CHIEF DIGITAL AND ARTIFICIAL INTELLIGENCE OFFICER
Statement for the Record
House Armed Services Committee
Subcommittee on Cyber, Information Technology, and Innovation
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Chairman Gallagher, Ranking Member Khanna, and distinguished Members of the Subcommittee, thank you for the opportunity to testify before you today. Today is my first appearance before Congress, and I look forward to sharing the ongoing efforts of the Chief Digital and Artificial Intelligence Office (CDAO) and the broader Department of Defense (DoD) related to data, analytics, and artificial intelligence and machine learning (AI/ML).

The Deputy Secretary of Defense (DSD) established the CDAO in February 2022, bringing together the authorities and resources of previously separate organizations, including the DoD Chief Data Officer (CDO), Joint Artificial Intelligence Center (JAIC), Defense Digital Service (DDS), and Advancing Analytics (ADVANA) Office.

DSD charged the CDAO with the mission of accelerating DoD adoption of data, analytics, and AI from the boardroom to the battlefield. This includes the following functions:

- Lead and oversee DoD' s strategy development and policy formulation for data, analytics, and AI
- Work to break down barriers to data and AI adoption within appropriate DoD institutional processes
- Create enabling digital infrastructure and services that support Components' development and deployment of data, analytics, AI, and digital-enabled solutions
- Selectively scale proven digital and AI-enabled solutions for enterprise and joint use cases
- Surge digital services for rapid response to crises and emergent challenges

It is an honor to serve our Nation as the first DoD CDAO. The importance of this role, the mission of the CDAO, and our service to the warfighter are not lost on me. From my experience as a professor of machine learning at the Naval Postgraduate School, to my time leading machine learning teams at some of the most prominent technology companies in the U.S., I'm proud to bring the best practices and lessons learned from my prior roles to enhance, accelerate, and scale the application of data, analytics, and AI/ML to the national security mission.

The National Defense Strategy identifies four top-level defense priorities the Department will pursue: defending the homeland, paced to the growing multi-domain threat posed by China; deterring strategic attacks against the United States, allies, and partners; deterring aggression while being prepared to prevail in conflict when necessary; and building a resilient joint force and defense ecosystem. Data, analytics, and AI/ML play a role in all these priorities. They are core capabilities underpinning the Department's operational and business

analysis and decision making in support of the Secretary of Defense's (SECDEF) priorities to Defend the Nation, Take Care of Our People, and Succeed Through Teamwork. They are also core capabilities in the execution of Joint warfighting functions, especially Joint All-Domain Command and Control (JADC2). The CDAO is focused on using data, analytics, and AI/ML to advance these top Department priorities.

To that end, when I arrived as CDAO in June 2022, my team and I first assessed data, analytics, and AI/ML activities and needs at all levels of the DoD. We studied the comprehensive recommendations from the National Security Commission on Artificial Intelligence (NSCAI). We assessed existing and emerging digital technologies within DoD, partner organizations, and commercial industry. We talked to experts and stakeholders to understand digital transformation in the context of DoD's mission and environment. From these efforts, we identified a Digital Hierarchy of Needs (Figure 1), four areas necessary to accelerate and scale data, analytics, and AI/ML adoption in support of DoD priorities:

- Improve data quality
- Enable advanced analytics
- Provide AI/ML services
- Cultivate key enablers

