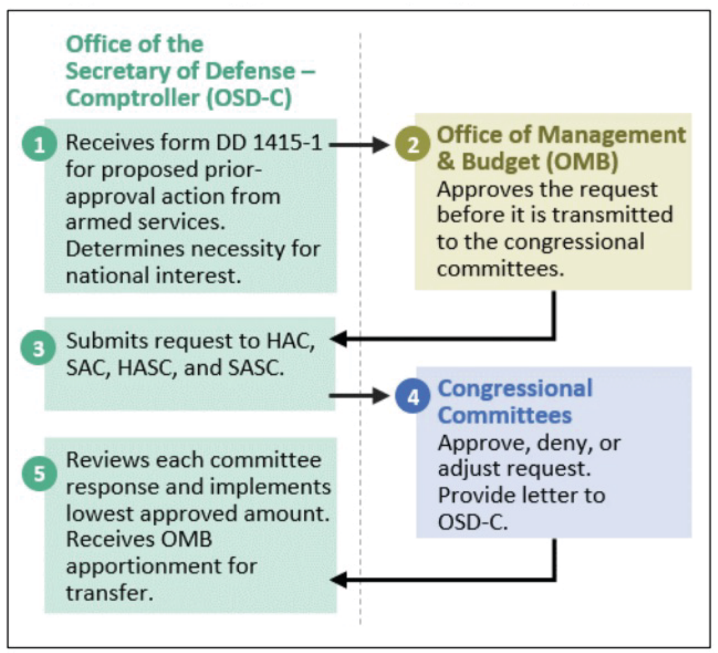
5. Key Challenges

Any new initiative within the DOD is challenged by bureaucratic inertia, and in this sense, Replicator was no different. Its announcement took many across the DOD by surprise, with various questions concerning how it would be executed and what demands would be made of the services. The resulting confusion exacerbated the below-listed challenges, which guided DIU's execution strategy to meet Replicator's goals within its short timeline.

Budget Reprogramming

DIU's appropriated funding for Replicator 1 was insufficient, prompting DOD to request $300 million of appropriated procurement funding to be reprogrammed from the services. The FY2024 National Defense Authorization Act (NDAA) and FY2024 DOD Appropriations Act included recurring General Transfer Authority provisions permitting the SecDef to transfer appropriated funding. However, the reallocation of funds exceeded the threshold known as "above threshold reprogramming" (ATR) and therefore required approval by the chair and the ranking member of the House and Senate Committees on Armed Services and Appropriations before DOD could process the transfer. For FY2024, the threshold amount for procurement was set at the lesser value of either $15 million or 20% of a line item in a procurement account.[55] The DOD process for obtaining Congressional approval of reprogramming actions is outlined in Figure 6. Reprogramming funding led to Congressional scrutiny, requiring DIU to devote much more bandwidth toward engaging with Congressional appropriators than originally anticipated. Even once the reprogramming of funding was approved, Congressional appropriators continued to request detailed updates from DIU throughout Replicator's execution. It took time and effort for DIU to gain the trust of Congressional appropriators to validate that Replicator was a better use of service program funding for these systems.[56] DIU must maintain this trust in the future to enable funding appropriation and flexibility for Replicator 2 and beyond as necessary.

Figure 6: DOD Process for Obtaining Prior Congressional Approval of Reprogramming



Source: "Defense Primer: DOD transfer and Reprogramming Authorities," Congressional Research Service

Service Resistance and Coordination

Resistance to Replicator was greatest once the services discovered that they would be responsible for funding much of it at the expense of other programs. Since Replicator's original announcement, this presented the most considerable obstacle for DIU to overcome.[57] Communicating the relative benefits of Replicator to the services, and their allies in Congress, required robust coordination and the strategic selection of technologies to further ongoing service initiatives and programs.[58]

Most significantly, transitioning newly fielded systems from initial to full operational capability requires painstaking service planning. Regardless of the speed with which new technologies are acquired, corresponding DOTmLPF-P changes remain the most significant bureaucratic hurdle to the accelerated employment of new technologies, and the lack of coordination with the services before Replicator's announcement delayed corresponding service planning to field new systems, increasing frustration.[59] The below table illustrates associated DOTmLPF-P considerations when assessing the ability to field ADA2 systems.

Figure 7: Replicator DOTmLPF-P Considerations

Component	Replicator-Related Considerations
Doctrine	• Integrating systems into ongoing operations and existing concept of operations (CONOPS) and operational plans (OPLAN), contingency plans (CONPLAN), and base plans (BPLAN) • Incorporating ADA2 systems into joint and service-specific doctrines
Organization	• Modifying force structure with ADA2-capable units
Training	• Developing training programs to gain proficiency in operating and maintaining ADA2 systems and associated components • Integrating programs into existing basic, advanced, and sustainment training pipelines • Coordinating mobile teams to deliver on-site operator training
Materiel	• Merging ADA2 systems with existing equipment and resources • Sustaining procured systems and developing operational, intermediate, and depot level maintenance thresholds and responsibilities • Ensuring adequate supporting communications architectures
Leadership and Education	• Preparing leaders to understand the capabilities and limitations of fielded systems • Understanding technical risks and risks to personnel
Personnel	• Building or modifying existing service units responsible to use acquired systems • Introducing new military occupational specialties (MOS) and/or designating MOS intended to operate ADA2 systems • Assessing personnel availability and existing qualifications to accept acquired systems
Facilities	• Identifying location, suitability, and capacity of storage magazines, training areas/ranges, and maintenance locations • Assessing ease of logistics movements
Policy	• Planning safety and risk mitigation protocol for ADA2 systems, including ethical AI use and autonomy • Revising existing security classification guides to govern the storage and handling of ADA2 associated data

Hardware and Software Maintenance

Despite the attritable nature of ADA2 systems, periodic hardware and software maintenance is still necessary to make repairs, perform upgrades, and ensure functionality.[60] The pace of AI-enabled software development underscores the need to acquire systems that can increase capability through software upgrades rather than requiring the purchase of entirely new systems. Doing so, however, requires overcoming numerous data management, storage, and contractual hurdles.

Once ADA2 systems are fielded, their sustainment is a service bill intended to be incorporated into annual operations and maintenance (O&M) budgets for established programs of record (PORs). Through maintenance contracts, technical experts from commercial vendors must perform on-site intermediate-level repairs and updates since software security compliance and data bandwidth limitations preclude remote software updates.[61] The large quantity, geographic separation, and deployment of ADA2 systems and their stored data in sensitive or hard-to-reach areas introduce logistic, diplomatic, security, and feasibility issues complicating maintenance. As the Replicator-procured systems transition to the services, and eventually into service PORs, commercial vendors will need to grow their capacity to support the increased maintenance demand.

Treating hardware and software separately represents a strategic change to how the DOD has traditionally performed acquisitions, and DIU personnel on the Replicator team consistently sought to contractually decouple software from hardware due to the inherent benefits of flexibility, adaptability, and speed.[62] When software is treated as independent of an unmanned system's hardware, a greater diversity of developers can iterate rapidly, allowing for new capabilities like collaborative autonomy or swarming behaviors to be pushed to fielded systems through software updates.[63] Since different missions require different sensors or payloads, decoupling enables vendors to provide interchangeable modules to adapt the system to the mission. Conversely, legacy systems have software hard-coded into specific hardware, which has contributed to long and costly development cycles and vendor lock-in while increasing cybersecurity risks with infrequent patching.[64]

Separating hardware from software complicates root cause attribution when a system malfunctions or causes unintended damage to personnel or property. When a system is comprised of hardware and software of two or more commercial vendors, each is incentivized to attribute malfunction to the other(s) following an accident or

failure. From the perspective of firms that build full systems, the technical benefit of separating hardware from software is strongest when a single vendor retains control over both since it increases technical reliability and understanding.[65]

Employing AI-driven autonomous systems requires the storage and management of massive quantities of data. Centralized data management and requirements regarding AI-driven decision-making remain the Chief Digital and Artificial Intelligence Office's (CDAO) domains, but its work is complicated by widespread data disaggregation, storage, and movement complexities.[66]

Testing Facilities, Ranges, and Simulators

The lack of sufficient and diverse test environments for unmanned systems is a growing problem for the DOD. The current testing infrastructure was largely built for manned platforms and does not fully support the scale, autonomy, or mission needs of ADA2 systems.[67] For Replicator, the lack of testing resources complicated the contractual verification of technical compliance and strained overall procurement timelines.[68]

For UAS, the primary issues are airspace restrictions, range size, and simulating realistic conditions.[69] Many existing DOD test ranges operate within national airspace, requiring strict Federal Aviation Administration (FAA) coordination. This limits the ability to test high-end autonomous swarms, beyond-line-of-sight (BLOS) operations, and large-scale AI-driven engagements. Additionally, regulatory issues minimizing the risk of unintended signal fratricide complicate electronic warfare (EW) and GPS (Global Positioning System)-denied testing, making it difficult to evaluate performance against near-peer jamming threats.[70]

For maritime systems, most U.S. Navy test areas operate in relatively controlled environments that also do not reflect realistic operational conditions. Testing in operationally relevant locations is preferable and supported by CCMDs via subordinate UxS units but poses logistical difficulties. Unmanned surface vehicles (USVs) intended for contested environments need to be tested in waters with realistic electromagnetic threats, extreme weather, and GPS disruptions. Instead of real-world testing, simulators present the next best option to model unmanned systems operation. However, the cost and complexity of simulators with the ability to run adaptable software associated with varying ADA2 systems contribute to capacity and capability shortfalls.[71]

6. Key Enablers

Senior Leadership Direction and Involvement

Former DepSecDef Hicks initiated the Replicator Initiative and maintained a persistent focus on its execution. As co-chair of both the Deputy's Management Action Group (DMAG) and the DISG, she ensured regular military and civilian senior leader attention on Replicator. For DIU's Replicator team, senior leader engagement and DIU's organizational placement within DOD enabled rapid decision-making and coordination to overcome bureaucratic hurdles. Multiple interviewees emphasized the importance of DepSecDef Hicks' direct involvement in three components of the acquisition process: defining the requirement, securing funding, and vendor contracting. Without the direct attention of DOD's number two authority, the rapid scaling and prototyping of ADA2 systems would have been difficult, if not impossible, to achieve within 18-24 months.[72] It is a key characteristic that pervades all other key enablers.

DepSecDef Hicks' primary mechanism to drive Replicator's completion was the DISG/DIWG framework, which was originally modeled on the DMAG. DepSecDef Hicks identified the DMAG as "the Department's principal governance body for management actions affecting the defense enterprise, including resource management and planning, programming, budgeting, and execution."[73] Former DepSecDef Robert Work testified to the utility of this model for centralizing defense acquisition authority about Joint All-Domain Command and Control (JADC2) – a joint, high-priority DOD initiative – when he commented that "the easiest thing without causing any type of an institutional ripple would be for the deputy to say, 'I'm going to have monthly DMAGs on JADC2,' and then the people would come and report in, she would get a sense on what's happening, she could give direction directly."[74]

To obtain buy-in across the services and Joint Staff, it helped that the DISG attendees were nearly the same as the Joint Requirements Oversight Council (JROC) – the body that identifies, assesses, and validates joint requirements before the second phase of acquisition begins.[75]

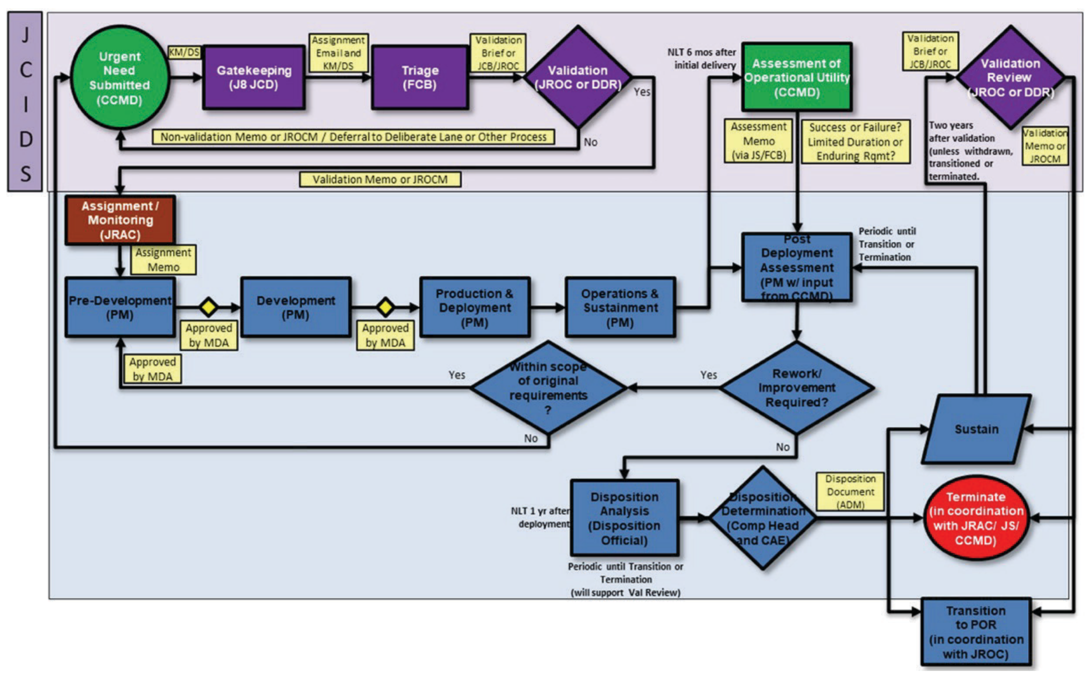
Streamlined Requirements

By announcing Replicator without a pre-existing formal requirement, DepSecDef Hicks bypassed the typical JCIDS process, which can take up to two years.[76] This was a critical initial step to direct collective, parallel efforts toward identifying sourcing solutions and procurement.[77] For Replicator, following the conventional requirements approach would have hindered the speed required to meet the quantitative procurement goal in 24 months.

