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The DOD's Hidden Artificial Intelligence Workforce

Leveraging AI Talent at the U.S. Department of Defense

Policy Brief

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Executive Summary

Cultivating a leading artificial intelligence workforce is a strategic focus of the U.S. Department of Defense's (DOD) 2018 AI Strategy. That makes harnessing the full potential of AI for assured superiority and security critical, but it cannot happen in a vacuum. It requires a ready and able workforce, along with sustained pipelines and opportunities to leverage expertise. Recommendations from the National Security Commission on Artificial Intelligence's *Final Report* echoed this need, stating that "national security agencies need more digital experts now or they will remain unprepared to buy, build, and use AI and its associated technologies."[1]

However, the DOD has publicly stated that it faces significant challenges in accessing AI talent.[2] Adding to these challenges, the DOD has not consistently defined AI talent. The DOD's AI workforce discussions have therefore had a narrow focus on recruiting select technical talent, namely software developers, lamenting an inability to compete with the private sector. The push to engage this talent includes campaigning to raise salaries, creating fellowships, and leveraging rotational exchanges with industry.

This policy brief provides a new perspective on this discussion. Instead of repeating how the DOD struggles to compete with the private sector, we argue that the DOD already has a hidden cadre of AI and related experts. We further argue that this hidden cadre could go a long way in meeting stated AI objectives, through policies that more effectively identify and leverage this talent, processes that incentivize experimentation and changes in career paths, and through investing in necessary technological infrastructure.

To better understand the current state of the DOD's AI workforce, we conducted interviews with 31 experts across the services and the Office of the Secretary of Defense. We then analyzed civilian personnel data from the Office of Personnel Management (OPM), and leveraged key insights from previous CSET research.

Our analysis suggests that the DOD employs more AI talent than the popular narrative may suggest. Previous CSET research found the national security community was a top employer of AI talent, particularly technical talent.[3] The interviews validated this hypothesis, as did our analysis of OPM data on the top occupation codes that likely include AI talent.

Our analysis also points to a range of reasons for why the DOD's existing AI workforce remains hidden. Strategically, the services do not have a consistent approach to defining or prioritizing AI. This translates directly into the level of prioritization and investment put into cultivating an AI workforce. On a more tactical level, we find that challenges for identifying and leveraging AI talent fall into three general categories: people, processes, and technology.

Moreover, we find that each DOD armed service currently has a different approach to defining, identifying, classifying, assigning and tracking AI and AI-related talent. Approaches span informal networking and word-of-mouth recommendations; equating AI expertise with technically-oriented career fields or educational credentials; creating searchable skills repositories; and even a machine learning approach in which personnel files are scraped and analyzed for potential digital skills. Our discussions revealed many organic experiments taking place within each service to identify and leverage AI or related talent, from informal "communities of practice" to flyaway teams and new career pathways. Finally, experts had a range of opinions on what different services should do to cultivate a leading AI workforce that reflected their circumstances, realities, and requirements.

Based on these findings, we provide 15 recommendations to help the DOD better leverage its existing AI workforce. Our recommendations cover technical and nontechnical talent, apply to each of the services, are broken down by challenge, and are intentionally actionable on short- and medium-term timelines.

We begin with a recommendation that sets the strategic foundation, while the remaining recommendations map through the framework:

Identification → Experimentation → Implementation → Harmonization

Each step in the framework defines a phase for sustained talent management process change. First, identification of AI talent; second, experimentation, evaluation, and iteration of new initiatives designed to leverage AI talent; third, implementation of an agreed upon approach; and fourth, harmonization of service-level approaches to enable enterprise-wide AI talent assessment.

Our recommendations are designed to create agility in talent management. We believe AI, like other emerging technologies, demonstrates the need for services to adapt to new warfighting techniques and domains. Such agility includes aligning performance incentives; creating opportunities to build and leverage expertise; and, importantly, to track, evaluate, and iterate pilot initiatives. It also allows for flexibility across services without creating more seams as AI talent management is unlikely to look the same for each service. What may work well for one service may not for another, given inherent differences in approach to AI adoption, mission priorities, and force management.

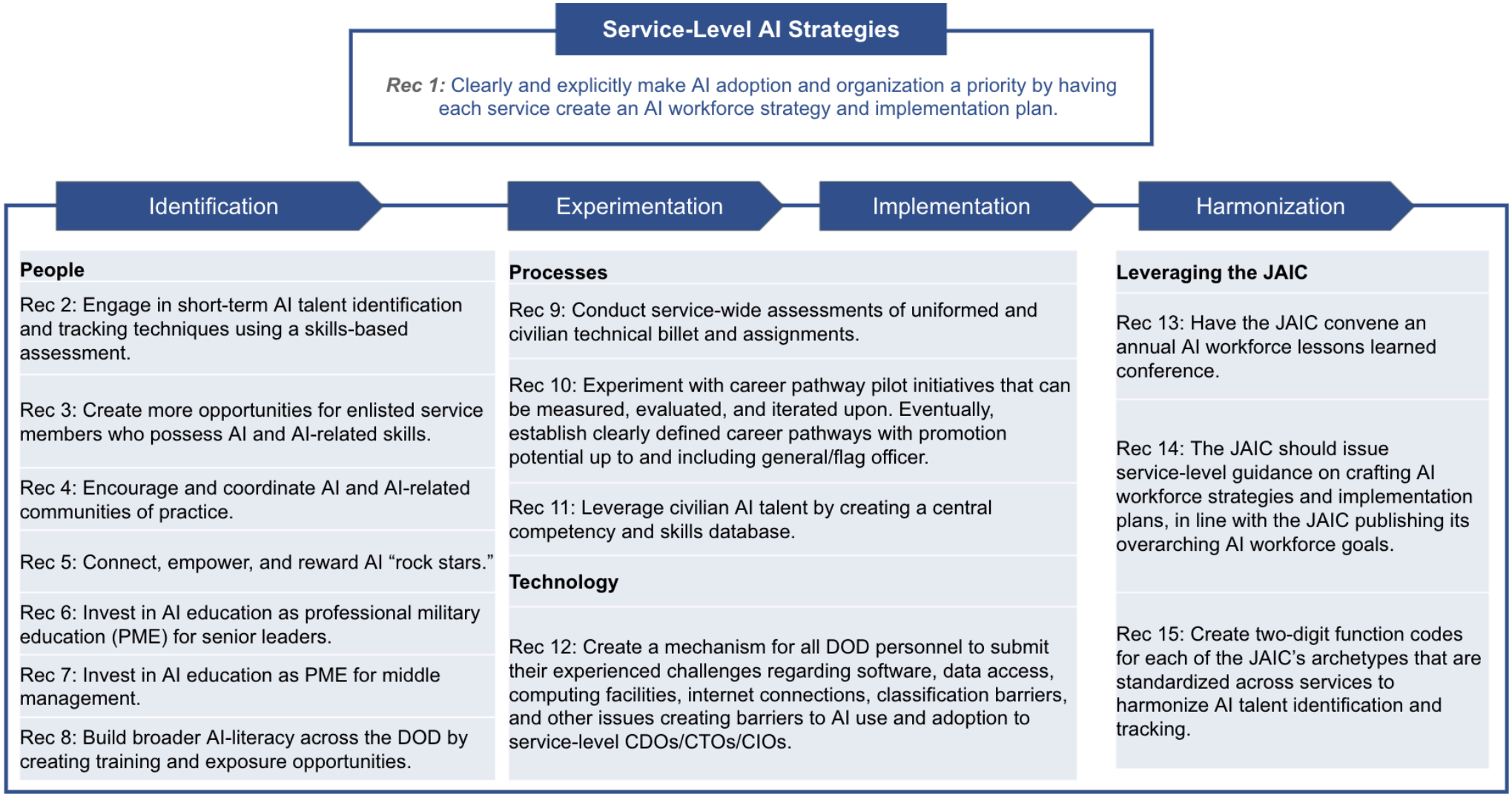
Figure S1 provides a summary list of our recommendations. We propose talent management actions for the short term to leverage AI talent now and in the medium term to cultivate pipelines of expertise in the future. We also recommend targeted training from operators and acquirers to senior leaders, and rewarding “rock stars” that are uniquely positioned to make change happen.

