

Defense Innovation Unit Experimental (DIUx)

Annual Report 2017

DIUx Annual Report

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The DIUx Mission

The U.S. Department of Defense (DoD) established Defense Innovation Unit Experimental (DIUx) to accelerate commercial innovation to the warfighter in order to meet the changing demands of today's strategic and technological environments. The Department's 2018 National Defense Strategy (NDS) boldly acknowledges that our nation's military-technical advantage is eroding as our competitors and adversaries have the same access to the global technology marketplace driving innovation. Without significant changes to DoD's acquisition culture and processes, the U.S. military will continue to lose its long-held technological superiority.

Military-technical competition is dramatically different from past decades when key technologies were developed in government labs, often exclusively for military use. A technology first-mover up until the end of the Cold War, DoD must now adopt a fast follower posture to keep pace with commercial refresh cycles. The commercial sector leads the way in many cutting-edge areas from artificial intelligence to autonomous systems to space, the convergence of which generates the prospect of dramatic changes to the character of warfare. The implications of global access to advanced commercial technology are visible in today's conflicts and the loss of exclusivity means the likelihood of technological surprise is far higher.

It is DIUx's mission to lead DoD's break with past paradigms of military-technical advantage to become fast adapters -- as opposed to sole developers -- of technology, integrating the advanced commercial capabilities necessary for strategic advantage. In this hyper-competitive environment, DoD needs to prioritize speed of delivery, rapid and modular upgrades, and quick operational adaptation on the battlefield. Success in this new era of military-technical competition no longer goes to those who seek the most exquisite systems, but rather to those who move fast and think creatively.

Headquartered in Mountain View, CA, with offices in Central Texas (Austin); Boston, MA; and in the Pentagon, DIUx is uniquely positioned to tap into the dynamic innovation ecosystems thriving around the country.



2017 in Review

A Quick Look

Awarded 48 prototype projects.

Leveraged approximately \$84 million in DoD partner funding from more than 30 different DoD entities to initiate prototype projects.

Recruited top talent with commercial technology and subject matter expertise from around the nation to build a staff of approximately 29 full-time personnel across four offices; stood up a unit of 55 reservists and guardsmen.

Awarded DoD's first-ever follow-on production contract under the Other Transaction (OT) authority.

Upgraded and deployed the Air Force's Combined Air Operations Center tanker planning tool.

Tested and deployed new commercial innovation to warfighters in the field.

Provided thought leadership on DoD's efforts to deploy cloud migration, machine learning, and agile software development.

Prototyping

Authorized under 10 U.S.C 2371b, Other Transaction (OT) prototype projects are designed to accelerate technology evolution from concept to experimentation and development with the goal of placing capabilities in the hands of warfighters.

Prototype projects can include hardware, software, or unique services. The prototypes, themselves, may involve mature, off-the-shelf capabilities or nascent technologies soon-to-be released to the broader market.

Over the past year, DIUx pioneered and improved its contracting process, the Commercial Solutions Opening (CSO). DIUx uses the CSO in conjunction with DoD partners to execute prototype projects to solve national defense problems.

Key CSO Elements

- Simple solicitation on diux.mil
- 60 to 90 days to award
- Negotiable payment milestones
- Negotiable terms and conditions
- Negotiable intellectual property and data rights
- Commercial accounting standards