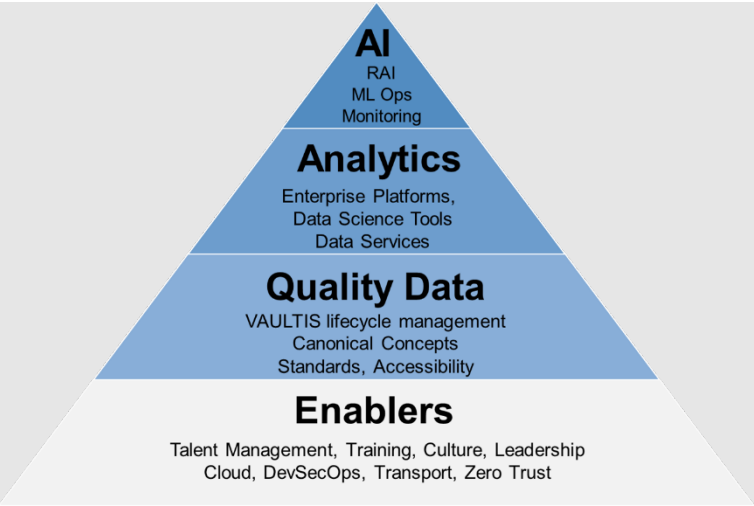

Figure 1. Digitial Hierarchy of Needs

More detail on each of these areas follows.

Quality Data

The foundation of every effective analytic and AI capability is quality data. That is why improving data quality is the CDAO's top priority. Quality data that is usable for analytics and AI must possess the seven "VAULTIS" attributes:

- Visible – Consumers can locate the needed data

- Accessible – Consumers can retrieve the data
- Understandable – Consumers can recognize the content, context, and applicability
- Linked – Consumers can exploit data elements through innate relationships
- Trustworthy – Consumers can be confident in all aspects of data for decision-making
- Interoperable – Consumers have a common representation/ comprehension of data
- Secure – Consumers know that data is protected from unauthorized use/manipulation

Over the last few years, DoD has established a solid foundation for data quality, and we are leading initiatives to scale that work. For example, as a result of the 2020 DoD Data Strategy and 2021 Creating Data Advantage memo, data silos that were once ubiquitous across the Department are now coming together in a federated data ecosystem. The ecosystem allows components to find and access data from sources across the Department and develop analytics and dashboards to support mission needs. The Advancing Analytics (ADVANA) platform has provided key capability in this area. ADVANA provides a centralized data lake using manual and semi-automated collection and aggregation of prioritized data across the DoD enterprise. Today, ADVANA has connected more than 390 DoD data sources with almost two petabytes of data; it has 31,000+ users across 190+ organizations and 12+ functional communities; it has saved DoD more than $11B from improved auditability; and it has allowed DoD to improve its response to crises like COVID-19, Afghanistan withdrawal, and Ukraine assistance.

In addition to providing an enterprise data platform, we are improving data quality through mission-focused initiatives. By applying data and analytics to solve real operational problems, we identify and then improve data quality in a way that immediately impacts mission outcomes. For example, through the Accelerating Data and AI (ADA) initiative, we are embedding digital teams within Combatant Command (CCMD) CDOs to improve CCMD decision support. ADA teams enable rapid data discovery and analytic development efforts across a range of capability areas. ADA teams have developed applications to automate and improve business and operational processes within and across CCMDs in various areas, including personnel, logistics, and financial management. We are implementing a similar approach with OSD Principal Staff Assistants (PSAs) by embedding digital teams within PSAs to help them access and use high-quality data to support SECDEF and DSD decisions on implementation of the National Defense Strategy and Strategic Management Plan.

We are also improving warfighting data quality, focused on enabling Joint All-Domain Command and Control (JADC2). The CDAO is developing a Joint data integration layer to improve access to, and interoperability of, data required for C2 at the strategic, operational, and tactical levels of war. We understand the strategic value of the American technology sector and are committed to unlocking DoD data so it is easier for software companies to develop applications for DoD warfighters to use in JADC2. We are also leading iterative experimentation and assessment of the data integration layer through a series of Global Information Dominance Experiments (GIDE) focused on Joint Warfighting Concept key operational problems, emphasizing the pacing challenge in the Pacific and globally-integrated

deterrence. Our first CDAO-led GIDE event concluded in February, and we are applying lessons and insights into future experiments, which are planned about every 90 days.