Several of our recommendations are also specific to the Joint Artificial Intelligence Center in its role as the central hub and coordinator for the DOD’s AI activities. This includes repurposing outdated and underused two-digit function codes already assigned to every DOD billet for the AI archetypes, and to create a forum to harmonize service-level AI workforce initiatives and learned best practices.

This policy brief focuses on the DOD’s best asset: its existing workforce. We hope this report provides a new perspective to advance the DOD’s strategic goals. We recognize that some of our

recommendations are intertwined with bigger issues that are difficult, time-consuming, and potentially costly to change. However, we believe that all of our recommendations are critical to effectively leveraging and sustaining the DOD's AI workforce.

Figure S1. Summary of Recommendations



Source: CSET and MITRE.

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Introduction

In 2019, the U.S. Department of Defense (DOD) released a summary of its Artificial Intelligence Strategy, titled "Harnessing AI to Advance Our Security and Prosperity."[4] The strategy elevated AI as a game changing technology that the United States must be ready to lead on, stating:

> "The Department of Defense's (DoD) Artificial Intelligence (AI) Strategy directs the DoD to accelerate the adoption of AI and the creation of a force fit for our time. . . . We will harness the potential of AI to transform all functions of the Department positively, thereby supporting and protecting U.S. servicemembers, safeguarding U.S. citizens, defending allies and partners, and improving the affordability, effectiveness, and speed of our operations."

The strategy outlines the department's goal for wide-scale adoption of AI tools, applications, and capabilities, which will require a major shift in current force structure and attitudes regarding the understanding and appropriateness of AI and its applications. The Joint Artificial Intelligence Center (JAIC) was tasked to lead coordination of AI activities throughout the department, including responsibility for "cultivating a leading AI workforce."

Effectively implementing this strategy will require both an AI-able and AI-ready DOD workforce. This includes technical talent and nontechnical talent across all ranks and grades. DOD personnel will need to work together with common understanding to develop, acquire, integrate, and utilize AI capabilities across the force.

However, growing, cultivating, and sustaining AI talent has been a challenge. Senior DOD officials, national security policymakers, and defense think-tank reports have all publicly stated that the DOD is struggling to recruit and retain the AI workforce it needs.[5] While there are several key challenges, reports abound of the DOD's inability to compete with the private sector in terms of salary.

This report takes a different approach to addressing this challenge: better leveraging the DOD's existing cadre of AI talent. We believe—and our research confirms—that the DOD has a wealth of AI-able talent already in its ranks. Making changes to empower this talent will therefore go a long way to advance the DOD's strategic AI goals.

Research Approach

The DOD's AI workforce is not easily measured or evaluated.[6] As an emerging technology that has only recently proliferated in adoption, thanks to advances in computing, cloud storage, and big data, the federal government's occupation classification system has not yet caught up. This extends to the uniformed services, who are still finalizing the implementation of the 2015 congressional legislation related to identifying and tracking cyber talent.[7]

Given this complexity, to enhance the reliability of our assessment, we scoped this study to the DOD's armed services—U.S. Army, U.S. Navy, U.S. Air Force, U.S. Marine Corps, and U.S. Space Force. We scoped the study in this way, instead of the entire DOD enterprise, when initial research revealed that the DOD is taking varied and wide-ranging approaches to managing AI talent.[8]

To best assess the DOD's AI workforce posture, we employed a mixed-methods approach. For our qualitative assessment, we interviewed 31 experts across each of the services and key offices of interest in the Office of the Secretary of Defense. We conducted several OSD interviews because we believe these offices offered important and valuable perspectives related to either overseeing or directly working with the services' AI talent. We used both existing networks as well as snowball sampling to obtain our set of interviewees, with targets for the range of roles and responsibilities we wished to include across services.

Table 1 below breaks down our interviewees by service and in OSD. Importantly, we note these interviews are not representative of the full range of stakeholder perspectives and experiences. In keeping our study reasonably bounded, we did not interview equivalent positions across each of the services as our goal was to obtain the range of approaches to defining, identifying, and tracking AI talent.[9] It became clear during our research that approaches vary widely both within and across services; every person interviewed had a unique perspective.

The range of initiatives and opinions regarding the DOD's AI talent were so varied that it is likely a truly comprehensive assessment

would include interviewing every office within every unit of every command for each service.[10] However, given the constraints of our study this was neither reasonable nor realistic. We instead opted to interview personnel across different types of commands and positions, uniformed and civilian, in leadership, technical, and nontechnical positions.

Table 1. DOD Interviews by Service

Service	Number of Interviewees
U.S. Army	12
U.S. Air Force	9
U.S. Navy	4
U.S. Marine Corps	2
U.S. Space Force	1
OSD	3
Total	31

Source: CSET and MITRE tabulations.

To analyze our interviews, we conducted a thematic assessment using NVivo coding software. We created a thematic codebook based on the interview protocol, research objective, and other notable discussion topics (see Appendix A for the list of discussion topics and thematic analysis codebook). We coded each interview using this codebook to analyze discussions specific to relevant topics or groups of interest. We analyzed selected individual codes through several lenses: in aggregate (all interviews), by service (for those with more than one respondent), and for uniformed interviewees versus civilians. We embed our findings as part of our discussion in each chapter of this report.

For our quantitative assessment, we considered several sources. First, we analyzed microdata from the U.S. Census Bureau's 2018 American Community Survey (ACS) on industry employment as well as top employers listed in LinkedIn Talent Insights for key AI occupations. The occupations considered were related to CSET's definition of the AI workforce, outlined in a separate report.[11]

After we had a complete list of occupations to consider, using both previous CSET research and the range of billets listed by our interviewees, we then analyzed civilian employment microdata from the Office of Personnel Management. Our final list included 12 OPM occupations, which we descriptively analyzed by service and over the last five years (2016–2020). Unfortunately, no analogous data is publicly available for the uniformed component.[12]

There are certainly challenges and limitations with our approach. First, as noted above, we were not able to interview personnel in equivalent positions across the services. While this allowed for a range of perspectives, we cannot make absolute and unequivocal comparative statements across the services. Second, interviews were semi-structured, and as such, did not all cover exactly the same topics or questions. The team shared the same list of discussion topics with interviewees, as developed from our interview protocol, in advance of interviews. However, due to differences in perspective and expertise, some discussion topics were more relevant than others. Third, some services were more heavily represented than others in our interview sample, due to sampling strategy, service size, and service investment in AI workforce development. This could affect the balance of our findings and recommendations. Finally, we were limited by the availability of quantitative data on DOD manpower and personnel, particularly regarding the uniformed service component.

Defining "AI Workforce" in the DOD

To understand what AI talent the DOD has, we must first define the DOD's "AI workforce." Just as there are several interpretations of what constitutes AI, so too are there varying interpretations of who makes up the AI workforce. This was verified by the range of interpretations of "AI talent" and "AI workforce" among our interviewees. While some described AI talent as the very technical core working actively on designing AI applications, others described the entire technical and nontechnical teams of talent that are needed to design, develop, acquire, and deploy AI tools or AI-enabled capabilities safely and effectively.

> "For this paper, we take the perspective that it takes an entire team—from the coders to the end users—to achieve mission success. Therefore, we interpret an AI workforce to include AI technical and nontechnical talent."