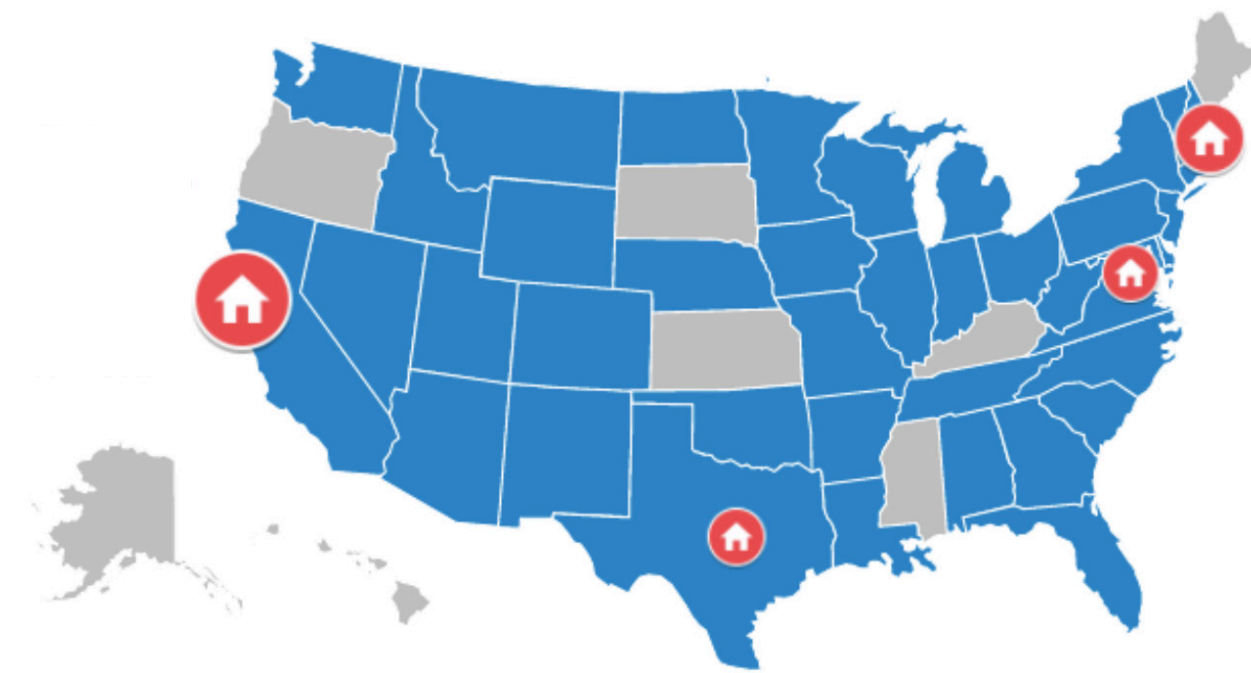


Since launching the CSO in June 2016, DIUx has initiated a total of 61 prototype projects. Over the past year, we've seen a marked interest in using the CSO and OT authorities to leverage commercial innovation across DoD to solve mission-critical problems.

With the support of Army Contracting Command - New Jersey (ACC-NJ), 48 prototype agreements were awarded for \$104 million in 2017 alone, averaging roughly 1 per week. With a limited budget of just \$10 million in RDT&E and \$15.7 million in O&M for FY17, DIUx worked diligently to find ways to collaborate with our DoD partners in order to fund these prototype projects. Of the \$104 million on contract, approximately \$84 million comes from DoD partners.

DIUx has received more than 650 proposals in response to CSO solicitations from companies across the nation and overseas.

Speed to impact for warfighters is paramount. On average, it takes just 90 calendar days from first contact with a company to contract award. This rapid approach not only allows the Department to properly evaluate the performance and cost of new capabilities, yet also provides warfighters the opportunity to develop new concepts of operation before committing to a larger purchase.



42 states are home to companies that have competed for DIUx contracts



Transitioning to Production

In the 2016 National Defense Authorization Act (NDAA), Congress granted DoD new OT authorities to allow successful prototype projects to serve as justification for follow-on production contracts without the need for further competition. This enables commercial innovation to survive the “valley of death” that often separates newer capabilities from our warfighters. DIUx designed these OT production contracts to scale across the Department; any DoD entity may buy and use successfully prototyped capabilities without each such entity having to allocate time and resources into putting a new contract into place.

In 2017, DIUx successfully transitioned two prototype projects into production contracts, marking the first time DoD has ever done this under the OT authority. Building on an initial \$13 million prototype contract awarded in 2016, the first production contract was signed in September 2017 for

endpoint security services provided by Tanium -- supported by World Wide Technology.

“DIUx helped NETCOM quickly identify, test, and scale this essential technology to support the size and complexity of Army networks.”

Daniel Bradford

Deputy to the Commander and Senior Technical Director
U.S. Army Network Enterprise Technology Command (NETCOM)

U.S. Army Network Enterprise Technology Command (NETCOM) made the first order for \$35 million. NETCOM is using Tanium to provide near real-time visibility and control of network endpoints, which when combined with managed service from World Wide Technology scales to support the size and complexity of Army networks.

Highlighted Efforts

DIUx designated five focus areas in 2017: artificial intelligence (AI), autonomy, human systems, information technology (IT), and space. This approach builds subject matter expertise within DIUx, while also focusing relationship development and ensuring unity of effort. The following are some highlights from 2017.