Particularly for funding approval, DIU found it necessary to retroactively validate requirements.[78] After initiating the acquisition process, DIU requested the Joint Staff to identify already validated requirements that aligned with Replicator's goals to ensure that the effort could be sustained and properly funded.[79] This process allowed the initiative to comply with the broader DOD requirements framework while maintaining the agility needed to field systems rapidly. The practice of retroactively applying Joint Staff-validated requirements to rapid procurement initiatives already underway is common, highlighting the benefit of broadly written requirements for using emerging technical solutions.[80]

For larger programs like aircraft carriers or fighter jets, existing methods of requirements validation still provide an important framework that allows appropriate DOD direction and oversight over the development of its most advanced and expensive capabilities. However, JCIDS has proven poorly suited for buying and fielding commercial technologies where private industry has already advanced beyond existing requirements.[81] For top-down rapid acquisition initiatives that focus on existing commercial technology, circumventing JCIDS in this instance significantly accelerated the process with negligible downside risk. Figure 8 outlines the flow of joint requirements.

Figure 8: Joint Requirements Flow Chart



Source:DOD Instruction 5000.81, "Urgent Capability Acquisition"

Targeted Acquisition Focus

"Replicator is removing kinks in the hose of the system that is innovation in DOD. There are a multitude of programs that already exist in the department that need help to get from where they are to delivery at scale, and that is where Replicator is focused."

— Deputy Secretary of Defense Kathleen Hicks, November 2023[82]

By targeting systems that were already or near commercial availability, DIU mitigated the risk of cost and schedule overruns that often result when industry develops a bespoke prototype to satisfy specific joint and service requirements.[83] In some cases, this emphasized industrial production scaling rather than technological development. Additionally, focusing on acquiring attritable systems may reduce (but not eliminate) the service sustainment burden.[84]

DIU's existing relationships with industry are a positive driver for Replicator since service-led rapid procurements are often biased toward proprietary solutions (i.e., projects that fit into preexisting concepts of operation for preferred service platforms or that overlap with service labs' ongoing work). DIU's focus on solutions that commercial vendors can deliver using existing technology aligns with its emphasis on speed. In the FY2025 DOD budget request, Replicator 1, Tranche 1 is described as including systems that "(1) meet the operational need identified by combatant commanders, (2) are at high technology readiness levels (TRL) or can be accelerated to achieve high readiness within the target period, and (3) have pathways to scaled production."[85]

Figure 9: Technology Readiness Levels

1	Basic principles observed and reported	Scientific research begins to be translated into applied research and development. Examples include paper studies of a technology's basic properties.
2	Technology concept and/or application formulated	Invention begins. Once basic principles are observed, practical applications can be invented. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.
3	Analytical and experimental critical function and/or characteristic proof of concept	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate the analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.
4	Component and/or breadboard validation in laboratory environment	Basic technological components are integrated to establish that they will work together. This is relatively low fidelity compared with the eventual system. Examples include integration of ad hoc hardware in the laboratory.
5	Component and/or breadboard validation in relevant environment	Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements so they can be tested in a simulated environment. Examples include high fidelity laboratory integration of components.
6	System/subsystem model or prototype demonstration in a relevant environment	Representative model or prototype system, which is well beyond that of TRL 5, is tested in its relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in a simulated operational environment.
7	System prototype demonstration in an operational environment	Prototype near or at planned operational system. Represents a major step up from TRL 6 by requirement demonstration of an actual system prototype in an operational environment (e.g., in an aircraft, a vehicle, or space).
8	Actual system completed and qualified through test and demonstration	Technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include developmental test and evaluation of the system in its intended weapon system to determine if it meets design specifications.
9	Actual system proven through successful mission operations	Actual application of the technology in its final form and under mission conditions, such as those encountered in operational test and evaluation. Examples include using the system under operational mission conditions.

Source: "Technology Readiness Assessment Guide: Best Practices for Evaluating the Readiness of Technology for Use in Acquisition Programs and Projects," Government Accountability Office

The below list of publicly announced systems contracted under the Replicator Initiative shows the program's targeted focus on ADA2 systems and concepts that are already technologically viable.

Replicator 1, Tranche 1 (announced Mar. 2024)[86]

- The Switchblade-600 from AeroVironment debuted in 2020[87]

Replicator 1, Tranche 2 (announced Nov. 2024)[88]

- The Anduril Industries Ghost-X rotary-wing UAS was commercially available and already listed on DIU's Blue UAS list of UxS cleared for DOD use[89]

- Performance Drone Works C-100 UAS was also already on the Blue UAS list[90]
- The armed version of the Altius-600 (originally made by Area-I, which was then acquired by Anduril) was first announced in 2022[91]

Absent from the above Replicator 1 Tranche 1 list are Production-Ready, Inexpensive, Maritime Expeditionary (PRIME) USV and the Enterprise Test Vehicle (ETV). While full unclassified assessments of these systems aren't available, to the extent that they leverage mature commercial technology like the other systems in Replicator 1, they have sustained Replicator's goals of turning around fielded systems in short timeframes, attracting new commercial competitors to the defense industry for the long run.[92]

Agile Budgeting and Acquisition Methods

Following an efficient Commercial Solutions Opening (CSO) solicitation process, DIU leveraged OTA to rapidly identify and procure ADA2 systems outside the traditional FAR process. By assuming greater oversight, legal, and long-term viability risks, DIU and DOD leadership prioritized speed over perfection to reach their procurement goals.

DIU's experience with rapid acquisition tools and position within the Department made it an ideal leader for the initiative. These qualities, in conjunction with flexible budgeting tools, enabled DIU to use existing authorities to achieve unusually fast results. Senior Leadership Involvement established the end goal of Replicator and brought together the right people in a regular forum. Targeted acquisition focus set guardrails on the project to keep it focused and nimble, while flexible budgeting represents the "how" of Replicator.

Commercial Solutions and Other Transaction Authority

The CSO solicitation instrument has enabled DIU to secure procurement contracts with vendors capable of supplying technical solutions at scale. OTA has provided DIU with the authority to use this mechanism, bypassing FAR and DOD's FAR supplement.

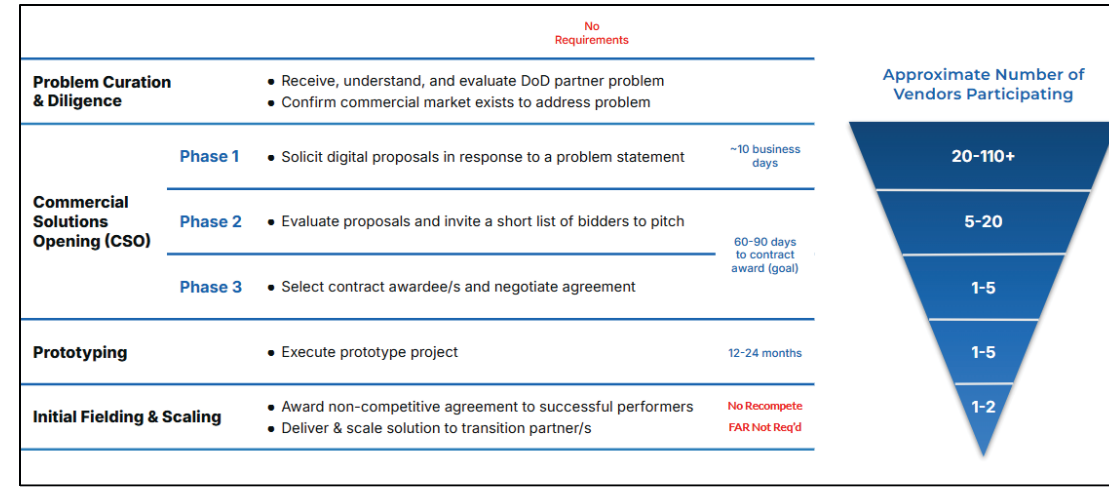
Figure 10: Summary of CSO and OTA

Type/Tool	Authority	Effect	Example
Commercial Solutions Opening (CSO)	FY16 NDAA §804; FY17 NDAA §847; FY18 NDAA §866	Program intended to be completed in 2-5 years, either producing a residual capability (new prototype) or fully fielded capability using already proven technologies.	Next-Gen Overhead Persistent Infrared System (Space Force's missile warning satellite constellation)
Other Transaction Authority (OTA)	National Aeronautics and Space Act of 1958; 10 U.S. Code §4021-4022	Contracting mechanism to fund research, acquire prototypes, or enter production without having to comply with FAR and other regulations.	Used for R&D, information technology, and COVID-19 response

Summary of CSO and OTA: Various Sources[93]

When drafting a CSO for publication, DIU will state the problem succinctly ("Problem Curation"), the same function normally performed in traditional acquisition by the requirements subject to FAR and agency-specific regulations. Second, DIU ensures that commercial solutions exist that can meet the problem ("Diligence"). For about ten days, it solicits proposals for solutions from commercial vendors through its website. The guidance for proposals is five pages for documents and fifteen slides for decks. Top bidders are invited to make Shark Tank-like pitches, and DIU then selects winners and negotiates contracts over two to three months (though the average length of time rose to over six months in FY2023 due to higher-than-anticipated CSO throughput).[94] Other DOD entities, including the services, can then reach out to DIU if they want to transition any resulting prototypes.[95] This process is shown in Figure 11.

Figure 11: Illustration of DIU's Competitive Solicitation Process for Commercial Vendors



Source: Defense Innovation Unit

Using CSOs and OTA has been necessary for DIU's core mission of quickly applying commercial solutions because the usual acquisition process involves lengthy reviews and substantial regulations. Defense Acquisition University notes that FAR Part 15 contract negotiation – part of the usual method for major systems – "does not lend to quick delivery of capability" and involves "labor intensive" procedures, "increasing administrative burden and costs."[96] DIU also focuses on nurturing new commercial entrants through prize challenges and its network of onramp hubs, further deepening its ability to pull solutions out of small, non-traditional defense companies.[97]

Limited Applicability

First, the CSO process has limited applicability for state-of-the-art, big-ticket items for which there is no available commercial solution. When the DOD is procuring a next-generation fighter or hypersonic missile, for instance, substantial R&D work is required upfront because there are few technical solutions for these capabilities extant in the private sector. That R&D necessitates large contracts, which bring the risk of politically connected or otherwise unmeritocratic contractor selection – hence, the hefty gauntlet of procedures, cost-accounting, and competition requirements that Congress has mandated in the FAR.

Transition Challenges

Second, CSO prototypes transitioned to production using OTA carry a risk of transitioning poorly. This is because other transactions (OTs) have limited requirements – their greatest strength. This also means that properly negotiating intellectual property and patent terms is much more than a box-checking exercise, demanding highly experienced PEOs. As one Congressional Research Service report put it, "OTs often require more experienced and capable government representatives to ensure implementation of agreements that are in the government's best interest."[98]

However, the number of PEOs capable of negotiating complex OTs is in short supply, limiting the effectiveness of a promising solution.[99] Poorly negotiated OTs could expose the government to lawsuits or impose unfavorable terms on it. Recent defense acquisition reform proposals have thus identified workforce training as a key pillar of progress.[100] The FY2018 NDAA contained provisions to increase training on OTA, and by the time Replicator began, Defense Acquisition University had deployed a training module.[101]

Even though there have not yet been detailed assessments of how these training initiatives have mitigated the risk of poorly negotiated OTs, the CSO and OTA methods used by Replicator have remained attractive. Commercial solutions are the centerpiece of Replicator, and DOD remains unable to serve as an appealing client to many commercial firms unless normal timelines are sped up with CSOs and normal regulatory burdens (such as costs from adopting government-compliant cost-accounting) are sidestepped with OTs.[102] Challenges with transitioning DIU prototypes to substantial production remain a significant concern for DOD acquisitions.

Figure 12: DIU Meeting with Industry

Source: Defense Department[103]

Increased Risk Tolerance

Increased risk tolerance by DOD senior leadership after Replicator's launch reflected leaders' focus on better equipping the DOD to fight and win potential conflicts. It also enabled DIU to effectively use the acquisition tools mentioned above, which introduce oversight, consistency, and sustainability risks. DIU and senior DOD leadership have accepted the legal, technical, and bureaucratic risk involved in fast acquisition because of the importance of Replicator's mission.[104]

Legal Risk

OTs' convenience does not eliminate the legal risk taken on by the DOD when using them instead of FAR procedures for acquisition. Losing bidders alleging ethical violations may still sue the DOD, a persistent challenge given DOD's growing use of OTs in recent years.[105] This legal risk is ultimately political, however, and the previous administration's SecDef and DepSecDef were willing to bear this risk.