For this paper, we take the perspective that it takes an entire team—from the coders to the end users—to achieve mission success. Therefore, we interpret an AI workforce to include AI technical and nontechnical talent. We consider the broader range of personnel both actively and indirectly engaged in deploying AI-enabled tools and capabilities because all of these personnel matter if AI is to be widely adopted across the DOD enterprise.[13] That is, AI adoption is a team sport. Our definition therefore consists of the set of uniformed and civilian personnel engaged in the design, development, testing, implementation, maintenance, and acquisition of AI-enabled tools and capabilities:

- Technical talent: those with the knowledge, skills, and abilities to engage in the design, development, and deployment of AI or AI-enabled capabilities.[14]

- Nontechnical talent: those in roles that complement technical talent, including acquisition personnel and program managers.[15]

Previous CSET research identified two types of technical talent—those who are or could be directly engaged in the design, development, and deployment of AI, and those with the requisite knowledge, skills, and abilities (KSAs) that could perform these functions with minimal additional training ("AI-adjacent").[16] For example, computer scientists, software developers, database architects, operations researchers, and data scientists fit in the first of these types, while electrical engineers, mechanical engineers, and aerospace engineers fit in the second. However, for the purposes of this study we include all relevant technical talent jointly.[17]

While we did not directly measure leadership talent—those making budget, strategy, or other programmatic decisions for uniformed and civilian personnel—it was clear from our discussions that this talent is also critical to the DOD's AI adoption. Therefore, we do acknowledge their importance in this context and include both middle management and senior leadership in our assessment of challenges and recommendations.

The DOD's Hidden AI Workforce

This study began by exploring the premise that the DOD has more AI, AI-adjacent, and AI-capable talent than senior leaders in the DOD realize. The indicators that we explored, as described here, validate this premise. This runs counter to the prevailing wisdom in national security policy circles that the DOD is unable to compete for AI talent. To the contrary, we find that the DOD has an able workforce with AI and AI-adjacent skills; the problem is that it is underidentified, undervalued, and underleveraged.

Previous CSET research identified the national security community as one of the top employing industries of both technical and nontechnical AI talent.[18] Looking at microdata from the 2018 ACS, our analysis found that about 8 percent of technical talent and between 6-8 percent of nontechnical talent were employed in public administration.[19] Within public administration, national security was the top employer, comprising roughly 3 percent of employment for technical and nontechnical talent.[20] Public administration ranked third in top employing industries for technical talent, and third and fourth for CSET's two categories of nontechnical talent.

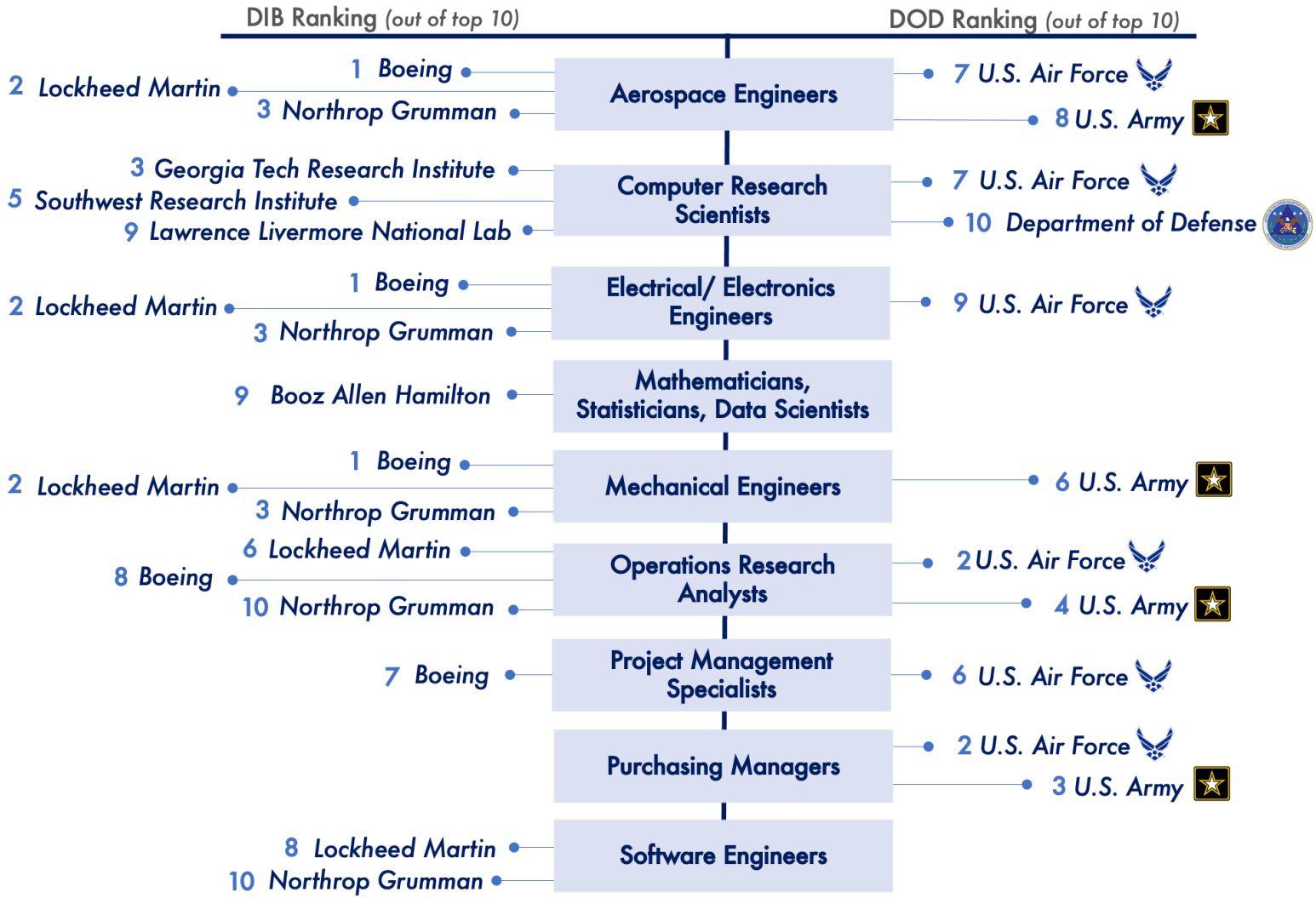
"Public administration ranked third in top employing industries for technical talent, and third and fourth for CSET's two categories of nontechnical talent."

In addition, CSET analysis of LinkedIn Talent Insights data reached a similar conclusion regarding several key AI occupations.[21] When looking at computer research and information scientists; software developers; statisticians, mathematicians, and data scientists; and project management specialists, we found at least one of the top employers for each occupation were entities considered part of the national security community.[22] For computer and information research scientists, four out of the top 10 employers were entities considered part of the national security community.

The importance of the national security community as a top employer of AI talent was even more apparent when we considered additional technical occupations such as electrical engineers, mechanical engineers, aerospace engineers, and operations researchers. For these occupations, we found half of the top employers were entities considered part of the national security community.

Table 2 showcases the presence of the DOD and the defense industrial base (DIB) as a top employer of AI talent across a range of prominent AI occupations. The complete list of all occupations and their top 10 employers is provided in Appendix B.

Table 2. The DOD is a Top Employer Across Selected AI Occupations



Note: We restricted our geographic search to the U.S. data for computer research scientists, software engineers, mathematicians, statisticians, data scientists, and project management specialists accessed December 2020. Data for aerospace engineers, electrical and electronics engineers, mechanical engineers, operations research analysts, and purchasing managers accessed March 2021.

Source: LinkedIn Talent Insights, CSET analysis.

Finally, we asked nearly all of our interviewees whether they agreed with our premise that the DOD had more AI and AI-adjacent talent than realized.[23] All of the interviewees we asked agreed with our hypothesis, regardless of how they defined AI talent. Many also described the large range of billets this talent could be found in, along with identifying other reasons why the services are not fully leveraging existing AI talent. We discuss this further in a subsequent section of this report.