Artificial Intelligence

DIUx is pioneering a path for DoD to leverage commercial advances in machine learning and related fields to more quickly and effectively analyze data in context.

Machine Learning for Predictive Maintenance: Leveraging artificial intelligence to develop algorithms to transition from time based maintenance to advanced predictive maintenance.

Autonomy

Commercially available hobbyist drones provide our adversaries a readily available means to conduct attacks against American troops and our allies. It is likely that these types of attacks will increase as these unmanned systems proliferate. DIUx is working to develop low-cost countermeasures to these new battlefield weapons.

Kinetic Drone Defeat: DIUx partnered with the Army, five non-traditional companies, and one traditional defense contractor to develop countermeasures to disable unmanned systems.

Human Systems

Because people are our most important resource. In an effort to optimize human performance, increase lethality and recovery, and enable better decision-making through improved battlefield awareness, DIUx worked to support a more connected warfighter.

Command and Control Platform: Web-based software platform allowing multiple users to visualize operations and collaboratively plan courses of action.

Non-Invasive Cooling: Frozen saline that cools the body in the event of combat trauma in order to improve the chances of organ survival and potentially extend the “golden hour” for wounded warfighters.

Wireless, Hands-free, Ears-Free Communicator: Two-way communications device that uses bone conduction to maximize freedom of movement and improves speech clarity in high noise environments for warfighters in the midst of operations.



Information Technology

DIUx is actively engaged in large-scale efforts to modernize and improve the Department's security and networking, information systems, platform analytics, and methodologies critical to adapting to the modern battlefield.

Security and Networking: Initiatives focused on hardening network defense, equipping the U.S. cyber mission force, enhancing IT readiness, informing cyber situational awareness, and addressing Precision Navigation and Timing (PNT) opportunities. Focus areas include endpoint security, network sensing and change detection, and multifactor authentication.

Information Systems: Initiatives focused on securing Industrial Control Systems (ICS), visualizing supply chains, increasing cryptologic warfare adaptability, and enhancing tactical communications resiliency. Automated vulnerability analysis and remediation at scale is a key initiative within this area.

Platform Analytics: Initiatives focused on enhancing mission planning and execution, as well as providing improved indications, warnings, and automated analysis.

Methodologies: Efforts to reimagine training delivery, redesign authority to operate (ATO) process, grow DevOps capabilities, enhance talent management and scale creative problem curation and solving. Notably, we partner with commercial companies as a means of leveraging agile development to provide a repeatable and cost-effective way to modernize and transition IT infrastructure from on-premise architectures to cloud-based solutions, greatly reducing risk, cost, and schedule of programs.

Executing Agile Software Development to Save Taxpayer Dollars

Demonstrating that agile software development is better, faster, and cheaper, DIUx is bringing U.S. Central Command's Combined Air Operations Center (AOC) into the 21st Century by delivering a more effective software solution for planning and executing air operations. This initiative began as an experiment to redesign the AOC's tanker planning process -- then, consisting of little more than a matrix hand-drawn on a whiteboard -- but early quickly evolved into a deployable application based on agile software development practices, to include user centered design, automated security and testing, and continuous delivery to users. The application was delivered to the warfighter in four months at an initial cost of \$1.5 million. It was rapidly adopted and has been in operational use since March 2017, allowing the Air Force to reprioritize hundreds of saved man-hours and tens of millions of taxpayer dollars in fuel costs.¹

Since March, DIUx's efforts in partnership with the AOC, Air Force Lifecycle Management Center (AFLCMC), Raytheon, and Pivotal Labs have continued to scale at an impressive rate. Within six months, the project team -- a combination of software engineers and end users -- delivered four new applications into operation. Six additional applications are in simultaneous development and more are expected.



Furthermore, while DIUx anticipated that the AOC would require development and IT operations support from DIUx and DDS for up to two years, the AOC is poised to execute both without outside assistance. The clear success of this project led the Assistant Secretary of the Air Force for Acquisition and the AFLCMC to terminate the AOC 10.2 modernization contract, which had been in effect for over 10 years, and instead implement DIUx-led agile software development.

The dramatic benefits demonstrated by this effort is inspiring greater change across the Air Force and DoD. The Air Force Distributed Common Ground Station (DCGS) enterprise is developing its first applications using agile methods and will soon natively integrate with AOC, breaking down traditional intelligence, surveillance, and reconnaissance operations stovepipes. DIUx is also working with the Air Force Space and Missile Center, the F-35 Joint Program Office, the Navy's Space and Naval Warfare Systems Command, and other program offices to identify ways in which agile software development can transform their traditional acquisition programs.