Technical Risk

Rapidly acquiring prototypes and fielding complete systems as DIU has done with OTs and CSOs brings safety risks for operators in the field and services. Operationally, systems fielded without adequate preparation as to how they will be sustained, used, and incorporated with military plans create sustainability risks.[106] Accelerated acquisitions may also preclude extensive safety testing and service familiarity.

Bureaucratic Risk

Furthermore, at a higher level, service leadership may politically challenge DIU or civilian DOD leadership if they perceive service DOTmLPF-P issues to be substantial, if they believe initiatives outside of the services like Replicator challenge their funding, or if civilian DOD direction is accompanied by demands to divest from desired programs. With the help of Congress, challenges related to the services were significantly mitigated by Deputy Secretary Hicks and continue to be mitigated by DIU.

In Replicator's case, the bureaucratic resistance in acquisitions is mainly about budget, as the ADA2 systems at current scale do not fundamentally threaten core service equities. Rather, how the systems are acquired determines the services' responses to senior DOD leadership on Replicator. Congressional appropriators have also tried to address the risk that Replicator inadequately addresses DOTmLPF-P issues by requiring briefings from the DepSecDef and VCJCS on service acceptance plans for each announced system.[107]

DIU's choices for Replicator's systems mitigated service-related risks by acquiring systems that helped the services reach their procurement and modernization objectives. The first procured system, the Switchblade-600, was already in use in the Army, and Army leadership wanted more systems after the war in Ukraine demonstrated their utility in ground warfare.[108] Ghost-X and C-100 provide company-level UAS for the Army and Altius-600 for the Marine Corps.[109] USV and the ETV give the Navy and Air Force, respectively, equities in Replicator, leaving the Space Force as the only service yet unaided by Replicator-related procurement (considering only announced systems).[110]

7. Policy Recommendations

Recommendation Criteria

Although it is unknown if Replicator will continue in the same form under new DOD leadership, the criteria below remain relevant as long as the DOD continues to recognize DIU's value as a positive force for accelerating rapid, targeted acquisition. The continued emphasis on speed and scale in the DOD's C-sUAS strategy aligns closely with Replicator 2's objectives and will remain explicit tenets of any rapid acquisition initiative, regardless of nomenclature or management.[111] Recommendations are evaluated collectively based on the following criteria to assess impact and challenges:

1. **Metal on Shelves:** Does this recommendation help DIU vastly increase the total DOD inventory of unmanned systems or counter-unmanned systems?[112]
2. **Strategic Value**: Does this recommendation help DIU enhance the Joint Force's ability to deter or defeat a PRC military threat?

3. **Better Buyer**: Does this recommendation help the DOD accelerate the scale and pace of acquisitions? Does this recommendation change acquisition culture, realign incentives, or both?[113]

4. **Supply Side**: Does this recommendation support further growth in the quality and quantity of commercial vendors selling viable defense technologies?

5. **Political Feasibility**: Is this recommendation likely to find support in the services, Congress, and the executive branch?

The goal of the following recommendations is to propose enhancements or areas for improvement for DIU to ensure that Replicator becomes a sustainable and replicable process, better positioning DOD for the rapid acquisition of similar categories of systems in the future. These recommendations specifically target future iterations of Replicator or whichever initiative may replace it. The following graphic displays the color assigned to each criterion, shown in the top right-hand corner of each recommendation below, to help track which criteria apply to each recommendation:

#	Criterion	Description	Assigned Color
1	**Metal on Shelves**	Does this recommendation help DIU vastly increase the total DOD inventory of unmanned systems or counter-unmanned systems?	
2	**Strategic Value**	Does this recommendation help DIU enhance the Joint Force's ability to deter or defeat a PRC military threat?	
3	**Better Buyer**	Does this recommendation help the DOD accelerate the scale and pace of acquisitions? Does this recommendation change acquisition culture, realign incentives, or both?	
4	**Supply Side**	Does this recommendation support further growth in the quality and quantity of commercial vendors selling viable defense technologies?	
5	**Political Feasibility**	Is this recommendation likely to find support in the services, Congress, and the executive branch?	

Recommendation 1:
Increase Joint Staff and Service Pre-Coordination

Recommendation Summary: Since the services are responsible for making DOTmLPF-P changes to employ procured systems, earlier consultation gives the services more time to lay the staffing, training, and logistical groundwork to field new technologies. The trade-off involves increased political risk if one or more services disagree with the targeted capability selected for the Replicator iteration. Additionally, one or more services may already have efforts underway to develop and acquire the technologies being considered. So, collaboration would help DIU best apply financial and personnel resources to accelerate ongoing efforts, making acquisition more efficient. Services represent the "scaling engines" of the DOD, and their involvement, funding, and expertise are critical to program success.[114]

Recommendation Components:

1. **Services communicate recommendations for the Replicator focus area in advance.** Services provide input to DIWG prior to selection to inform selection based on alignment with service needs and existing or emerging PORs.

2. **Seek requirement prioritization from the Joint Staff** to ensure that Replicator targets validated joint requirements.

3. **DIU performs industry analysis** to assess technical maturity, availability, and cost.

Justification:

Senior DOD leadership pursued ADA2 systems for Replicator 1 with minimal service and Joint Staff input, which caused confusion across the bureaucracy after it was announced. The unexpected nature of the announcement by the DepSecDef was a strategic choice to decrease the chance of upfront resistance to an unfamiliar initiative with funding uncertainty.[115] Since then, however, DIU has demonstrated the value that Replicator provides to the services by accelerating the adoption of capabilities ("pulling programs to the left") and introducing new technologies where gaps previously existed.[116] Now that Replicator's purpose is more widely understood and supported, bureaucratic resistance is less likely. The services are more comfortable with Replicator as a "seed fund" for programs they will soon own.[117] Therefore, earlier communication with the services affords additional time for the services to plan corresponding DOTmLPF-P changes and forecast bureaucratic hurdles, as well as attain early buy-in across the department. Manning, training, and equipping activities all benefit from earlier preparation, which minimizes the time between system fielding and operational employment.[118]

While the Services maintain their own innovation organizations and development pipelines, there are challenges with service-led rapid acquisition due to budgetary constraints, a lack of prioritization, unfinished end products, and redundant efforts across the Department. While duplicative innovation efforts are not necessarily an issue, siloed communications may lead to similar contracts being awarded to the same vendors by different parts of the Department.[119] Avoiding this type of duplication is an important step in ensuring new technologies can be transitioned and that DOD can continue to foster the development and growth of smaller, non-traditional vendors.[120]

Challenges and Risks:

- **Political Tradeoff:** By notifying the services early and including them in the process of forming Replicator's capability focus area, the DepSecDef and DIU run the risk of slowing the Replicator process down.
- **Constrained Requirements:** By bringing the services in early and looking specifically for pre-validated or existing requirements, the DepSecDef and DIU may limit the creativity that could come from out-of-the-box thinking, applying novel but existing commercial tech solutions to DOD-wide gaps.

Implementation Plan:

1. **Communicate criteria for Replicator capability selection with Services.** Criteria include requirement priority, commercial technical maturity, cost, scaling ability, timeline, and service readiness to incorporate new technology. DepSecDef retains authority to reject service recommendations.
2. **Increase requirement-specific DIU staff** to work with Services and form closer ties between DIU Replicator capabilities and service needs.
3. **Align capability selection with prioritized Joint Staff-validated requirements** to ensure operational need in advance of presenting to DepSecDef.

Recommendation 2:
Streamline Technical Feedback Loops

Recommendation Summary: Technical user feedback on tested technologies is often retained in service-specific and operational chains of command. This prevents information sharing between services, leading to duplication of effort. Additionally, technical feedback reports are often not readily accessible by DIU. Varying technical after-action report (AAR) formatting complicates the extraction of relevant observations and lessons learned. Creating and maintaining a technical AAR repository of system-specific operator feedback that is accessible across the DOD's innovation ecosystem increases awareness and transparency.

Recommendation Components:

1. **Leverage the existing Joint Lessons Learned Information System (JLLIS)** database as a technical AAR repository to make lessons learned more accessible across the Department.
2. **Gain greater awareness of various experimentation events and exercises by standardizing technical reporting procedures** to ensure all relevant parties receive centralized technical reports as needed.

Justification:

Military experimentation with new systems occurs regularly in domestic and foreign locations within all CCMDs. Experimentation events may be independent or occur during named exercises, which may or may not include allies and partners. While detailed technical AARs are typically generated and forwarded to users in different operational and administrative chains of command or service innovation labs, the reports often do not reach DIU, program managers, and senior leaders responsible for resourcing. This information asymmetry may contribute to poor resourcing decisions based on an incomplete understanding of system performance. Shortening the communication chain between the operator on the ground and program managers increases mutual awareness.[121]

The Joint Lessons Learned Program's (JLLP) five-phase process of discovery, validation, resolution, evaluation, and dissemination (as an ongoing activity) allows DIU to assess observations from operations, activities, exercises, experiments, and wargames as potential joint lessons learned.[122] Although larger AAR products are submitted to JLLIS, the reports often lack candid technical feedback regarding system performance. Additionally, most DIU personnel do not have JLLIS access credentials.

Risks and Challenges:

- **Workforce Strain:** DIU may lack the manpower/bandwidth to manage the technical AAR sub-repository under JLLIS adequately. This could be overcome by assigning responsibility to reserve personnel working for DIU.
- **Schedule Strain:** Incorporating AAR lessons learned into DIWG meetings will extend meeting length and complexity.
- **Mandating Compliance:** The repository is only useful if reports are submitted to it. Ensuring reporting from experimentation events is difficult, and adding a new reporting requirement for operators increases administrative burden.

Implementation Plan:

1. **Establish JLLIS technical AAR sub-repository.** Coordinate with JS J7 to gain permissions to manage jointly accessible sub-repository of technical AARs following technical evaluation and experimentation events.
2. **Assign management responsibility.** Divide responsibility within DIU by service, technology type, and/or CCMD to track the occurrence of experimentation events.
3. **Promulgate standardized DIU technical AAR template.** An example technical AAR template is included in Appendix Section 3.
4. **Establish connections.** Liaise with service and CCMD science advisors to facilitate technical AAR submissions into JLLIS.
5. **Revise DIWG charter.** Formalize the briefing of technical AAR lessons learned into regular DIWG meetings.
6. **Deploy DIU reserve workforce** to track the time, location, and objectives of experimentation events.

Recommendation 3:
Maintain a Dedicated Replicator Budget

Recommendation Summary: Adequate funding appropriated annually to DIU specifically for Replicator is critical to enabling the initiative. Funding reprogramming frustrates the services' plans and requires burdensome Congressional approval when exceeding the reporting threshold. Flexibility in this budget allows DIU to pursue emerging technologies with procurement contracts that best position the services to employ novel systems.

Recommendation Components:

1. **Leverage relationships with Congress to achieve a regularly dedicated budget of at least $500 million for Replicator**. This adapts to the current trend of year-to-year budgets and protects DIU in the case of a full-year continuing resolution (CR). This should complement other funding that already goes to Services in support of Replicator – not replace it.
2. **Work with Congress to increase Replicator budget flexibility** to enable DIU to rapidly shift funding based on system prioritization and anticipated timelines for system development and procurement. The budget should be colorless, or able to be used across various stages of acquisition, such as development, prototyping, and procurement.

Justification:

As discussed above, Replicator 1's budget of roughly $500 million came from a combination of congressionally appropriated funds and mid-cycle reprogrammed funding from the services.[123] However, it is doubtful DIU could repeat this process at scale. A standing budget would ameliorate this issue. Maintaining Replicator's current funding level of at least $500 million annually would allow DIU to fund the development and procurement of relatively small systems like UxS (in Replicator 1) and C-sUAS (in Replicator 2) on a limited scale.

A standing budget would also better enable DIU to connect solutions to users quickly while Congress maintains appropriate oversight. To be clear, $500 million is not enough for DIU to become the sole acquisition authority for small UxS, for example, or take the responsibility for scaled procurement, fielding, and DOTmLPF-P away from the services.

With a predictable and flexible budget, DIU would be able to better plan sustainment activities – something not as clearly articulated with Replicator 1 but nevertheless desirable for speeding up the time between fielding and operational useability.[124] In the future, if DIU works with a service and pays for the research and development of a system, for example, the service would be more motivated to plan for sustainment if DIU is working on a pre-determined priority of the service. A standing budget also better positions DIU if DOD adopts reforms that increase the importance of rapidly fielding systems incorporating commercial technology.[125]

Challenges and Risks:

- **Past Missteps:** Critics point to previous programs that utilized rapid funding and fielding mechanisms like OTA and MTA, such as the Integrated Visual Augmentation System, that have yet to prove successful.[126] Adding additional flexible funding may not solve these problems and could, in some cases, exacerbate it.[127]
- **Problems with POM Process:** A larger standing budget for DIU does not address POM-related efficiency issues.