"Given the strong AI and AI-adjacent workforce already employed by the DOD, the question then becomes how to identify and leverage this talent."

Given the strong AI and AI-adjacent workforce already employed by the DOD, the question then becomes how to identify and leverage this talent. Where is this talent hiding, why is it hidden, and what can the DOD do about it? We address these questions in turn.

The DOD's Approach to Identifying AI Talent

Our findings suggest the problem is not a lack of AI-talent in the DOD but rather an ineffective approach for identifying and leveraging AI talent. Each service is approaching the issue in different ways, both across and within the services. Most services do not have a formalized process to identify talent within their ranks. Here we discuss our findings by providing highlights from each approach.

AI talent is—formally or informally—overseen by a variety of organizations across the services. This is summarized in Table 3. The Air Force Directorate of Studies, Analyses and Assessments (AF/A9) shares responsibility with the Air Force Directorate for Strategy, Integration and Requirements (AF/A5) for the U.S. Air Force, while the Office of Naval Research (ONR) is the central entity for the U.S. Navy. The U.S. Army has two task forces working from different perspectives, the Army Talent Management Task Force (ATMTF) under the Office of the Deputy Chief of Staff for Personnel (G-1), and the U.S. Army Artificial Intelligence Task Force (AITF) under Army Futures Command (AFC). U.S. Marine Corps efforts are spearheaded by the Manpower and Reserve Affairs Department, and the U.S. Space Force has no known specific entity for AI talent management yet as they are still setting up.[24] Finally, the JAIC is the DOD's central coordinating hub for AI strategy, including workforce.

Table 3. AI Talent Tracking Organization by Service

Air Force	Army	Navy	Marine Corps	Space Force	DOD-Wide
AF/A9	Army Talent Management Task Force	NWIC	M&RA	N/A	JAIC
AF/A5	Artificial Intelligence Task Force	N5/N8			

Note: Service-level research laboratories (e.g., ONR, ARL, AFRL) also have independent efforts ongoing to identify their own civilian AI talent, but these efforts are not necessarily service-wide.

Source: CSET and MITRE tabulations.

Interviewees highlighted the lack of an effective means to quickly and accurately identify AI talent. Different efforts and strategies are currently employed or are in development, and interviewees indicated substantial room for progress. For example, service members often rely on word-of-mouth recommendations and referrals to find and access necessary talent. Another practice is to identify career fields or educational credentials that may not be AI-specific, but might indicate that the service member has requisite knowledge or skills that could be applied to AI. We also learned about a machine learning (ML) approach to identifying digital talent in which personnel files and other available documentation for uniformed and civilian personnel are scraped for data and coding skills.

Civilians

Across all services, interviewees highlighted a similar range of occupations linked most closely to civilian personnel with AI and AI-adjacent skills.[25] These were operations researchers, mathematicians, computer scientists, information technologists, and various disciplines of engineers.[26] While there is no guarantee these occupations include all AI expertise in the civilian force, nor can we state how many within these occupations have AI expertise, we are confident that a large share of technical AI and

AI-adjacent expertise are contained in these categories. Additionally, we learned that informal networks play a huge role in identifying AI talent, coordinating internally by word-of-mouth referrals and personal connections.

U.S. Air Force

The Air Force currently identifies AI talent through several means, but is planning to implement a skills-based approach. To date, identification happens through informal networks in addition to tracking relevant educational degrees and select career fields. For example, the most commonly cited uniformed career field applicable to AI by our interviewees was "operations research analyst." However, operations research analysts do not have all of the technical KSAs needed for AI, and discussions are underway for what additional career fields may be included.

Recent years have also seen a sustained push in the Air Force to coordinate AI activities and elevated the need for AI and related talent identification. The USAF-MIT AI Accelerator, an Air Force partnership with the Massachusetts Institute of Technology, established in 2019, is the central hub for Air Force AI.[27] The emergence of software factories—de facto centers of coding excellence—across the service also created a need to identify AI and AI-adjacent talent. Our interviewees noted this involved asking manpower, personnel, and services support to the Air Force for recent graduates of relevant programs along with informal networking. Networking includes reaching out to those having done tours in Education With Industry, those working in other software factories,[28] and those working on publicly known grassroots coding communities such as Airman Coders. One coding factory, BESPIN, also manages Digital University, which allows airmen to obtain online coding certifications through third-party providers.

Going forward, plans are in place to create AI-adjacent specialty experience identifiers (SEIs), which are two-digit codes for special skills and experiences attached to each billet.[29] This particular effort stems from the implementation of a service-wide Computer Language Proficiency Test that treats software coding skills similar

to foreign languages in terms of incentive pay. The Air Force will use the results to identify service members with coding skills and assign them a SEI.

U.S. Army

The Army has taken a different approach to identifying AI and AI-adjacent talent. The G-1 ATMTF employed natural language processing to conduct keyword extraction from résumés, position descriptions, personnel files, and Github repositories in an attempt to categorize the Army's AI workforce. This scan identified a "data workforce" of approximately 27,000 uniformed and civilian service members.[30] Additional measures were taken to ascertain what KSAs individual service members possess, including interviews, résumé reviews, and analysis of other special identifiers. Career fields commonly associated with AI were operations research and systems analysts, and information network engineers.[31]

The ATMTF is also working on several new AI-relevant talent initiatives.[32] One such initiative is a pilot program to create small "lab sprint teams" where a small cadre of AI talent is available for consultation for a given command. Another is the Talent Based Career Alignment program, created to increase high-performing officer retention by curating career paths to officers based on their stated interests. One path specific to AI is the data science master's program at Carnegie Mellon University in Pittsburgh. The Army also developed the Integrated Personnel and Pay System (IPPS-A) which the ATMTF plans to use to build out a database of their data workforce.

The AITF is working on several workforce pilot programs that include identifying and leveraging AI talent.[33] One program is the recently established Army Software Factory, which includes a partnership with Austin Community College to train service members in coding.[34] Another program is an AI scholar program through Carnegie Mellon University to graduate officers, noncommissioned officers, and civilians with master's degrees in data science or data engineering, or a certification in an AI cloud technician program.[35] Our discussions revealed, however, that there were challenges identifying participants and that deadlines

for military sign-off were after the deadlines for university applications.[36] Moreover, once the initial assignment with AITF was complete, it remained unclear if participants would continue on assignments that leveraged this expertise.

At least one U.S. Army Reserve unit is also taking on the initiative to better identify, classify, and assign AI and AI-adjacent talent. Discussions revealed about one-third of the members in the 75th Innovation Reserve Command (75IC), tasked with future force strategic planning in partnership with AFC, could be considered AI talent. To more effectively leverage this talent, 75IC has two approaches. First, members are given a generic occupational specialty code, enabling assignment flexibility. Second, 75IC is developing an internal Civilian, Education, Skills, Experience, and Certifications database in which they enter every soldier's and civilian's qualifications for tracking (similar to what the Army at-large is attempting to create with IPPS-A). This will allow for more targeted assignment matching, particularly for personnel with AI expertise.

U.S. Navy

The Navy follows a similar practice as the Air Force and Army in that they use a mix of occupational codes and specialty identifiers to identify personnel who may be considered AI talent. Interviewees observed that the most commonly cited career specialty for both officers and civilians with AI skills by our interviewees was operations research analysts. While this career specialty does not directly equate to "AI," advanced operations research (OR) degrees and related technical degrees were the closest identifiable and trackable proxy for AI- or ML-related expertise. This is particularly true for uniformed officers since the Navy Officer Occupational Classification System assigns a primary designation by broad functional area.[37] The Office of the Chief of Naval Operations, Assessments Division (OPNAV N81), within Naval Strategy, Resources, and Plans (N5/N8), tracks Naval Postgraduate School (NPS) graduates in OR and other relevant fields closely, and works with program offices to guide graduates into relevant billets. Service members with these degrees are given a subspecialty code, and efforts are also underway to track them in

subsequent assignments. However, interviewees noted this pool of graduates is small, and split between the Army, Navy, and Marine Corps.