There is more work to do to scale data access and improve data quality beyond the data used in ADVANA, JADC2, and ADA and PSA use cases. We are leveraging and empowering the Department's Chief Data Officers (CDO) at every command to improve data quality by managing data as a product. Managing data as a product means data stewards actively provide data they produce or manage to customers in a way that directly meets customers' needs. It is a shift from traditional program management functions that DoD uses to develop and deliver hardware systems. A data product manager's job is never done; they must iteratively and agilely work with customers from across the DoD enterprise to ensure their data products meet mission needs as they evolve. To orchestrate better data quality, we are also improving data governance through our DoD-wide CDAO Council, and with allies and partners through the Five Eyes CDO Council.

DoD is committed to treating data as a strategic asset, and the CDAO is committed to making trusted, high-quality data widely and readily available for business and warfighting decision-makers and mission partners.

Advanced Analytics

In speaking with military commanders across the force this past year, the most requested digital capabilities were more advanced analytics and dashboards to help them visualize and make better decisions about how to manage their resources, readiness, people, and operations. Analytics provide the ability to measure, visualize, and sometimes predict the various factors that impact a decision. If quality data is available, data scientists and other analysts both in DoD and in the commercial sector can build and tailor models to explore variables and offer unique data-informed insights to leaders.

The DoD analytics environment has traditionally consisted of many disparate business intelligence capabilities that used siloed data, focused on only one functional domain, and existed in on-premises computing environments. Most analytic applications relied on old data, collected at monthly or even quarterly intervals, and senior governance and decision-making bodies relied on PowerPoint slides instead of real-time analytics.

Over the last few years, DoD has made significant progress in integrating data and providing commercial state-of-the-art tools for organizations to create their own analytics and dashboards to support decision makers. DoD is also using real-time analytics in key senior decision meetings up to the SECDEF and DSD levels. The ADVANA platform, described above, has been instrumental in this progress. ADVANA has enabled development of analytics in financial, contracting, readiness, logistics, medical, personnel, and other areas. A key benefit of the ADVAVNA environment is how makes data from multiple sources accessible to both DoD analysts at all levels to create their own dashboards and analytics, and commercial software providers on contract with DoD organizations to develop more sophisticated applications.

Today, the CDAO is scaling ADVANA efforts beyond current use cases to support decision making across all SECDEF priority areas. We developed "Pulse," a performance management application that connects data and provides analytics to measure progress on SECDEF priorities, including the implementation of the National Defense Strategy and the Strategic Management Plan. As a result of this work, the Department is increasing transparency in execution and improving the quality of its measures, moving from input metrics to output metrics on the majority of its priorities. There is endless opportunity to apply advanced analytics to the broad and diverse aspects of DoD business and operations. ADVANA has given DoD a foundation of quality data and analytic tools so leaders can make data-driven decisions to improve Department effectiveness and stewardship of taxpayer resources.

The CDAO is also applying analytics to JADC2. In addition to developing a Joint data integration layer to unite Service, Intelligence Community, and mission-partner data and make it discoverable and accessible across echelons, C2 nodes, and operational forces, we plan to use the acquisition authority Congress authorized for us to make it easier for industry to develop software applications for Combatant Commands and Joint users. Our approach will assert government rights over DoD data while giving CCMDs and Joint users a reliable acquisition path to leverage innovative industry software solutions that convert data into decision advantage.

AI/ML Services

Since DoD released its first Artificial Intelligence Strategy in 2018, DoD has made significant strides in bringing AI/ML to the warfighter and business decision maker. The CDAO established an ML development environment with tools, like Sage-Maker and Databricks, which provide integrated development environments for composing ML workflows to bring AI/ML to enterprise and business applications, including procurement, human resources monitoring, and investments. We have seen great value in computer vision use cases, such as vehicle detection and tracking in support of force protection missions; natural language processing to automate the search of large amounts of policy and contract documents; predictive maintenance capabilities to maximize up-time for air, land and sea fleet vehicles; and fraud monitoring to enhance business operations by detecting anomalous patterns in contractual money flows.