Implementation Plan:

1. **Work with current DOD leadership** to align expectations for a standing Replicator budget. Convey the clear benefits of Replicator and how a standing budget will enable future acquisition wins for the warfighter.
2. **Work with Congressional partners** to integrate a standing Replicator budget beginning in FY2026. Meet with authorizer and appropriator staffs in both chambers to discuss the need for a standing budget in the FY2026 cycle.

Recommendation 4:
Spread Acquisitions and Technical Knowledge Across the Department

Recommendation Summary: The frequent turnover of personnel in acquisitions
roles across the services means that the level of knowledge and expertise wavers. Consistent, short-term temporary assignments of personnel to DIU for exposure to rapid acquisitions pathways, authorities, and methods would help spread awareness throughout the bureaucracy.

Recommendation Components:

1. **Work with current DOD leadership** to align expectations for a standing Replicator budget. Convey the clear benefits of Replicator and how a standing budget will enable future acquisition wins for the warfighter.
2. **Create technological resources** to help answer acquisition pathway questions. Partner with DAU to improve the DAU Assistant to help better navigate acquisition challenges.

Justification:

DIU did not have unique authorities to speed up its adoption efforts for Replicator. DIU's true advantage was institutional empowerment and a short chain of command, allowing it to move faster and secure mid-year reprogramming. However, program offices throughout the DOD that work on similar systems don't have the same access or knowledge base of rapid procurement authorities.

The Defense Acquisition University (DAU) is a DOD online resource that offers continued learning resources for career Acquisition Professionals.[128] DIU has previously helped DAU improve its materials and trainings on acquisitions pathways. DIU should leverage this previous work to help DAU continue improving its offerings. DAU currently runs a "DAU Assistant" chatbot that helps with acquisitions and training questions. DIU could enhance the chatbot model's effectiveness by making it more interactive and specific. For instance, granting it access to specific live contracts, where it could suggest alternative strategies or acquisition approaches, would render it a more useful tool than the current arrangement, which only offers general guidance. This could be paired with a limited live help desk that could aid acquisition professionals with more complicated challenges where the Assistant may not be capable.

Challenges and Risks:

- **Leadership Backing:** Without the additional leadership backing that DIU enjoyed, it may be difficult for other program offices to navigate the rapid procurement process and take advantage of funding flexibility in a way that steps outside the more cyclical POM process.
- **Time and Resource Drain:** Putting DIU at the center of the effort to navigate around the DOD's immense bureaucracy may be too large and complex of an administrative challenge for DIU. Coordinating a help desk may be outside DIU's scope, despite the value of its knowledge for the rest of DOD. Because DAU has already developed the initial version of the Assistant, they may be reluctant to change its purpose or integrate it further into higher-risk applications.

Implementation Plan:

1. **Codify and Distribute Lessons Learned.** Record specific technical acquisition knowledge and generate detailed directions with Replicator staff. Continue working with DAU to identify areas of improvement for trainings, chat bot, and live help desk.
2. **Implement Improved DAU Assistant** across DOD contracting entities as applicable and desired.

Recommendation 5:
Employ Automated and Shareable Budgeting Tools

Recommendation Summary: Since approval from Congressional appropriators may be required to reprogram funding above reporting thresholds, DIU should transparently share its budgeting plans with appropriators with software budgeting tools which are already widely used across the federal government. This would increase efficiency by reducing the quantity of briefings and explanations DIU must give to appropriators. The main alternative to reduce the burden of reporting to Congress is to simply grant more freedom to DOD in executing programs, but this is politically infeasible because it would wrest substantial control from the Congressional Professional Staff Members (PSMs) who ultimately write the budget. Improved or widely adopted automated budgeting tools could also help reduce the risk of duplicative contracts or other uncoordinated procurement actions across DOD.

Recommendation Components:

1. **Acquire automated budget management software and tools** for use internally and for budget requests to Congress. *This is already in process, as DIU recently announced three companies that moved into the prototyping phase of the acquisition of new, automated budgeting and project management software.*[129]
2. **Pilot and implement new budgeting tools across DOD.** This will provide OSD with greater insight into its budget and how appropriated funds are being spent. OSD could, in turn, give congressional partners access to the same tools to better inform budget appropriations and decision-making for the Department's portfolio.

Justification:

While it was recently announced that DIU is already in the process of implementing the first recommendation component, the second component is where DIU's larger value could be realized. Both Congressional partners and DOD professionals have expressed frustration with current budget communication requirements.

From the DOD's perspective, these requirements include meticulous advance notice on how the Department will spend appropriated funds over pre-determined periods, as well as frequent visits to Congress to brief members on DIU activities and spending. When employing automated budgeting tools, DOD should determine the right balance of information to share with Congress, ensuring that authorizers and appropriators are kept up to date on important aspects of spending to help justify current or future activities. However, oversharing may complicate the process. On the other hand, Congress desires transparency and accountability. With high-profile audit failures, the DOD has an opportunity to show the public it has a clear understanding of its finances.[130] Congressional leaders, even those supportive of increasing defense spending, want more transparency on DOD expenditures.[131]

Challenges and Risks:

- **Resource Drain:** Like coordinating acquisition knowledge across the DOD, helping implement wider budgetary software may consume a significant share of DIU's time and resources. To ameliorate this concern, DIU should clearly limit its engagement to updates related to its mission of connecting technology with DOD stakeholders.
- **Asymmetric Expectations:** Determining the ideal level of transparency is not simple. Providing too much internal budget information beyond what Congress needs may limit DOD flexibility and decision space around acquisitions. This tool should enable better determination of spending and allocations, but shouldn't overburden either party with further complications.

Implementation Plan:

1. **Down-select winning software** vendor for automated budgeting tool and finalize contract.
2. **Work across DIU and innovation ecosystem** to import all existing data and connect live sources of data where possible.
3. **Employ budget tool within DOD** to pilot accuracy and functionality. Measure utilization over pre-determined pilot timeline.
4. **Launch the finalized budgeting tool** and interface with a dedicated Congressional view and internal DOD-facing view.

Recommendation 6:
Reform the DICE (Defense Innovation Community of Entities)

Recommendation Summary: The DOD invests significant funding in organizations across the innovation ecosystem, from federally funded R&D centers to warfighting labs. However, the R&D performed in many of these centers is frequently distant from operational needs, priorities across the ecosystem are opaque, and significant duplication persists. While some duplicative efforts can be helpful for the defense industrial base's resilience, better aligning innovation pipelines would enable more efficient resource use, give the DOD better purchasing leverage, and bridge more valleys of death for future critical emerging technologies.

Recommendation Components (ROLL):

1. **Reform the Defense Innovation Community of Entities (DICE):** DIU should work to consolidate the community of entities where possible and institute a phased reform plan tied to specific deadlines. This requires DepSecDef support to recommend points of consolidation and reduce duplication.
2. **Oversee Activities Empowered Through Software:** Leverage DIU's strength in commercial software acquisition as an engine to power its review and assessment of DICE. Require mapping of each entity's spending and efforts within the new software tool and set clear deadlines for when the DIU will present its findings to the DepSecDef during a future DISG. Deconflict and prioritize using the DIWG.
3. **Link Operational Needs to Innovation Ecosystem:** With better visibility of activities across the DICE, DIU should link relevant projects in service-housed labs with warfighter-derived requirements. The ideal end-state is knowledge going both ways: warfighters informing research and needs and new breakthroughs in labs creating new opportunities for warfighters. Not 100 percent of DIU-enabled systems can be commercially derived; some require unique or exquisite defense innovations.
4. **Leverage talent rotation through the community:** DIU should work with partner organizations to create talent rotation programs to offer additional incentives to join DOD. DIU should also offer continued learning opportunities to existing government employees to incentive them to stay.

Justification:

1. **Reform the Defense Innovation Community of Entities (DICE):** DIU has been given the challenging order to work with entities across DICE to deconflict duplicative efforts and better allocate funding. However, DIU has only started with 15 entities and has struggled to unify intent across the diverse set of entities.[132] While DIU may not be the final arbiter of decisions made throughout the entire Innovation Ecosystem, it is empowered to inform the decisions of the DepSecDef. It should take advantage of its position and capability to apply cutting-edge technology solutions to these existing problems.
2. **Oversee Activities Empowered Through Software:** Thus far, DIU has approached the communications and programmatic elements of this problem by providing a structure to foster better understanding across DICE. While DICE has expressed a desire to use software solutions to help with its programmatic alignment, it has not been the driving force behind its efforts. This recommendation proposes a heavier-handed and more far-reaching approach enabled by software. Additionally, the inclusion of only 15 prioritized entities limits the reach of the effort and will not have the desired impact across the wider innovation ecosystem needed for substantial outcomes.
3. **Link Operational Needs to Innovation Ecosystem:** The innovation ecosystem is strongest when it is integrated. In its current, siloed form, DOD has faced challenges in utilizing homegrown solutions, either due to poor management, lack of full site-picture awareness, failure to understand warfighter needs or extant innovative solutions, and poor prioritization. A software solution can help fix this by providing awareness that allows DIU to identify prototypes or demonstrated technical capabilities in other innovation organizations that could soon meet requirements. DIU can perform its duties better if it finds solutions that have either been adapted from commercial use or were already developed in-house and are ready for military application. Ensuring a reliable and enduring pipeline between the innovation community and the warfighter will help DOD develop and employ the most advanced technology possible at the scale and speed necessary.
4. **Leverage talent rotation through the community:** Some of the warfighting and innovation labs offer incredible opportunities to understand the defense innovation space and learn from new perspectives. It is in the best interests of both the Department and DIU to find, maintain, and grow the best talent possible to develop technology and carry out its implementation. Currently,

talent acquisition is far too inflexible, and the government continues to lose the battle over talent to private-sector salaries. While the government may not always be able to compensate at the same level, other incentives drive individuals who seek government-related work, and capitalizing on those motivations, such as with unique opportunities and exposure in a rotational program, could help the government compete for talent.[133]

Challenges and Risks:

- **Ongoing Challenge:** While it has made some progress, DIU has struggled with its efforts to streamline the DICE due to the scale and complexity of the challenge. A new, software-defined approach could alleviate some of the burden on DIU to justify unpopular choices within the Innovation Community by creating a new authoritative source of truth it can leverage.
- **Compliance and Enforcement:** DIU has been charged with overseeing the DICE, but suggesting large-scale changes could come with significant internal challenges and political hurdles. DIU will need to win the support of the new DepSecDef and leverage their backing to enforce and codify changes. As mentioned, DIU should leverage the current environment, as the new administration may particularly favor consolidating duplicative lines of effort.

Implementation Plan:

1. **Meet with leadership** to come to an agreed-upon way forward on DICE Reform plans.
2. **Launch new initiative at next DIWG** and give entities initial direction to index current activities and update data repositories as instructed.
3. **Onboard new software** and import updated data from entities to begin process of assessing duplications of effort, overlapping AORs, or areas of further integration with operational needs.
4. **Propose a new map of the community of entities** after assessing what areas are best for consolidation, alteration, or elimination.
5. **Work to begin talent rotation** at a handful of entities, such as DIU, DARPA, service labs, etc. Finalize budget and schedule. Release applications and create pathways on the back end for full-time employment opportunities where possible.

8. Conclusion

Replicator's success: Overall, the Replicator Initiative successfully accelerated the acquisition of technologies vital for the U.S. military to maintain a competitive advantage in the Indo-Pacific and beyond. With persistent senior leader direction, Replicator pressurized OSD, the Joint Staff, the services, and private industry to move faster to develop, scale, procure, and field new systems. This pressure, paired with greater risk tolerance, stimulated doctrinal, policy, and concept of operations changes to employ new systems quickly. After initial resistance, the services realized tangible benefits as the timeline for the acquisition of technologies under existing programs shifted years earlier than originally planned. Through the DISG and DIWG governance structure, DIU established a robust process framework to overcome bureaucratic obstacles and identify cross-service redundancies and inefficiencies. Replicator has also had positive effects on private industry. Vendors with innovative technologies improved manufacturing and scaling capabilities, and the strong demand signal for unmanned systems has contributed to industry growth. Replicator has also helped diversify the defense industrial sector by awarding contracts to smaller, nontraditional vendors and helping them overcome contractual valleys of death that plague defense tech startups.

Replicator's Limitations: However, Replicator is certainly not a cure-all for defense acquisitions inadequacies. While the fielding of tens of thousands of ADA2 systems within 24 months would be a meaningful accomplishment for both domestic industry and the DOD, quantitative production figures remain significantly lower than those of the PRC. Quantitative disadvantage is overcome by quality. Sustained, reliable demand, backed up with larger financial investments, will be essential to maintain a competitive edge. While important, rapid procurement is just one piece of a much larger puzzle since fielding new technologies requires painstaking planning by the Services that are responsible for operating them. Regardless of the speed with which new technologies are acquired, corresponding DOTmLPF-P changes will remain the most laborious bureaucratic hurdle limiting the employment of new technologies.