For civilians, the Naval Information Warfare Center Pacific is the primary organization for talent identification, in coordination with ONR. While interviewees did not mention AI-specific talent tracking efforts, they did acknowledge that through word-of-mouth and project research the organization could identify the few who were working in AI/ML. In addition, faculty and doctoral candidates at NPS with relevant AI/ML experience can also be called upon as needed through informal networks within the Navy.

U.S. Marine Corps

The Marine Corps recently drafted a new AI workforce development plan to create military occupational specialty codes for AI, although the occupations coded are mostly AI-adjacent instead of purely AI.[38] One new code will be for data scientists, separate from the existing operations research MOS. The goal is to allow for greater workforce management and career tracking for these technical skills. They also have a goal to create "flyaway teams" for units to access AI talent. These teams will be modeled after similar teams in their intelligence operations for career fields with limited supply and high demand.

Interviewee Perspective

"This concept [flyaway teams] was that these would be trained in agile stuff and database engineering and could holistically look at a problem the Marine Corps is facing and suggest a way ahead for technologies to solve that problem . . . small detachments of experts in four- to five-month stints."

On the civilian side, we learned that only two Marine Corps personnel are considered research scientists with AI expertise. This is because the Marine Corps relies heavily on the Navy for its research and development, so it does not have the R&D infrastructure or staffing levels of other services. However, if AI talent is needed, informal networks within the Naval Warfare

Centers are used to find individuals with the KSAs necessary to meet identified needs, or similar talent from within ONR is tapped by personal request.

U.S. Space Force

As a new service, the Space Force has done relatively little in the way of AI talent identification and tracking. Moreover, the service is still closely tied, in terms of talent, to the Air Force.[39] One interviewee highlighted that, currently, the only way to assemble AI talent in the Space Force is to use personal connections similar to those noted above in coordination with Air Force A5/A9 to gather a small group of experts. However, the recent guidance from the U.S. Space Force Chief of Space Operations, Gen. John Raymond, also highlighted above signals a potential shift toward digital talent training, tracking, and identification.[40] In addition, the Space Force has their own software factories—Kobayashi Maru, a "command and control (C2) program," and Space CAMP, described as "the premiere software factory for Space Force" that is based in Colorado Springs and led by the same office in charge of the new digital workforce strategy.[41]

Joint Artificial Intelligence Center

At the department level, the JAIC is the centralized hub for all AI activities. Currently, the JAIC is coordinating with each service to design and implement an archetype system for AI talent to deliver tailored AI education for different segments of DOD personnel. These six archetypes are: Lead AI, Drive AI, Create AI, Facilitate AI, Embed AI, and Employ AI.[42] Their first pilot program began in October 2020, with the goal of using these archetypes to design and provide education and training programs at scale. In the longer term, the JAIC hopes to use these education platforms as means of creating unifying certifications that signal competency in specific AI fields, based on the archetypes. However, there is also difficulty in mapping these archetypes to existing manpower categorization systems.

The DOD's Civilian AI Workforce

There are no explicit AI occupation codes in the uniformed or civilian force. However, as noted above, interviewees were able to isolate a reasonable range of civilian occupations linked most closely to personnel with AI and AI-adjacent skills.[43] In addition to the occupations cited, our own research of news media and USAJobs position descriptions revealed additional codes related to technical and nontechnical talent, such as program and management analysts and contracting and purchasing agents. While this may not include all DOD civilian AI, AI-adjacent, or AI-capable billets, given the misalignment of OPM's occupational codes and hiring practices of individual services, we are confident these occupations comprise a large share of this target workforce.[44]

OPM collects and publishes civilian personnel data for the federal government. OPM also oversees the occupational taxonomy used for civilian positions (i.e., billets), which is different from the taxonomies used by other occupational data-reporting federal agencies (e.g., the U.S. Bureau of Labor Statistics, and the U.S. Census Bureau).[45]

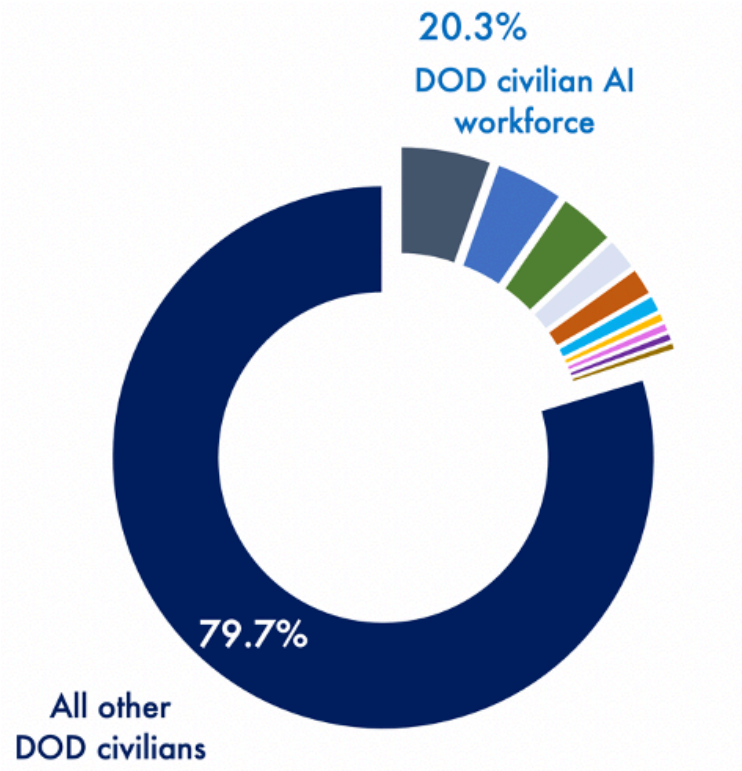
According to OPM data, as of 2020 the DOD civilian workforce consisted of roughly 770,000 workers. Most of these personnel were housed in the Army (over 256,000), followed by the Navy (226,000), then the Air Force (176,000), and finally the Office of the Secretary of Defense (112,000) which includes the DOD's independent agencies.

Using OPM data on the occupations AI technical and nontechnical talent likely fill, it is possible to provide a general description of the DOD's civilian "AI workforce." Our list is composed of 12 technical and nontechnical occupation codes—what we call "AI occupations" for the purpose of this analysis—listed below.

- 2210 - Information Technology (IT) Management
- 0343 - Management & Program Analysts
- 1515 - Operations Research
- 1105 - Purchasing
- 1102 - Contracting
- 0830 - Mechanical Engineering
- 0850 - Electrical Engineering
- 0854 - Computer Engineering
- 0855 - Electronics Engineering
- 0861 - Aerospace Engineering
- 1550 - Computer Science
- 1520 - Mathematics

Together, these 12 occupations accounted for roughly 20 percent of the DOD's civilian workforce in 2020, totaling about 157,000 personnel across the services. As shown in Figure 1, IT management comprises the largest share of this talent at 5 percent.[46]

Figure 1. Identified AI Occupations as a Share of the DOD Civilian Workforce, 2020