¹ Within 120 days of developing the software, users at AOC calculated that the Air Force's tool for planning tanker refueling missions began saving taxpayers hundreds of thousands of dollars per day through deferred fuel and maintenance costs.

Space

Exploring the dynamic commercial space sector for improved space resiliency and rapid launch capabilities has drastically improved the quality of data analytics supporting space missions.

Small, Responsive Launch: Providing low-cost, precise, and 'on-demand' deployment of small payloads into space. This effort will greatly reduce the satellite inventory waiting to go into orbit.

Micro-Satellites & Advanced Analytics: Working to develop new micro-satellite constellations coupled with advanced imagery analytics for improved peacetime indications and warnings.



Staffing DIUx for Success

Beyond adopting new practices to purchase commercial innovation, DIUx is also recruiting new types of talent for DoD. DIUx employs a diverse team of operational, technical, and commercial experts, which consists of 29 full-time equivalents (FTEs) including both civilians and military. Prior to joining DIUx, team members have launched and sold companies backed by tier-1 venture capital firms; led teams at the Joint Staff, the Office of the Secretary of Defense, and the White House; Commanded operational forces; served in warfighting capacities around the world; and helped build some of Silicon Valley's most iconic companies.

Combining these experiences, DIUx's team includes three sets of distinct experts who are key to solving mission-critical DoD problems:

- Warfighters from all branches of the military who know defense problems intimately.
- Technology experts who are immersed in commercial innovation.
- Fortune 500-level commercial executives who conduct financial due diligence on companies and help negotiate the best possible deal for the taxpayer.

This combination of warfighters and technology experts on all projects ensures that DIUx is able to deliver the best solutions to the Joint Force. To bring in these unique private-sector skill sets, DIUx relies on many different types of civilian and contract hiring authorities, including the Intergovernmental Personnel Act (IPA), Presidential Innovation Fellows (PIF), Presidential Management Fellows (PMF), Special Government Employees (SGE), Highly Qualified Experts (HQE), the civilian General Schedule (GS), and contractors.

DIUx reservists have also been a central part of our success. There are 55 reservists and guardsmen attached to DIUx who offer both intimate knowledge of the problems warfighters face, as well as commercial and technological expertise. Our reserve model allows DIUx to effectively harness a largely untapped area of competency. Leveraging the top military talent within innovation hubs around the country is just one more example of how DIUx is helping to ensure a strategic advantage for national defense.



Looking Ahead

In 2018, DIUx is focused on identifying and prototyping cutting-edge commercial innovation that solves mission-critical problems for the warfighter.

DIUx is an essential partner in our nation's mission to maintain and extend the military's technological advantage over all potential adversaries. A unique combination of methodology, geography, network, and expertise positions DIUx to coordinate with key organizations across the Department's innovation ecosystem, including the Strategic Capabilities Office (SCO), the Defense Digital Service (DDS), the Defense Advanced Research Projects Agency (DARPA), and the Defense Innovation Board (DIB).

Looking ahead, DIUx will examine how to scale its processes to include the understanding and use of the OT authority and the technologies and methodologies available to DoD. DIUx is also working to improve collaborative relationships with our DoD partners by embedding them in project management teams at DIUx. This further expands knowledge and understanding of our unique process across DoD. DIUx's success has been due, in large part, to the commitment of our DoD partners and in particular ACC-NJ. Scaling the DIUx process of prototyping and transitioning to production is not only timely, but essential.

As DIUx continues to enable faster adoption of commercial innovation into existing programs of record, we will also provide credible, technical expertise for new DoD concepts of operation.

DIUx and DDS are working to apply agile methodologies to ongoing hardware and software upgrades of legacy platforms. DIUx will address challenges facing Major Defense Acquisition Programs (MDAPs) as they refresh and upgrade hardware and software components. This will mark the beginning of a concerted effort to shift from intermittent to continuous capability upgrades across DoD's platforms.

It is incumbent upon DIUx to lead DoD toward rapidly acquiring commercial innovation to solve mission-critical problems for the men and women who ensure our national defense. DoD cannot afford to go into the next conflict without the ability to harness the disruptive capabilities being imagined by today's commercial technology companies. DIUx is DoD's pathway to that commercial innovation.