Internal Resistance and Supportability: Without a sufficient dedicated budget, Replicator is destined to fail or fade away. Reprogramming services' appropriated funding originally marked for other programs puts services on the defensive

and increases internal resistance against Replicator or any other future rapid acquisitions initiative. Such resistance was overcome with service engagement and strategic selection of systems that aided service programs already underway, but reprogramming funding is not a sustainable tactic for success. By nature of DIU's positioning within the DOD, the approach of Replicator is top-down, with senior leaders directing the prioritization of effort towards its accomplishment. In an organization with rampant personnel turnover and shifting priorities, the DOD must rely on trusted processes to continue progress. Agnostic to senior leader priorities and personality, Replicator's long-term sustainability depends on the continuance of the DISG/DIWG framework or a similar process.

An Uncertain Future: In the shorter term, the recommendations provided intend to promote Replicator's sustainability as DIU continues to function as a change agent within the department. The successful bureaucratic inertia generated from Replicator 1 has been sufficient to enable a second iteration with Replicator 2, but the threat it addresses and definitions of success are more difficult and complex. DIU must remain focused on candidly messaging Replicator's successes and limitations as it adjusts to the priorities of a new administration. The lack of FY2025 appropriated funding may complicate Replicator 2's execution, likely extending its timeline and risking the loss of any positive momentum gained from Replicator 1.

Healthy Pressure: Accelerating DOD's ability to operationally employ cutting-edge technologies requires both robust partnerships with industry and coordinated action among an expansive collection of stakeholders within the department. Directed by senior DOD leadership, Replicator's principal virtue is the pressure it imposes on the bureaucracy to move faster. Coupled with adequate seed funding to fast-track innovative service-led programs, Replicator can remain a positive instrument of change to ensure an enduring U.S. military competitive advantage.

Areas for Further Research

Since this study was completed while Replicator 1 was still underway, further research should examine the degree to which the services transition fielded systems from initial to full operational capability to form a more comprehensive assessment of Replicator's lasting benefit. Additional study should evaluate the program's tangible effects on the domestic industrial base, as access to specific quantitative data related to contracts, investments, and quantities remains classified and non-public. More research should also address the complexities of data storage and management, since this plays a critical role and limitation in integrating AI within UxS for collaborative autonomy, automated target recognition, and tactical decision-making. Research rigor should also be applied toward assessing if and how the DOD can leverage lessons learned from Replicator and apply them to larger, more expensive defense platforms to accelerate acquisition timelines. All of this can be supplemented by analysis of whatever proposed changes related to OTA caps, PEO authorities, JROC structure, budget reporting, commercial acquisition thresholds, and other procurement reforms from the FoRGED and SPEED Acts are actually passed in the FY26 NDAA. Finally, research at the classified level should continue to inform both the deterrence value of UxS and how UxS can be effectively integrated into existing operational and contingency plans.

Appendix

Section 1: Acronyms and Key Terms

List of Acronyms

A&S	Acquisitions and Sustainment
AAR	After-Action Report
ADA2	All-Domain Attritable Autonomous
AFWERX	Air Force Research Laboratory
AI	Artificial Intelligence
ATR	Above Threshold Reporting
BLOS	Beyond-Line-of-Sight
BPLAN	Base Plan
C2	Command and Control
CCMD	Combatant Command
CDAO	Chief Digital and Artificial Intelligence Office
CONOPS	Concept of Operations
CONPLAN	Contingency Plan
COTS	Commercial-off-the-shelf
CR	Continuing Resolution

CSO	Commercial Solutions Opening
C-sUAS	Counter-Small Unmanned Aerial System
DARPA	Defense Advanced Research Projects Agency
DAU	Defense Acquisition University
DepSecDef	Deputy Secretary of Defense
DFARS	Defense Federal Acquisition Regulation Supplement
DICE	Defense Innovation Community of Entitles
DISG	Deputy's Innovation Steering Group
DIU	Defense Innovation Unit
DIWG	Defense Innovation Working Group
DMAG	Deputy's Management Action Group
DOD	Department of Defense
DOTmLPF-P	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy
ETV	Enterprise Test Vehicle
EW	Electronic Warfare
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulation
FY	Fiscal Year

GPS	Global Positioning System
HAC	House Committee on Appropriations
HASC	House Armed Services Committee
INDOPACOM	Indo-Pacific Command
JADC2	Joint All-Domain Command and Control
JCIDS	Joint Capabilities Integration and Development System
JCS	Joint Chiefs of Staff
JLLIS	Joint Lessons Learned Information System
JLLP	Joint Lessons Learned Program
JRAC	Joint Rapid Acquisition Cell
JROC	Joint Requirements Oversight Council
JS	Joint Staff
JTF	Joint Task Force
MOS	Military Occupational Specialty
MTA	Middle Tier of Acquisition
NDAA	National Defense Authorization Act
NDS	National Defense Strategy
NSIC	National Security Innovation Capital
NSIN	National Security Innovation Network

O&M	Operations and Maintenance
OMB	Office of Management and Budget
OPLAN	Operational Plan
OSD	Office of the Secretary of Defense
OSD-C	Office of the Secretary of Defense – Comptroller
OT	Other Transaction
OTA	Other Transaction Authority
OUSD(R&E)	Office of the Under Secretary of Defense for Research and Engineering
PDW	Performance Drone Works
PEO	Program Executive Office
PO	Program Offices
POM	Program Objective Memorandum
POR	Program of Record
PPBE	Planning, Programming, Budgeting, and Execution
PRC	People's Republic of China
PRIME	Production-Ready, Inexpensive, Maritime Expeditionary
PSM	Professional Staff Member
RAA	Rapid Acquisition Authority

R&D	Research and Development
RDER	Rapid Defense Experimentation Reserve
RTD&E	Research, Testing, Development, and Evaluation
SAC	Senate Committee on Appropriations
SASC	Senate Armed Services Committee
SecDef	Secretary of Defense
SCO	Strategic Capabilities Office
SYSCOM	Systems Command
T&E	Test and Evaluation
TF	Task Force
TRL	Technology Readiness Level
UAS	Unmanned Aerial System
USA	United States Army
USAF	United States Air Force
USMC	United States Marine Corps
USN	United States Navy
USV	Unmanned Surface Vehicle
UxS	All-domain Unmanned Systems
VCJCS	Vice Chairman of the Joint Chiefs of Staff

Key Terms

Key Term	Definition
Acquisition	The conceptualization, initiation, design, development, test, contracting, production, deployment, logistics support, modification, and disposal of weapons and other systems, supplies, or services (including construction) to satisfy DoD needs, intended for use in or in support of military missions.
AI and Trusted Autonomy	DOD Definition for AI & Trust Autonomy: Artificial Intelligence (AI) is the software engineering discipline of expanding capabilities of software applications to perform tasks that currently require human intelligence. Machine learning is an engineering subfield of AI that trains software models using example data, simulations, or real-world experiences rather than by direct programming or coding. Autonomy is the engineering discipline that expands robots' abilities to perform tasks while limiting the need for human interaction. AI holds tremendous promise to improve the ability and function of nearly all systems and operations. Trusted AI with trusted autonomous systems is imperative to dominate future conflicts. As AI, machine learning, and autonomous operations continue to mature, the DOD will focus on evidence-based AI-assurance and enabling operational effectiveness.
Defense Innovation	The processes of generating, fielding, and scaling technologies and other products, services, processes, or practices that are new or improved in the military context.
Defense Innovation Organization	DOD organizations that were created to help the U.S. military pursue innovative ways to sustain and advance the force capabilities, prototype and field emerging commercial technologies, and build connectivity with the commercial, dual-use sector.
Defense Innovation Ecosystem	The DOD organizations, activities, pilot programs, functions, processes, hubs, and initiatives that aim to develop, produce, and field new or improved technologies (including purely military, dual-use, or commercial) for military use.
Procurement	The process of acquiring goods, services, and works, including construction from non-federal sources using appropriated funds, encompassing the entire acquisition lifecycle from needs identification to contract closure.
Scaling	Successfully transitioning a small UAS technology to a PM/PEO, operational unit, or other funding mechanism that leads to production, fielding, operations, and maintenance.
Small Unmanned Aerial System	For this report, a small UAS is defined as non-lethal, unmanned aircraft system that weighs less than 55 pounds (FAA Regulation weight and DOD weight group 1 and 2).
Transition	A shift in responsibility or ownership of the technology product or system to a PM/PEO, program of record (POR), or an operational unit for production, fielding, operations, maintenance, and/or support activities.
Unmanned Aerial System	DOD defines UAS as powered aircraft that do not carry a human operator, use aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload.
Unmanned Surface System	DOD defines USV as boats or ships that operate in the surface of the water without a crew, and the equipment necessary for their safe and efficient operation.
Valley of Death	Waiting period/gap between when a vendor transitions a prototype or commercially available product to a DOD contract, typically one to two years.

Section 2: Interviews

Methodology

To encourage candor, interviewees' responses were not attributed. Interviews assumed a semi-structured format. A standardized set of questions tailored to the interviewees' organization was used, but follow-on questions and discussions frequently deviated from the standardized question set depending on the experience and expertise of the interviewee.

The interviews were conducted in-person, via video teleconference, or by phone call. While most interview subjects are DOD experts from OSD, DIU, and the services, Congressional staffers, private industry representatives, and academic professionals were also interviewed to provide a comprehensive picture of Replicator and the broader context.

Disclaimer for government employees: The views expressed by interviewees are personal and do not reflect the Department of Defense or any other governmental agency.

Limitations

While this study captures and refers to the personal opinions and thoughts of many significant contributors to Replicator, we would have appreciated the opportunity to speak with more rank-and-file members of the Services. We also would have loved to hear from individuals who may have been part of companies or teams that did not win DIU contracts to learn more about their impressions of the contracting and feedback process. It also would have been helpful to better understand possible opportunities to direct them toward other DOD organizations.

Interview List

T.S. Allen

Replicator Strategy and Policy Lead, DIU

Doug Beck

Former Director, DIU

Col. George Buch, USAF

Deputy Military Director, Secretary of the Air Force Studies and Analysis

Trevor Burns

Replicator Initiative Director, DIU

Shaun Collins

Innovation Officer, Joint Staff J-8

John DeMello

Former Enhanced Space Capabilities Materiel Leader, Department of the Air Force Rapid Capabilities Office

Christopher Diaz

Former Chief of Staff to Secretary of the Navy

Nathan Diller

Aerospace and Defense Chief Strategy Officer, Divergent Technologies Inc.

Dorothy Engelhardt

Director for Unmanned Systems, Deputy Assistant Secretary of the Navy (Research, Development, and Acquisition)

Holli Foster

Chief Technology Officer, CTF 59

Abigail Grace

Professional Staff Member, Senate Appropriations Committee Defense Subcommittee

William C. Greenwalt

Senior Fellow, American Enterprise Institute

Ryan Holte

Former Program Manager, United States Air Force

Michael Horowitz

Former Assistant Sectary of Defense for Force Development and Emerging Capabilities

Church Hutton

Senior Vice President of Government Relations, Marketing and Communications, AeroVironment, Inc.

Sunmin Kim

Chief of Policy, DIU

Aditi Kumar

Former Deputy Director, DIU

Scott Lacy

Deputy Director, Marine Corps Warfighting Laboratory

Bill Lear

Principal Technologist, USINDOPACOM

Michael Lebrun

Director of Strategy and Plans, Assistant Secretary of the Army for Acquisition, Logistics, and Technology

Eric Lofgren

Professional Staff Member, Senate Armed Service Committee, Readiness and Management Support and Seapower Subcommittees

Matthew MacGregor

Senior Director, Strategic Growth Anduril Industries

Dave Michelson

Director of Autonomy Portfolio, DIU

Sean Roark

All-Domain Attritable Autonomous System Integration Officer, DIU

Eric Rosenbach

Former Chief of Staff, Secretary of Defense

Bethan Saunders

Military Legislative Assistant, U.S. Senate

Joy Shanaberger

Former Senior Advisor for Innovation, Deputy Secretary of Defense

Maj. Gen. Edward Vaughn, USAF

Executive Director, Joint Rapid Acquisition Cell, Office of the Assistant Secretary of Defense for Acquisition

Section 3: Technical AAR Template

The below technical AAR template corresponds with Recommendation #2: Streamline Technical Feedback Loops

DEFENSE INNOVATION UNIT

Technical After-Action Report

Event:	**Operator Feedback:** • Overall Assessment • How did the system(s) perform? • List of technical successes • List of technical failures
Date:	
Location:	
Unit and Point of Contact:	**Additional Comments:** • Were all objectives accomplished? Why or Why not? • What are the next experimentation steps?
Equipment Evaluated: • List of all systems tested and evaluated to include vendor	

Upload to JLLIS DIU technical AAR repository at <NIPR/SIPR URL> when complete

DEFENSE INNOVATION UNIT

Technical After-Action Report

Insert Pictures here

Upload to JLLIS DIU technical AAR repository at <NIPR/SIPR URL> when complete

Section 4: Bibliography

"Acquisition Policy." CRS Report, July 30, 2024. https://crsreports.congress.gov/product/pdf/IN/IN12397.

Albon, Courtney. "Pentagon Chief Technologist Argues Case for Rapid Experimentation Fund." *Defense News*, August 8, 2024. https://www.defensenews.com/pentagon/2024/08/08/pentagon-chief-technologist-argues-case-for-rapid-experimentation-fund/.