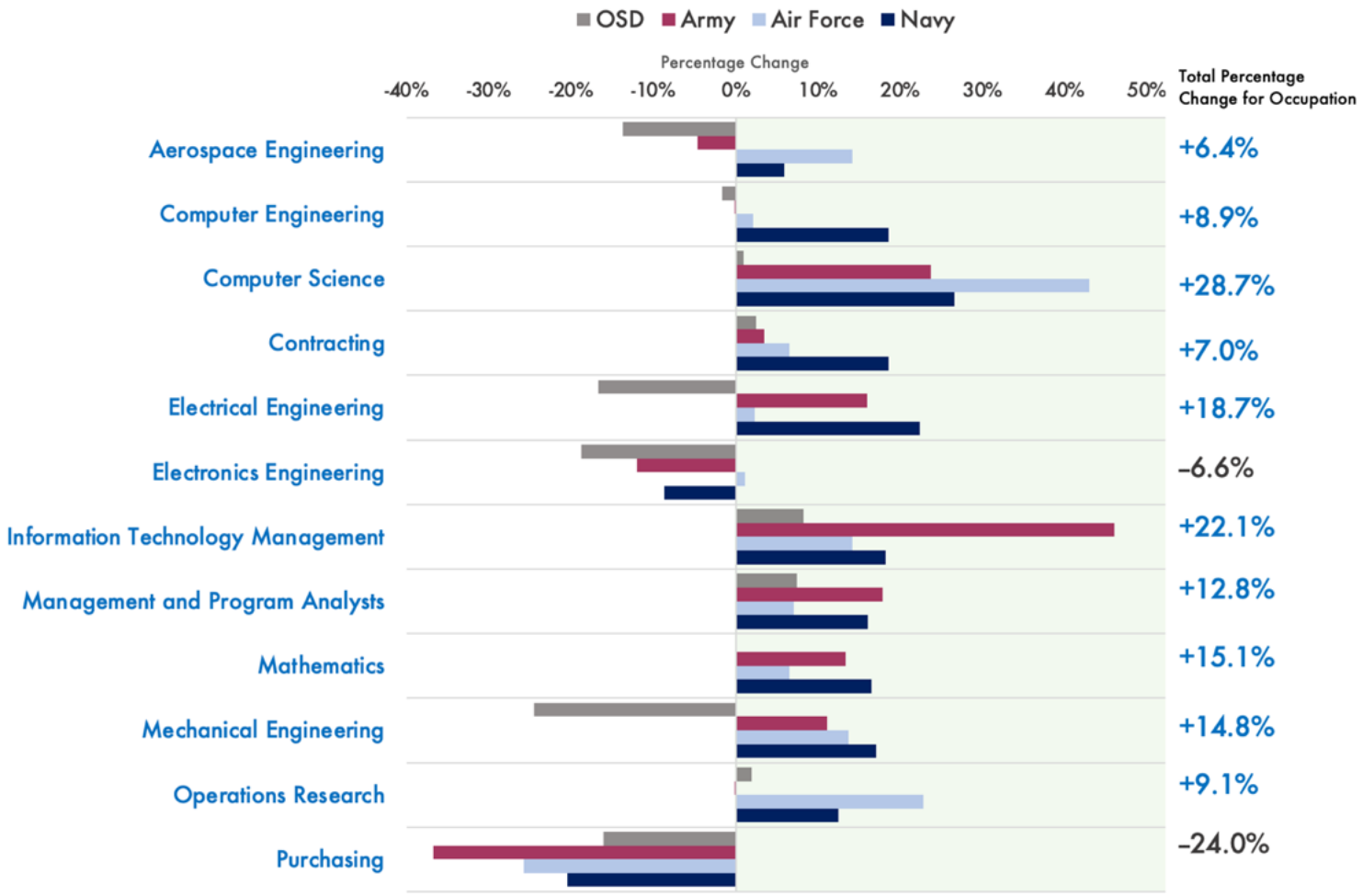


Occupation	% of DOD
Information Technology Management	5.5%
Management and Program Analysts	4.1%
Contracting	3.4%
Electronics Engineering	2.0%
Mechanical Engineering	1.7%
Computer Science	1.1%
Aerospace Engineering	0.6%
Operations Research	0.6%
Electrical Engineering	0.6%
Computer Engineering	0.5%
Purchasing	0.1%
Mathematics	0.1%

Source: CSET analysis of 2020 FedScope OPM data

Since 2016, most of the DOD's civilian AI talent has increased. However, this increase has been uneven, as shown in Figure 2. While the Air Force and Navy generally experienced widespread increases in AI and AI-adjacent personnel, the Army and OSD saw both increases and decreases. The only occupation to see decreases across the services and OSD was purchasing agents, which are part of the acquisition workforce. It is likely that decreases in electronics engineers were offset by increases in the number of electrical engineers.

Figure 2. AI Occupational Employment Change Over Time, by Service (2016–2020)



Source: CSET analysis of 2016–2020 FedScope OPM data.

Note: Total employment over 2016–2020 in these 12 occupations increased 4 percent in OSD, 17 percent in the Army, 10 percent in the Air Force, and 13 percent in the Navy. Total DOD employment in these 12 occupations increased 12 percent, going from 140,000 in 2016 to 157,000 in 2020.

In general, the technical talent included in these occupations grew more than the overall civilian workforce, in ways we might largely expect. For example, the Air Force greatly increased its number of aerospace engineers and operations research analysts, and the Army increased its number of mechanical engineers. Notably, the Navy had double-digit increases for each of these occupations, with the exception of electronics engineering, aerospace engineering, and purchasing.

Moreover, this data suggests computer scientists—a small but critical AI occupation—are increasing rapidly in the DOD. The increase in computer scientists is much faster than the DOD's total civilian workforce, as shown in Figure 3. The Air Force led the increase in computer scientists, increasing its cadre 43 percent between 2016 and 2020, with the Navy and Army also experiencing large increases. Interestingly, however, as of 2020, Navy totals included almost twice as many computer scientists as the Air Force, and more than three times as many as the Army.

Figure 3. Percent Growth of the DOD's Workforce for Selected Groups (2016–2020)

+ 8.4%

growth of the DOD's **civilian workforce**

+ 12.1%

growth of the DOD's **civilian AI workforce**

+ 28.7%

growth of the DOD's civilian computer scientists

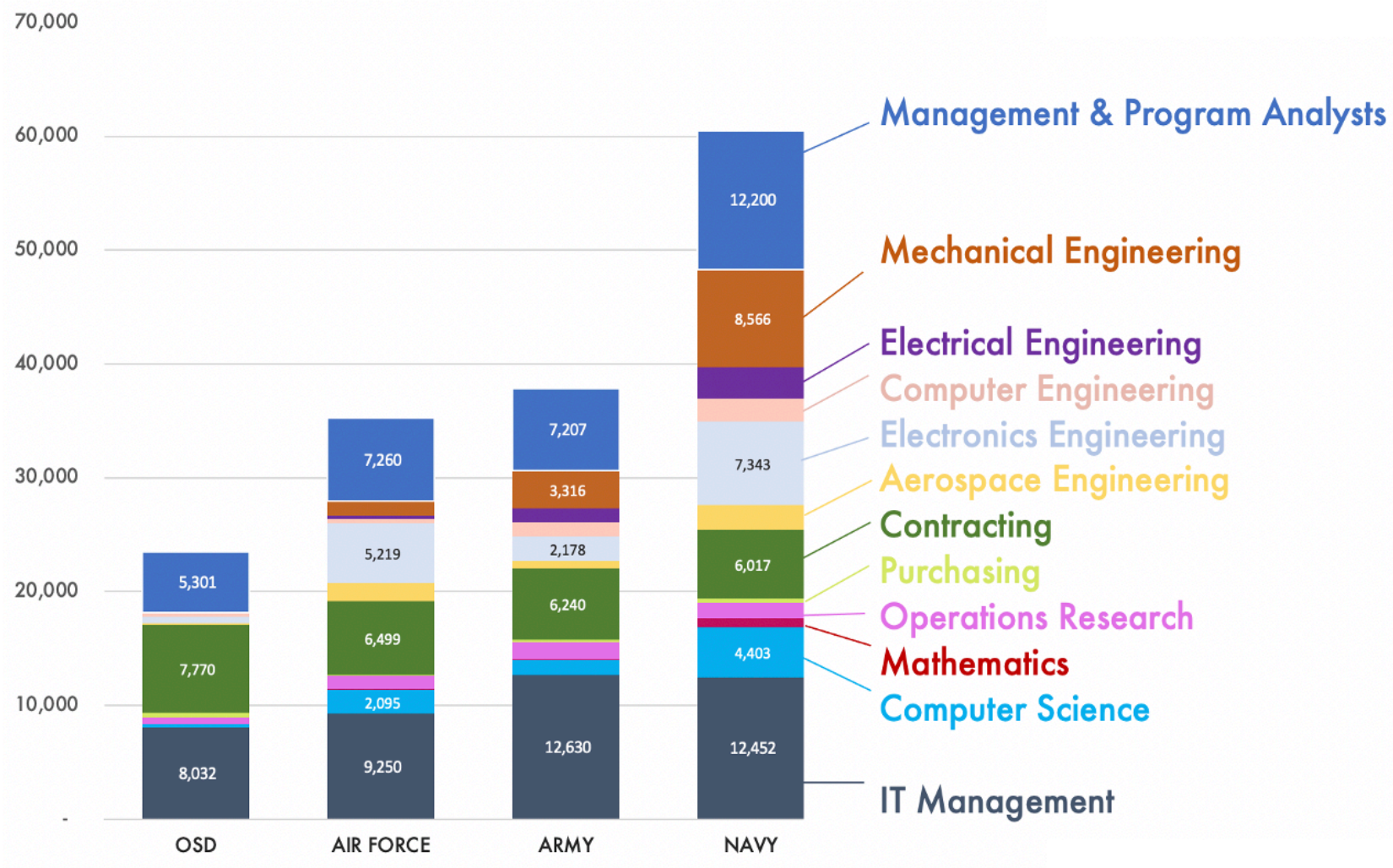
Source: CSET analysis of 2016–2020 FedScope OPM data.