To scale AI/ML development across DoD, the CDAO is defining the appropriate enterprise scaffolding to facilitate development in the most effective, secure, responsible, and sustainable way. By 'scaffolding,' we mean the enterprise infrastructure, data, tools, services, and best practices that any AI/ML developer – whether in government or industry – can leverage to produce AI/ML capabilities for the national security mission. Scaffolding elements include data labeling as a service, federated model catalogs, an enterprise feature store, a common library of AI packages, and test and evaluation (T&E) capabilities.

Our keystone T&E effort is establishing the Joint AI Test Infrastructure Capability (JATIC). JATIC provides an interoperable set of state-of-the-art software capabilities for AI algorithm testing & evaluation. JATIC will test model robustness, resiliency to adversarial attack, the ability of humans to understand and trust model outputs, and competence. It will also ease

model deployment, integration, and compatibility, thus integrating seamlessly into the various AI/ML pipelines that different DoD organizations have adopted.

An integral component of our AI/ML adoption plan is promoting the tenets of responsible AI. The Department's desired end state for responsible AI is trust. Trust in DoD AI will enable the Department to modernize its warfighting capability across a range of combat and non-combat applications and consider the needs of the DOD's internal and external stakeholders. Trust is also critical to our relationships with like-minded nations as we expand partnerships and collaboratively set new international norms for AI usage which respect democratic values such as privacy and civil liberties, while defending against adversarial aggression. The CDAO is either the lead or participating in over 40 of the 64 lines of effort designed to develop capacity with partner and allies and is guiding or executing alongside responsible AI leaders. We are also working closely with NATO, FVEY partners, and the 16-nation AI Partnership for Defense initiative, which we lead to advance the responsible development and use of AI in defense around the world.

Key Enablers

While getting the technology right is why the CDAO was created, none of this can be sustained without taking care of the people and providing enablers that drive digital transformation, breaking down technological and acquisition barriers, and drive the growth of our network of highly skilled personnel and international relationships.

The CDAO is managing digital talent by attracting, recruiting, hiring, and employing highly talented individuals. As the lead office for the data, analytics, and AI work roles in the cyber workforce, the CDAO is championing the effort to expand the DoD Cyber Workforce Framework (DCWF). In partnership with DoD CIO, the CDAO established 10 data and AI work roles across the DoD which collectively include 106 new tasks and 80 new knowledge, skills, and abilities (KSAs) deemed important for strengthening DoD's innovation workforce. To promote the culture and infrastructure for digital talent in the Department, the CDAO is designing and implementing the Defense Digital Corps (DDC) pilot program to create a cadre of DoD digital talent that will be available to meet surge demand and tackle key problems. CDAO will manage the DDC, providing mentorship, networking, and professional development aligned with skillsets, while creating a pipeline to attract, recruit, flexibly hire, and creatively employ digital talent from across the Nation.

CDAO is using its acquisition authority to transform acquisition processes within the Department in support of AI expertise, joint synchronization, agile contracting, and stronger relationships with industry and academia. We are breaking down barriers in the acquisition process in order to quickly and repeatedly identify and acquire critical AI technologies from traditional and non-traditional DoD partners. The use of innovative and decentralized procurement vehicles such as T&E Blanket Purchase Agreement and TryAI Commercial Solutions Opening allow CDAO to rapidly purchase and deliver key AI services and enabling tools. CDAO's Tradewind platform leverages an Other Transaction Authority to identify, acquire, and operationalize critical AI technologies from traditional and non-traditional DoD

partners, quickly and repeatedly. Tradewind is available throughout the DoD and has successfully awarded contracts to multiple services and components.

Conclusion

The CDAO was created to provide lasting value to the Department. We are focused on pursuing an integrated strategic approach across data, analytics, AI/ML, and enabling activities. These activities include fostering an educated, empowered workforce; leveraging the strengths of commercial software development; continuing iterative experimentation and assessment to determine the right capabilities and architecture to support mission needs; and effectively integrating our data and activities with allies and partners. I look forward to working closely and transparently with the Subcommittee on these issues, and others, as we enable DoD's current and future use of data, analytics, and AI/ML for national security.