Bacon, Don. "Enough Talking about Defense Innovation. It's Time to Make Choices and Move out." *Breaking Defense. February*, 2025. https://breakingdefense.com/2025/02/rep-bacon-enough-talking-about-defense-innovation-its-time-to-make-choices-and-move-out/.

Beck, Douglas A. "'DIU 3.0': Scaling Defense Innovation for Strategic Impact." Center for a New American Security, February 2024. https://www.cnas.org/publications/reports/diu-3-0.

Berg, Matt. "'Disorganized and Confusing': Lawmakers, Industry Rip Pentagon Plans for Drones." *Politico*, December 18, 2023. https://www.politico.com/news/2023/12/17/pentagon-drones-replicator-program-funding-00132092.

Biesecker, Cal. "Hundreds Of Switchblades Delivered So Far In First Replicator Tranche, DIU Official Says." *Defense Daily*, August 28, 2025. https://www.defensedaily.com/hundreds-of-switchblades-delivered-so-far-in-first-replicator-tranche-diu-official-says/advanced-transformational-technology/.

Bloomberg, Michael R., David H. Berger, Kristen Bartok Touw, Yisroel Brumer, Nathan Diller, Matt George, and Clint Hinote. "Strategic Edge: A Blueprint for Breakthroughs in Defense Innovation," January 13, 2025. https://www.mikebloomberg.com/news/strategic-edge-a-blueprint-for-breakthroughs-in-defense-innovation/.

"Blue UAS Clear List." *As Of*, January 18, 2024. https://web.archive.org/web/20240118160818/https://www.diu.mil/blue-uas-cleared-list.

"Blue UAS Cleared List," November 2024. https://web.archive.org/web/20241110203731/https://www.diu.mil/blue-uas-cleared-list.

Bondar, Kateryna. "Closing the Loop: Enhancing U.S. Drone Capabilities through Real-World Testing." *Center for Strategic and International Studies* (blog), August 21, 2024. https://www.csis.org/analysis/closing-loop-enhancing-us-drone-capabilities-through-real-world-testing.

Cantin, John M. "Ukrainian Unmanned Aerial System Tactics." *U.S. Army Training and Doctrine Command* (blog), October 8, 2024. https://oe.tradoc.army.mil/2024/10/08/ukrainian-unmanned-aerial-system-tactics/.

"CJCSI 3150.25H: JOINT LESSONS LEARNED PROGRAM." Joint Chiefs of Staff, December 30, 2021. https://www.jcs.mil/Portals/36/Documents/Doctrine/jlld/cjcsi3150_25h.pdf.

"CJCSI 5123.01I CHARTER OF THE JOINT REQUIREMENTS OVERSIGHT COUNCIL AND IMPLEMENTATION OF THE JOINT CAPABILITIES INTEGRATION AND DEVELOPMENT SYSTEM." Joint Chiefs of Staff, October 30, 2021. https://www.jcs.mil/Portals/36/Documents/Library/Instructions/CJCSI%205123.01I.pdf.

Clark, Bryan. *Winning the Fight for Sensing and Sensemaking: Fielding Cyber and Electronic Warfare Capabilities at Scale*. Hudson Institute, 2024. https://www.hudson.org/national-security-defense/winning-fight-sensing-sensemaking-fielding-cyber-electronic-warfare-c5isr-bryan-clark.

Clark, Bryan, and Dan Patt. "The Pentagon Must Build Weapons Differently to Mobilize for the Information Age." *Breaking Defense*, December 11, 2024. https://breakingdefense.com/2024/12/the-pentagon-must-build-weapons-differently-to-mobilize-for-the-information-age/.

———. "The Value of Experimentation, Not Demonstration." Hudson Institute, November 30, 2024. https://www.hudson.org/defense-strategy/value-experimentation-not-demonstration-dan-patt-bryan-clark.

Clark, Joseph. "DOD Innovation Official Discusses Progress on Replicator." *U.S. Department of Defense News*, 2024. https://www.defense.gov/News/News-Stories/Article/Article/3999474/DOD-innovation-official-discusses-progress-on-replicator/.

Daniels, Seamus P. "Dept. of Defense Faces Shutdown Amid Continuing Resolution Uncertainty." *Center for Strategic and International Studies* (blog), March 13, 2025. https://www.csis.org/analysis/dept-defense-faces-shutdown-amid-continuing-resolution-uncertainty.

Defense Acquisition University. "Contracting by Negotiation (FAR Part 15)," n.d. https://aaf.dau.edu/aaf/contracting-cone/far-15/.

Defense Acquisition University. "Joint Requirements Oversight Council (JROC)," n.d. https://www.dau.edu/acquipedia-article/joint-requirements-oversight-council-jroc.

Defense Acquisition University. “Leadership / Organization,” n.d. https://www.dau.edu/about/mission-organization.

Defense Acquisition University. “MTA Statutes & Policy,” N.d. https://aaf.dau.edu/aaf/mta/policy/.

“Defense Acquisitions: DOD’s Use of Other Transactions for Prototype Projects Has Increased.” Government Accountability Office, November 22, 2019. https://www.gao.gov/products/gao-20-84.

“Defense Budget Overview: United States Department of Defense Fiscal Year 2025 Budget Request.” Washington, D.C: Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, April 4, 2024. https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2025/FY2025_Budget_Request_Overview_Book.pdf.

Defense, Deputy Secretary. “Charter for the Deputy’s Innovation Steering Group.” Washington, D.C, 2023.

Defense Innovation Unit. “Autonomous Maritime Domain Capabilities Awarded in Support of Replicator Initiative,” August 12, 2024. https://www.diu.mil/latest/autonomous-maritime-domain-capabilities-awarded-in-support-of-replicator.

“Defense Innovation Unit,” n.d. https://www.diu.mil/.

Defense Innovation Unit. “DIU Awards Three Contracts To Streamline DIU’s Budget Execution and Project Management,” March 18, 2025. https://www.diu.mil/latest/diu-awards-three-contracts-to-streamline-dius-project-management.

Defense Innovation Unit. “Four Companies Selected To Support the U.S. Air Force and Defense Innovation Unit’s Enterprise Test Vehicle (ETV) Project,” June 3, 2024. https://www.diu.mil/latest/four-companies-selected-to-support-the-u-s-air-force-and-defense-innovation.

Defense Innovation Unit. “Replicator,” n.d. https://www.diu.mil/replicator.

“Defense Innovation Unit: Actions Needed to Assess Progress and Further Enhance Collaboration.” Government Accountability Office, February 27, 2025. https://www.gao.gov/products/gao-25-106856.

“Defense Primer: DOD Transfer and Reprogramming Authorities.” Legislation. Accessed April 5, 2025. https://www.congress.gov/crs-product/IF11243.

“Defense Resourcing for the Future: Final Report.” Commission on Planning, Programming, Budgeting and Execution Reform, March 6, 2024. https://ppbereform.senate.gov/finalreport/.

Defense, U.S. Department. “Deputy Secretary of Defense Hicks Announces First Tranche of Replicator Capabilities Focused on All Domain Attritable Autonomous Systems.” Washington, D.C, 2024. https://www.defense.gov/News/Releases/Release/Article/3765644/deputy-secretary-of-defense-hicks-announces-first-tranche-of-replicator-capabil/.

———. “Director Operational Test and Evaluation.” *N.d,”*, 2024. https://www.dote.osd.mil/Portals/97/pub/reports/FY2024/army/2024ivas.pdf?ver=5Pd1U9EeyWJ0MIXAVaFeqg%3d%3d.

———. “Memorandum: Realignment and Management of the Defense Innovation Unit.” Washington, D.C, 2023. https://media.defense.gov/2023/Apr/04/2003192904/-1/-1/1/REALIGNMENT-AND-MANAGEMENT-OF-THE-DEFENSE-INNOVATION-UNIT.PDF.

———. “Remarks by Deputy Secretary of Defense Kathleen H. Hicks at the Defense Innovation Board’s Public Meeting.” *U.S. Department of Defense News*, 2025. https://www.defense.gov/News/Speeches/Speech/Article/4028027/remarks-by-deputy-secretary-of-defense-kathleen-h-hicks-at-the-defense-innovati/.

———. “Summary of the Joint All-Domain Command & Control (JADC2) Strategy.” Washington, D.C, 2022. https://media.defense.gov/2022/Mar/17/2002958406/-1/-1/1/SUMMARY-OF-THE-JOINT-ALL-DOMAIN-COMMAND-AND-CONTROL-STRATEGY.pdf.

Department of Defense Appropriations Bill, 2025, Pub. L. No. S.4921, Report 118-204 (2024). https://www.congress.gov/118/crpt/srpt204/CRPT-118srpt204.pdf.

“DoDI 5000.81 Urgent Capability Acquisition 31 Dec 2019 | Www.Dau.Edu.” Accessed April 6, 2025. https://www.dau.edu/cop/pm/documents/dodi-500081-urgent-capability-acquisition-31-dec-2019.

“Fact Sheet: Department of Defense Strategy for Countering Unmanned Systems.” Washington, D.C: U.S. Department of Defense, December 5, 2024. https://www.defense.gov/News/Releases/Release/Article/3986597/dod-announces-strategy-for-countering-unmanned-systems/.

“FY2023 Annual Report.” May 2024. https://www.diu.mil/fy23.

Gallo, Marcy E. “Defense Primer: Under Secretary of Defense for Research and Engineering.” Congressional Research Service, November 15, 2024. https://www.congress.gov/crs-product/IF10834.

Gould, Joe. “Vice Chief Nominee Pledges to Drive Acquisition Reforms.” *Air Force Times*, 2021. https://www.airforcetimes.com/congress/2021/12/08/vice-chief-nominee-pledges-to-drive-acquisition-reforms/.

Greenwalt, Bill, and Dan Patt. “Required to Fail: Beyond Documents: Accelerating Joint Advantage through Direct Resourcing and Experimentation.” Hudson Institute, February 10, 2025. https://www.hudson.org/technology/required-fail-beyond-documents-accelerating-joint-advantage-through-direct-resourcing-dan-patt-william-greenwalt.

Harper, Jon. “DIU Confronting C2 Challenge for Counter-Drone Phase of Replicator.” *Defense Scoop*, December 12, 2024. https://defensescoop.com/2024/12/12/replicator-diu-confronting-command-control-challenge-counter-drone-phase/.

———. *OSD Moving to Corral the Military Services for JADC2*. Defense Scoop. September, 2022. https://defensescoop.com/2022/09/09/osd-moving-to-corral-the-military-services-for-jadc2/.

———. “Pentagon CTO Emil Michael becomes acting director of DIU.” Defense Scoop, August 26, 2025. https://defensescoop.com/2025/08/26/emil-michael-acting-director-diu/

———. “Pete Hegseth Narrowly Wins Confirmation to Be Trump’s Defense Secretary.” *Defense Scoop*, January 24, 2025. https://defensescoop.com/2025/01/24/pete-hegseth-defense-secretary-confirmation-vote-senate-donald-trump/.

Hitchens, Theresa. “Oversight or Overkill? DoD Faces New Congressional Order to Detail Mid-Tier Acquisitions.” *Breaking Defense*, February 6, 2023. https://breakingdefense.com/2023/02/oversight-or-overkill-DOD-faces-new-congressional-order-to-detail-mid-tier-acquisitions/.

House, U.S. Congress. “Committee on Armed Services, Subcommittee on Cyber, Innovative Technologies and Information Systems.” *Outside Perspectives on DOD’s Replicator Program*, 2023. https://democrats-armedservices.house.gov/hearings?ID=CAD4258B-C7CD-4CB3-B0C7-C85547178B13.

Hudson Institute. “Accelerating Replicator and Fielding Technologies for Today’s Fight,” December 12, 2024. https://www.hudson.org/events/accelerating-replicator-fielding-technologies-todays-fight-bryan-clark.

Iorio, Nick, and Scott DeWitt. “Overcoming Goliath: How the Defense Establishment Can Maximize Allied Innovation.” *War on the Rocks*, October 7, 2024. https://warontherocks.com/2024/10/overcoming-goliath-how-the-defense-establishment-can-maximize-allied-innovation/.

Lofgren, Eric. “Does DoD Not Actually Want Startups to Win Programs of Record?” *Acquisition Talk* (blog), August 9, 2022. https://acquisitiontalk.com/2022/08/does-dod-not-actually-want-startups-to-win-programs-of-record/.

———. “Programmed to Fail: The Rise of Central Planning in Defense Acquisition, 1945-1975.” *Self-Published*, October 14, 2019. https://acquisitiontalk.com/wp-content/uploads/2023/02/Lofgren_Programmed-to-Fail-DRAFT_2019.10.14.pdf.

Looijen, Benjamin. “Russia’s Fiber-Optic Drones Dodge Jamming, but Ukraine Hunts Them with Infrared and Sound.” *Euromaidan Press*, March 2, 2025. https://euromaidanpress.com/2025/02/03/russias-fiber-optic-drones-DODge-jamming-but-ukraine-hunts-them-with-infrared-and-sound/.

Luttwak, Edward N. *The Pentagon and the Art of War: The Question of Military Reform*. New York: Simon & Schuster, Inc, 1985.