We next examined OPM microdata of civilian DOD personnel to show how these 12 AI occupations were distributed among the services. Some occupations (e.g., IT management, operations research, and contracting) are well-distributed, with no single service housing more than one-third of that specified talent. Conversely, other occupations are vastly overrepresented in certain services. For example, over 50 percent of computer scientists, mechanical and electrical engineers, and computer engineers are found in the Navy.

A closer examination of this talent's distribution within each service reveals most are concentrated within certain commands. For example, the majority of computer scientists can be found in OSD's Defense Information Systems Agency, the Air Force Materiel Command, the Army Futures Command, and in the Navy's Naval Information Warfare Systems Command, as well as its Naval Sea Systems Command. A similar distribution is found for the Air Force's, the Army's, and the Navy's operations research analysts and computer and mechanical engineers.

As Figures 4 and 5 demonstrate, the Navy by far has the most civilian talent in these occupations compared to the other services. As shown in Figure 4, the Navy's employment total in these 12 occupations is nearly double that of the Air Force's or the Army's. Moreover, in some of these occupations, the Navy's workforce surpasses that of the other services. For example, the Navy has more civilian computer scientists than the other three services combined.

Figure 4. AI Occupational Distribution Across DOD Services, 2020

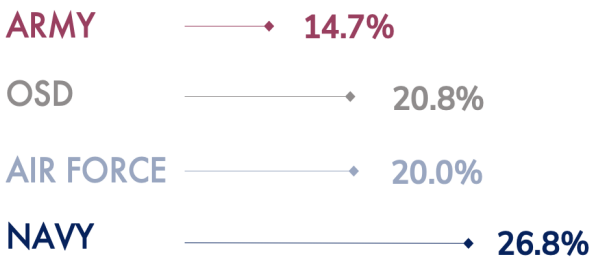


Source: CSET analysis of 2020 FedScope OPM data.

The Navy also has the highest share of its civilian workforce in these occupations. As shown in Figure 5, these 12 occupations comprise over a quarter (26 percent) of the Navy's civilian workforce. This compares to 14 percent for the Army, which has the largest civilian workforce yet the smallest share comprised of these occupations.

Figure 5. The Navy Has the Highest Share in AI Occupations

All 12 occupations as a percentage of each service's civilian workforce



Source: CSET analysis of 2020 FedScope OPM data.

This data supports our hypothesis that the DOD may have more AI and AI-relevant expertise than is commonly understood. Claims that the DOD lacks this talent is not borne out in this data, particularly given notable expansions of its computer science workforce. Moreover, our interviews suggest technical military billets are also distributed among the services, and many service members (both officers and enlisted) may be in nontechnical billets but possess AI skills.

Why the DOD's AI Workforce is Hidden: Challenges

Interviewee Perspective

"Talent is 'hidden'—in many cases the jobs they are working today aren't their true passions, they are just put there. For example, someone in the medical field was coding at night. There was no formal process for identifying them."

Our interviews revealed many reasons why the DOD's AI and AI-adjacent workforce remains hidden and not effectively leveraged. These reasons are myriad and complex; intertwining strategy, people, processes, and technology.

Here we provide a discussion of these reasons as raised by our interviewees. While some services experienced varying degrees of these challenges and barriers, our analysis finds that most, if not all, of these reasons affect each service to some degree.

Service-Level AI Strategies

What is considered AI, and its relative strategic importance, varies widely across services and within organizations. While interviewees across services noted an emphasis on AI coming from senior leadership, each service approached actual AI adoption and prioritization of adoption slightly differently. Moreover, interviewees inconsistently defined both AI and AI talent. Some interviewees grouped autonomy with AI, some equated ML to AI, while others followed a stricter definition of AI (many in the latter category were AI practitioners). A two-tier problem exists within the services: leadership wants AI without proper understanding of the technology, while practitioners often focus on their area of application to the exclusion of broader application areas.

Interviewee Perspectives

"What is AI talent? [We] debated a lot on how to identify that talent in a community that didn't itself promote it or even was self-aware of it."

"You're trying to gauge workload for an organization that wants to become data/AI enabled and doesn't know what that entails."

Interviewees noted at least one consequence of prioritizing AI without understanding AI: an overinflated importance placed on software developers. They noted that while important, software developers are but one part of the AI workforce. Many professionals with AI-adjacent skills who are not software developers by training have pivoted to deliver key AI capabilities for their local missions. Yet there was concern that software developers were given undue influence that risked dominating AI-related policy conversation or decisions.

Interviewee Perspective

"There is a lot of talent that has the potential [to work with AI]. . . . We went through a myriad of different studies and articles, what you need for appropriate robustness in the data science team [is] like 19 roles. Ethicists, researchers, social scientists. . . . [You] can't build [an] AI stack with only software developers or UI engineers."

There is no agreement across the DOD on who constitutes the AI workforce and how much investment and prioritization should be given to cultivating AI talent in-house. Some interviewees believed AI expertise should be left to contractors, federally funded research and development centers, and university affiliated research centers, having some general technical operational, maintenance, and acquisition talent in-house. Others acknowledged the need for some top-tier AI expertise within their organization, since there are some capabilities that are best suited for direct development by uniformed or civilian personnel. When we asked interviewees about the JAIC's categorization of AI talent into six archetypes, many agreed with the premise, but none had

thought about how or how well that translated into practice for their service.[47] These differences also factor into why each service's AI workforce is overseen by varying commands or groups, making any attempt to standardize AI talent management extremely difficult.

Larger strategic challenges stem from a lack of a shared view of AI's capabilities, limitations, and mission suitability. Different views on AI have led to a range of approaches across DOD elements. For example, many interviewees discussed challenges, including how others within their organization had a lack of understanding of AI, whether as a tool or a technique; skepticism about the current state of AI as being ready for wide-scale adoption across processes and operations; availability of adequate technology and investment in modernizing data systems; reliance on contractors for technical capabilities; organizational culture; and the ability for both the planning, programming, budget, and execution processes and requirements processes to adequately include AI as a nonmaterial capability.[48] Some of these are tactical and discussed in more detail below, but the aggregation of these is an organizational reality.