Mansouri, Mo, Michael McGrath, Donald Schlomer, Dinesh Verma, and Philip S. Anton. “Report on Joint Capabilities Integration and Development System (JCIDS).” Stevens Institute of Technology, September 15, 2022. https://www.dmi-ida.org/knowledge-base-detail/Report-on-Joint-Capabilities-Integration-and-Development-System.

McCormick, Rhys, and Gregory Sanders. “Trends in Department of Defense Other Transaction Authority Usage.” Center for Strategic and International Studies, May 25, 2022. https://www.csis.org/analysis/trends-department-defense-other-transaction-authority-usage.

McGarry, Brendan W. “Defense Primer: DOD Transfer and Reprogramming Authorities.” CRS Report, 2024. https://sgp.fas.org/crs/natsec/IF11243.pdf.

McNamara, Whitney M., Peter Modigliani, Matthew MacGregor, and Eric Lofgren. “Commission on Defense Innovation Adoption: Final Report.” The Atlantic Council, January 16, 2024. https://www.atlanticcouncil.org/in-depth-research-reports/report/atlantic-council-commission-on-defense-innovation-adoption/.

McNamara, Whitney M., Peter Modigliani, and Tate Nurkin. “Commission on Software-Defined Warfare: Final Report.” Atlantic Council, March 2025. https://www.atlanticcouncil.org/wp-content/uploads/2025/03/Commission-on-Software-Defined-Warfare-Final-Report.pdf.

“Memorandum: Directing Modern Software Acquisition to Maximize Lethality.” Washington, D.C: U.S. Secretary of Defense, March 6, 2025. https://media.defense.gov/2025/Mar/07/2003662943/-1/-1/1/DIRECTING-MODERN-SOFTWARE-ACQUISITION-TO-MAXIMIZE-LETHALITY.PDF.

“Memorandum: Establishment of Joint Interagency Task Force 401.” Washington, D.C: U.S. Secretary of Defense, August 27, 2025. https://media.defense.gov/2025/Aug/28/2003790021/-1/-1/0/ESTABLISHMENT-OF-JOINT-INTERAGENCY-TASK-FORCE-401.PDF.

"Memorandum: Reforming the Joint Requirements Process to Accelerate Fielding of Warfighting Capabilities." Washington, D.C: U.S. Secretary of Defense, August 20, 2025. https://www.newspacenexus.org/wp-content/uploads/2025/08/SecDef-Memo-20-Aug-2025.pdf.

"Memorandum: Replicator 2 Direction and Execution." Washington, D.C: U.S. Secretary of Defense, September 27, 2024. https://media.defense.gov/2024/Sep/30/2003555473/-1/-1/0/REPLICATOR-2-MEMO-SD-SIGNED.PDF.

"National Defense Strategy of the United States of America." Washington, D.C.: U.S. Department of Defense, October 27, 2022. https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.pdf.

National Security Innovation Network. "DIU Presents: Defense Tech Accelerator Challenge," February 27, 2025. https://nsin.mil/events/2025-02-10-defense-tech-accelerator-challenge/.

Neenan, Alexandra G. "FY2025 NDAA: Department of Defense," 2024.

Newdick, Thomas. "Our First Look At An ALTIUS-600M Loitering Munition Detonating." *The War Zone*, April 3, 2023. https://www.twz.com/our-first-look-at-an-altius-600m-loitering-munition-detonating.

Nicastro, Luke A. "The U.S. Defense Industrial Base: Background and Issues for Congress." Congressional Research Service, September 23, 2024. https://www.congress.gov/crs-product/R47751.

Notes, Acquisition. "Defense Acquisition Life Cycle Objectives & Contributions with Tailoring," 2017. https://www.acqnotes.com/wp-content/uploads/2014/09/Defense-Acquisition-Wall-Chart-18-Apr-2017.pdf.

Obis, Anastasia. "DOD Dispelling Lingering Myths about OTAs." *Federal News Network* (blog), February 23, 2024. https://federalnewsnetwork.com/contracting/2024/02/DOD-dispelling-lingering-myths-about-otas/.

O'Connor, Michael. *Replicator: A Bold New Path for DOD*. Center for Security and Emerging Technology, 2023. https://cset.georgetown.edu/article/replicator-a-bold-new-path-for-DOD/.

"OT Huddle Takeaways on CSOs." Defense Acquisition University, March 2023. https://www.dau.edu/sites/default/files/2024-03/CSO%20Takeaways.pdf.

"Other Transactions Guide." Washington, D.C.: Office of the Under Secretary of Defense for Acquisition and Sustainment, July 2023. https://www.acq.osd.mil/asda/dpc/cp/policy/docs/guidebook/TAB%20A1%20-%20DOD%20OT%20Guide%20JUL%202023_final.pdf.

Pak, Wayne. "Ukraine's Rapid Innovation Cycle Is Changing the Future of War." *The Cipher Brief* (blog), April 14, 2024. https://www.thecipherbrief.com/column_article/ukraines-rapid-innovation-cycle-is-changing-the-future-of-war.

Patt, Dan, and Bryan Clark. *Unalone and Unafraid: A Plan for Integrating Uncrewed and Other Emerging Technologies into US Military Forces*. Hudson Institute, 2023. https://www.hudson.org/defense-strategy/unalone-unafraid-plan-integrating-uncrewed-other-emerging-technologies-us-military-bryan-clark-dan-patt.

Patt, Dan, and William Greenwalt. "Competing in Time: Ensuring Capability Advantage and Mission Success through Adaptable Resource Allocation." Hudson Institute, February 25, 2021. https://www.hudson.org/national-security-defense/competing-in-time-ensuring-capability-advantage-and-mission-success-through-adaptable-resource-allocation.

Peters, Heidi M. "Defense Acquisitions: How DOD Acquires Weapon Systems and Recent Efforts to Reform the Process." Congressional Research Service, May 23, 2014. https://crsreports.congress.gov/product/pdf/RL/RL34026.

"Prepared Remarks by Douglas A. Beck, Director, Defense Innovation Unit, On Outpacing China: Expediting Innovation to the Warfighter." U.S. House Armed Services Committee, February 15, 2024. https://www.congress.gov/118/meeting/house/116887/witnesses/HHRG-118-AS00-Wstate-BeckD-20240215.pdf.

Probasco, Emilia. "The Future of Drones in Ukraine: A Report from the DIU-Brave1 Warsaw Conference." *Center for Security and Emerging Technology* (blog), November 13, 2023. https://cset.georgetown.edu/article/the-future-of-drones-in-ukraine-a-report-from-the-diu-brave1-warsaw-conference/.

"Production-Ready, Inexpensive, Maritime Expeditionary (PRIME) Small Unmanned Surface Vehicle (sUSV) and Collaborative Intercept Capability." *sUAS News*, 2024. https://www.suasnews.com/2024/01/production-ready-inexpensive-maritime-expeditionary-prime-small-unmanned-surface-vehicle-susv-and-collaborative-intercept-capability/.

Rep. Ken Calvert. "REP. CALVERT: DEFENSE DEPARTMENT'S FAILED AUDIT UNDERMINES OUR COMMITMENT TO TAXPAYERS," December 2, 2024. https://calvert.house.gov/media/press-releases/rep-calvert-defense-departments-failed-audit-undermines-our-commitment.

Robertson, Noah. "Pentagon Announces New Batch of Drones for Replicator Program." *Marine Corps Times*, November 13, 2024. https://www.marinecorpstimes.com/unmanned/2024/11/13/pentagon-announces-new-batch-of-drones-for-replicator-program/.

Roque, Ashley. "Last Stand for IVAS? New Challenges, Delays as Army Debates Future of Augmented Reality Goggles." *Breaking Defense*, May 10, 2023. https://breakingdefense.com/2023/05/last-stand-for-ivas-new-challenges-delays-as-army-debates-future-of-augmented-reality-goggles/.

———. "Pentagon Fails 7th Audit in a Row, Eyes Passing Grade by 2028." *Breaking Defense*, November 16, 2024. https://breakingdefense.com/2024/11/pentagon-fails-7th-audit-in-a-row-eyes-passing-grade-by-2028/.

Rosenbach, Eric, Ethan Lee, and Bethany Russell. "The Autonomous Arsenal in Defense of Taiwan: Technology, Law, and Policy of the Replicator Initiative." Belfer Center for Science and International Affairs, February 3, 2025. https://www.belfercenter.org/replicator-autonomous-weapons-taiwan.

Sankar, Shyam. "The Defense Reformation," October 31, 2024. https://www.18theses.com.

"Scaling Nontraditional Defense Innovation." Washington, D.C.: Defense Innovation Board, January 8, 2025. https://innovation.defense.gov/Portals/63/DIB%20Scaling%20Nontraditional%20Defense%20Innovation%20250113%20PUBLISHED.pdf.

Schwartz, Moshe, and Heidi M. Peters. "Department of Defense Use of Other Transaction Authority: Background, Analysis, and Issues for Congress." Congressional Research Service, February 22, 2019. https://sgp.fas.org/crs/natsec/R45521.pdf.

Somerville, Heather, and Brent Forrest. "How American Drones Failed to Turn the Tide in Ukraine." *Wall Street Journal*, April 10, 2024. https://www.wsj.com/world/how-american-drones-failed-to-turn-the-tide-in-ukraine-b0ebbac3.

"Statement of Dr. Eric Schmidt," April 17, 2018. https://docs.house.gov/meetings/AS/AS00/20180417/108132/HHRG-115-AS00-Wstate-SchmidtE-20180417.pdf.

Stewart, Jennifer. "Keeping Pace with the Drone Threat." *National Defense Magazine. December*, 2024. https://www.nationaldefensemagazine.org/articles/2024/12/5/keeping-pace-with-the-drone-threat.

"Technology Readiness Assessment Guide: Best Practices for Evaluating the Readiness of Technology for Use in Acquisition Programs and Projects." Government Accountability Office, January 7, 2020. https://www.gao.gov/products/gao-20-48g.

U.S. Army. "The U.S. Army Selects Vendors for the Company Level Small Uncrewed Aircraft System Directed Requirement for Brigade Combat Teams." September 11, 2024. https://www.army.mil/article/279603/the_u_s_army_selects_vendors_for_the_company_level_small_uncrewed_aircraft_system_directed_requirement_for_brigade_combat_teams.

U.S. Department of Defense News. "Deputy Secretary of Defense Dr. Kathleen Hicks Holds a Press Briefing to Discuss the State of A.I. in the Department of Defense." November 2, 2023. https://www.defense.gov/News/Transcripts/Transcript/Article/3578177/deputy-secretary-of-defense-dr-kathleen-hicks-holds-a-press-briefing-to-discuss/.

U.S. Department of Defense News. "Deputy Secretary of Defense Kathleen Hicks Announces Additional Replicator All-Domain Attritable Autonomous Capabilities." November 13, 2024. https://www.defense.gov/News/Releases/Release/Article/3963289/deputy-secretary-of-defense-kathleen-hicks-announces-additional-replicator-all/.

U.S. Department of Defense News. "Keynote Address by Deputy Secretary of Defense Kathleen H. Hicks: 'Structuring Change to Last' (As Delivered)." August 7, 2024. https://www.defense.gov/News/Speeches/Speech/Article/3864270/keynote-address-by-deputy-secretary-of-defense-kathleen-h-hicks-structuring-cha/.

Vincent, Brandi. "DOD Opens New Innovation OnRamp Hubs across 5 States." *DefenseScoop*, January 25, 2024. https://defensescoop.com/2024/01/25/nsin-defense-innovation-onramp-hubs-diu-5-states/.

———. "Feinberg Initiates Pentagon's Implementation of DOGE-Influenced Regulatory Review." *Defense Scoop*, April 2, 2025. https://defensescoop.com/2025/04/02/feinberg-dod-doge-regulatory-review-trump-memo/.

———. "Pentagon's Newly Elevated Innovation Steering Group Preps for First Replicator Event." *Defense Scoop*, September 25, 2023. https://defensescoop.com/2023/09/25/pentagons-newly-elevated-innovation-steering-group-preps-for-first-replicator-event/.

Wicker, Roger. "Restoring Freedom's Forge: American Innovation Unleashed." Washington, D.C, December 19, 2024. https://www.wicker.senate.gov/2024/12/senator-wicker-announces-pentagon-reform-and-innovation-proposal.

Endnotes

1 Replicator," n.d
2 Clark, "DOD Innovation Official Discusses Progress on Replicator," 2024.
3 "Military and Security Developments Involving the People's Republic of China 2024," 135–49.
4 Defense, "National Defense Strategy of the United States of America," 2.
5 "Statement of Dr. Eric Schmidt."
6 Clark, "DOD Innovation Official Discusses Progress on Replicator," 2024.
7 "Memorandum: Replicator 2 Direction and Execution."
8 Roque, "Last Stand for IVAS?"
9 Please refer to the appendix for the full list of interviews and methodology details.
10 Biesecker, "Hundreds Of Switchblades Delivered So Far In First Replicator Tranche, DIU Official Says."
11 "About DIU."
12 Beck, "'DIU 3.0': Scaling Defense Innovation for Strategic Impact," 6.
13 Gallo, "Defense Primer: Under Secretary of Defense for Research and Engineering."; Beck, "'DIU 3.0': Scaling Defense Innovation for Strategic Impact."
14 Pentagon CTO Emil Michael becomes acting director of DIU.
15 For more about CSOs, see the Key Enabler "Streamlined Requirements," pp. 34-35.
16 "About DIU."
17 "About DIU."
18 Iorio and DeWitt, "Overcoming Goliath: How the Defense Establishment Can Maximize Allied Innovation."
19 "Keynote Address by Deputy Secretary of Defense Kathleen H. Hicks: 'Structuring Change to Last' (As Delivered)."
20 Interview, DOD, 2025.
21 "FY2023 Annual Report."
22 Interview, DOD, 2025.
23 Vincent, "Pentagon's Newly Elevated Innovation Steering Group Preps for First Replicator Event."
24 Vincent.
25 "Prepared Remarks by Douglas A. Beck, Director, Defense Innovation Unit, On Outpacing China: Expediting Innovation to the Warfighter," 8.
26 Hicks, "Deputy Secretary of Defense Dr. Kathleen Hicks Holds a Press Briefing to Discuss the State of A.I. in the Department of Defense."
27 Defense, "Charter for the Deputy's Innovation Steering Group."
28 Hicks, "Deputy Secretary of Defense Dr. Kathleen Hicks Holds a Press Briefing to Discuss the State of A.I. in the Department of Defense"; Vincent, "Pentagon's Newly Elevated Innovation Steering Group Preps for First Replicator Event."
29 "Replicator," n.d.
30 Hicks, "Deputy Secretary of Defense Dr. Kathleen Hicks Holds a Press Briefing to Discuss the State of A.I. in the Department of Defense."
31 Hicks.
32 Defense, "Deputy Secretary of Defense Kathleen Hicks Announces Additional Replicator All-Domain Attritable Autonomous Capabilities." "TBA" reflects that DIU has not yet specified the contractor, domain, or service for the announced system. Additional information and media have appeared in some media, but not via DIU announcements.
33 Harper, "DIU Confronting C2 Challenge for Counter-Drone Phase of Replicator."
34 Interview, DOD, 2025.
35 "Memorandum: Replicator 2 Direction and Execution."
36 Harper, "Pete Hegseth Narrowly Wins Confirmation to Be Trump's Defense Secretary."
37 "Memorandum: Establishment of Joint Interagency Task Force 401."
38 Interview, DOD, 2025.

39 Interview, DOD, 2025.
40 "Memorandum: Reforming the Joint Requirements Process to Accelerate Fielding of Warfighting Capabilities."
41 Nicastro, "The U.S. Defense Industrial Base: Background and Issues for Congress."; Lofgren, "Programmed to Fail: The Rise of Central Planning in Defense Acquisition, 1945-1975."; "Scaling Nontraditional Defense Innovation," 22.
42 Looijen, "Russia's Fiber-Optic Drones Dodge Jamming, but Ukraine Hunts Them with Infrared and Sound"; Probasco, The Future of Drones in Ukraine: A Report from the DIU-Brave1 Warsaw Conference; Somerville and Forrest, "How American Drones Failed to Turn the Tide in Ukraine"; Pak, "Ukraine's Rapid Innovation Cycle Is Changing the Future of War"; Cantin, "Ukrainian Unmanned Aerial System Tactics."
43 McNamara, Modigliani, and Nurkin, "Commission on Software-Defined Warfare: Final Report."
44 "Defense Resourcing for the Future: Final Report," 1.
45 Box, "Senator Jim Banks Introduces Bill to Speed up Military Procurement."; "Memorandum: Directing Modern Software Acquisition to Maximize Lethality."
46 Interview, former DOD, 2025; Daniels, "Dept. of Defense Faces Shutdown Amid Continuing Resolution Uncertainty," March 13, 2025.
47 Greenwalt and Patt, "Required to Fail: Beyond Documents: Accelerating Joint Advantage through Direct Resourcing and Experimentation," 51–52; Luttwak, The Pentagon and the Art of War: The Question of Military Reform, 157–203. Vice Admiral Christopher W. Grady, Vice Chairman of the JCS, has said that the DoD has "a tendency to Christmas tree things too much." Gould, "Vice Chief Nominee Pledges to Drive Acquisition Reforms."
48 Interview, former DOD, 2025; Interview, DOD, 2024.
49 Interview, DOD, 2024.
50 Interview, former DOD, 2025.
51 "DOD Announces Next Round of Projects to Receive Funding From Pilot Program to Accelerate the Procurement and Fielding of Innovative Technologies (APFIT)."; Freedberg, "Pentagon Reveals 5 More Funded RDER Projects, Including a Top Marine Priority."
52 Lofgren, "Does DoD Not Actually Want Startups to Win Programs of Record?"; "Senator Wicker Announces Pentagon Reform and Innovation Proposal."; "The Defense Reformation."; Box, "Senator Jim Banks Introduces Bill to Speed up Military Procurement."
53 Interview, congressional staffer, 2025; Interview, congressional staffer, 2025; Interview, industry, 2025; Interview, industry, 2025.
54 Interview, former DOD, 2025.
55 Albon, "Pentagon Chief Technologist Argues Case for Rapid Experimentation Fund."
56 Interview, former DOD, 2025.
57 Interview, former DOD, 2025.
58 Berg, "'Disorganized and Confusing': Lawmakers, Industry Rip Pentagon Plans for Drones."
59 Interview, DOD, 2024.
60 Interview, industry, 2025.
61 Interview, industry, 2025.
62 Interview, DOD, 2025; "Accelerating Replicator and Fielding Technologies for Today's Fight."
63 Interview, former DOD, 2025.
64 Interview, industry, 2025.
65 Interview, industry, 2025.
66 Interview, industry, 2024.
67 Interview, industry, 2024.
68 Interview, DOD, 2025.
69 Bondar, "Closing the Loop."
70 Interview, industry, 2024.
71 Interview, DOD, 2024.
72 Interview, DOD, 2025; Interview, DOD, 2025; Interview, congressional staffer, 2025; Interview, former DOD, 2025; Interview, former DOD, 2025; Interview, DOD, 2025.
73 Defense, "Charter for the Deputy's Innovation Steering Group," 1.
74 Harper, "OSD Moving to Corral the Military Services for JADC2."

75 “Joint Requirements Oversight Council (JROC).”; “Defense Innovation Unit: Actions Needed to Assess Progress and Further Enhance Collaboration,” 6.; House, “Prepared Remarks by Douglas A. Beck, Director, Defense Innovation Unit, On Outpacing China: Expediting Innovation to the Warfighter,” 8.

76 Interview, former DOD, 2025; Greenwalt and Patt, “Required to Fail: Beyond Documents: Accelerating Joint Advantage through Direct Resourcing and Experimentation,” 28.

77 Interview, DOD, 2025.

78 Interview, DOD, 2025.

79 Interview, DOD, 2025.

80 Interview, DOD, 2025.

81 Interview, former DOD, 2025.

82 Hicks, “Deputy Secretary of Defense Dr. Kathleen Hicks Holds a Press Briefing to Discuss the State of A.I. in the Department of Defense.”

83 Interview, former DOD, 2025.

84 Interview, DOD, 2025.

85 “Office of the Under Secretary of Defense (Comptroller) OUSD(C),” 4–20; “Defense Budget Overview: United States Department of Defense Fiscal Year 2025 Budget Request,” 4–20.

86 Defense, “Deputy Secretary of Defense Hicks Announces First Tranche of Replicator Capabilities Focused on All Domain Attritable Autonomous Systems.”

87 Judson, “AeroVironment debuts bigger, anti-armor loitering missile.”

88 Defense, “Deputy Secretary of Defense Hicks Announces First Tranche of Replicator Capabilities Focused on All Domain Attritable Autonomous Systems.”

89 “Blue UAS Cleared List, as of Nov. 10, 2024.”

90 “Blue UAS Cleared List, as of Nov. 10, 2024.”

91 Newdick, “Our First Look At An ALTIUS-600M Loitering Munition Detonating.”

92 Interview, DOD, 2025.

93 Patt and Greenwalt, “Competing in Time: Ensuring Capability Advantage and Mission Success through Adaptable Resource Allocation,” 28.; Peters, “Defense Acquisitions: How DOD Acquires Weapon Systems and Recent Efforts to Reform the Process,” 2.; “MTA Statutes & Policy.”; Hitchens, “Oversight or Overkill? DOD Faces New Congressional Order to Detail Mid-Tier Acquisitions.”; “Other Transactions Guide,” 4–7, 19. McCormick and Sanders, “Trends in Department of Defense Other Transaction Authority Usage.”

94 “FY2023 Annual Report,” 14.

95 “OT Huddle Takeaways on CSOs.”; “DIU Awards Three Contracts To Streamline DIU’s Budget Execution and Project Management,” 2025.

96 “Contracting by Negotiation (FAR Part 15).”

97 “National Security Innovation Network.”; Vincent, “DOD Opens New Innovation OnRamp Hubs across 5 States.”

98 Schwartz and Peters, “Department of Defense Use of Other Transaction Authority: Background, Analysis, and Issues for Congress,” 17.

99 Interview, former DOD, 2025.

100 McNamara et al., “Commission on Defense Innovation Adoption: Final Report,” 2, 10, 11, 13, 17.

101 “Other Transactions Guide,” 40, 50.

102 “Defense Acquisitions: DOD’s Use of Other Transactions for Prototype Projects Has Increased,” 2.; Schwartz and Peters, “Department of Defense Use of Other Transaction Authority: Background, Analysis, and Issues for Congress,” 13.; Obis, “DOD Dispelling Lingering Myths about OTAs.”

103 Clark, “DOD Innovation Official Discusses Progress on Replicator,” 2024.

104 Interview, congressional staffer, 2024.

105 Interview, DOD, 2025. At the time of writing, authors are not aware of any data showing that OT-based contracts receive more protests than FAR-based ones. This may indicate that OTs do not, in fact, carry more legal risk than FAR-based contracting, or it may instead indicate that OTs bear greater risk but this leads PEOs to more selectively use OTs.

106 Interview, DOD, 2024.

107 Department of Defense Appropriations Bill, 2025, 10–11.; Interview, congressional staffer, 2025.

108 Interview, DOD, 2025.

109 “The U.S. Army Selects Vendors for the Company Level Small Uncrewed Aircraft System Directed

Requirement for Brigade Combat Teams”; Robertson, “Pentagon Announces New Batch of Drones for Replicator Program.” DIU also found the Marines to be receptive to Replicator’s promise of an alternative acquisition pathway given the Marines’ relatively small force (and thus small budget) compared to other services. Interview, DOD, 2024.

110 “Autonomous Maritime Domain Capabilities Awarded in Support of Replicator Initiative”; “Four Companies Selected Support the U.S. Air Force and Defense Innovation Unit’s Enterprise Test Vehicle (ETV) Project.”

111 “Fact Sheet: Department of Defense Strategy for Countering Unmanned Systems.”

112 Clark and Patt, “The Pentagon Must Build Weapons Differently to Mobilize for the Information Age.”

113 DIU has been clear that it views Replicator as important for impacting other challenges. Former DIU Director Doug Beck wrote last year that “Replicator is a Department-wide initiative announced by the Deputy Secretary to deliver attritable autonomous systems at mass within 18 to 24 months in order to meet the challenge presented by the PRC, and to develop and then employ a replicable process to attack other problems the same way.” Beck, “‘DIU 3.0’: Scaling Defense Innovation for Strategic Impact,” 6.; “DIU Awards Three Contracts to Streamline DIU’s Project Management.”

114 Interview, congressional staffer, 2025; Interview, former DOD, 2025.

115 Interview, DOD, 2024.

116 Interview, DOD, 2025.

117 Interview, DOD, 2024.

118 Interview, DOD, 2025.

119 Redundancy in procurement can provide backup solutions if some attempts fail to produce mature, scalable technology.

120 Interview, DOD, 2025.

121 Clark and Patt, “The Value of Experimentation, Not Demonstration.”

122 “CJCSI 3150.25H: A1–5.

123 Interview, DOD, 2024.

124 Another reason the services did not want to pick up the sustainment piece of Replicator 1 was a lack of requirements tied to programs funded with reprogramming. Interview, DOD, 2025; Interview, DOD, 2025; Interview, DOD, 2024.

125 Bloomberg et al., “Strategic Edge: A Blueprint for Breakthroughs in Defense Innovation,” 40–41.

126 Roque, “Last Stand for IVAS?”

127 Interview, congressional staffer, 2025.

128 “Leadership / Organization.”

129 “DIU Awards Three Contracts To Streamline DIU’s Budget Execution and Project Management,” 2025.; The recommendation was in process before DIU’s announcement, but the release of this information is a positive development.

130 Roque, “Pentagon Fails 7th Audit in a Row, Eyes Passing Grade by 2028.”

131 Calvert, “REP. CALVERT: DEFENSE DEPARTMENT’S FAILED AUDIT UNDERMINES OUR COMMITMENT TO TAXPAYERS.”

132 Interview, DOD, 2025.

133 Interview, DOD, 2025.

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