"Nevertheless, how each service defines and categorizes AI will factor into how services define their AI workforce, determine who is a part of this workforce, and decide on how this talent is trained, assigned, and promoted."

Regardless of cause, the result is an inconsistent prioritization of investing in and adopting AI, which directly results in inconsistently identifying, leveraging, and cultivating a dedicated AI workforce. Nevertheless, how each service defines and categorizes AI will factor into how services define their AI workforce, determine who is a part of this workforce, and decide on how this talent is trained, assigned, and promoted. We do not assert that services should adopt a uniform definition of AI,[49] we do contend that it is not necessary for services to have the same mix

of AI talent. In fact, given differences in needed AI capabilities and applications for AI across services, it is beneficial for services to have a different mix of AI talent.

OSD and Service-Level Culture

Organizational culture for each service represents another barrier to leveraging the DOD's existing AI workforce. Interviewees noted that organizational strategy and organizational culture are intertwined. However, culture embodies its own challenge when it limits forward-thinking and encourages misaligned performance incentives for leveraging AI talent. While each service has a distinct culture, this challenge affects them all.

Organizational culture is critical not only in influencing organizational AI strategy, but in how services approach talent management. In addition to congressional mandates regarding end-strength quotas and officer promotions,[50] culture is a key determining factor for how each service's uniformed and civilian personnel are classified, assigned, and promoted. While culture is broader than the AI talent topic, conversations about AI talent are necessarily part of this discussion and will be affected by culture.

> "As a result, little opportunity outside of self-initiative exists to build, use, and maintain technical expertise. Moreover, technical talent can be less highly regarded than their combat peers because of service culture."

For example, we heard from multiple interviewees that having warfighting experience was not only celebrated, but necessary for promotion. By design, officers change assignments every two to three years. These rotations normally include a mix of operational tours, broadening experiences, education and instructional tours, and service headquarters or joint operation tours, in addition to assignments that align with the officers' primary career field. The guiding mindset is for service members to

be combat or operation-ready, a concept that remains largely defined by traditional warfare. As a result, little opportunity outside of self-initiative exists to build, use, and maintain technical expertise. Moreover, technical talent can be less highly regarded than their combat peers because of service culture.[51]

Finally, in another dimension of culture, we heard about the limited risk tolerance and willingness to divert from the traditional, long acquisition processes. There was a sense that it is ingrained in hearts and minds of service members that to receive positive performance evaluations, and maximize promotion potential, existing rules and procedures require strict adherence.

People

Each service has an inconsistent interpretation of its AI workforce, AI workforce needs, and in their ability to identify AI talent. AI workforce leaders have different, often nonoverlapping visions of talent composition (whether it be uniform, civilian, or contracted out) and number (how many uniformed members should be AI-technically savvy). Consequently, skilling and training military personnel in AI becomes ad hoc and falls heavily on individual drive.

Interviewees disagreed not only on how much technical talent is needed, but where in the organization this talent should be located. Still, they agreed the current personnel structure is not designed to cultivate and leverage technical expertise. The degree to which contractors are relied upon also came up on multiple occasions, with some interviewees lamenting the lack of in-house capability while others believing it was the right division of labor given in-house funding and other personnel constraints.

Interviewee Perspectives

"[It's] also important to recognize a distinction when talking about coding [and the] relevance between low code and high code. We don't need a whole [service] who can expertly code. But [we] do need a better understanding of low code opportunities, and an awareness to identify where discrete algorithms can fix problems. [We] need broad brush understanding of low code, and niche areas of high coding opportunities."

"No. I don't think everyone should be a coder. Further, I believe we are over STEMing our force. [We] don't need a STEM degree to operate sats. Need team players and communication skills. You don't do math on a console. You work from a checklist and work as a team. And we are less diverse when we make arbitrary roadblocks regarding STEM degrees."

We also heard accounts of enlisted service members taking the initiative to build AI expertise, but commissioned officers being prioritized for the few opportunities that exist to use these skills.[52] A fair number of enlisted service members either already have AI-adjacent coding skills coming in, or took their own initiative to learn them through extracurricular online coding boot camps and programs via entities like the Air Force's Digital University. Several interviewees noted that for any software factory or other opportunity to build or use coding skills, interest from the enlisted community far exceeded demand. However, interviewees also noted limited opportunities for enlisted talent to use these skills.[53]

For opportunities that do include enlisted service members, very few slots are dedicated to them. The stigma that enlisted service members' expertise is inferior to officers remains a cultural barrier that limits effectively leveraging the greater pool of AI and AI-adjacent talent. In an interview about the USAF-MIT AI Accelerator, its deputy director recognized the importance of enlisted service members in advancing its goals, saying "*The only way we get to that level is including more enlisted folks. . . . There's a lot more meat on the bone with them and the future of AI is in the enlisted, not in the officers. The officers will play a very important role in this, but we will need the enlisted by sheer numbers.*[54]

Formal and informal AI and AI-related communities have been an important convening mechanism for talent, but remain frail and fragmented. In a more positive light, interviewees noted several instances of individuals taking the initiative to form and maintain technical communities of practice. These communities—both uniformed and civilian, formal, and informal—were established and growing within existing cultures across services. These include, for example, Platform One, Airmen Coders, and Naval Applications of Machine Learning.

However, they are scattered across the DOD. While these communities of practice provide a powerful organizing and convening function, unless they are part of a larger network, or supported organizationally, they risk frailty. Moreover, many lack sustained funding streams. This could explain why, in spite of these communities, interviewees continued to stress the importance of personal connections in identifying and accessing technical talent. This included interviewees in strategically technical positions, such as in a software factory.

Interviewee Perspective

"There's always going to be interpersonal connections. One idea we had was a competition page and to see what happens if we put a cash prize and use that as a designation prize. I think that was one of the best ways of looking at this problem set, like how do you identify these people? Because you have people taking Udemy courses in their rooms and you have to find those people and give them opportunities."

The role of personal connections in building AI-related research portfolios was particularly salient for research lab personnel who felt disconnected from the "big" service. While some efforts exist, for example a "dotted line" or informal chain of command between Army Research Lab and Army Futures Command, the "valley of death" remained very real for other researchers.[55] Researchers without personal connections remained relatively siloed in their efforts, with no clear project impact. For example, interviewees at the Naval Information Systems Warfare Command noted a rotation

program into the larger NWIC did not result in a lasting connection. Many ultimately did not come back to the NWIC and moved on.

AI rock stars are critical players in cultivating an AI workforce. They thrive in spite of, not because of, their organizations' incentives. AI "rock stars" are essential but extremely rare within each service. These rock stars not only know AI and have AI or AI-adjacent expertise, but they are in positions to enact the policy changes needed to create a formal AI workforce. That is, they have AI expertise, see the potential of AI and want to build this expertise across the service, have close, positive relationships with senior leadership who support their recommendations, and are working in or directly engaged with headquarters personnel or talent management. We were fortunate to speak with a few such rock stars. When we asked these interviewees what would happen when they left their current assignment, they did not know how their initiatives would continue. Yet without these rock stars strategically positioned, it is not clear how needed changes to personnel policy will happen.

Interviewee Perspectives

"Most of my work was done out of frustration."

"We were both at the point of career where it was like, 'what are you gonna do, fire me?'"

"The [X] says I'm not allowed to go anywhere, and we're in hostage negotiations right now for another three years. We don't have a backfill because there's not enough people who understand how to use the tech and navigate the decision cycle."

Senior leaders championing AI adoption and workforce development are essential, yet their understanding and appreciation of AI is highly inconsistent and support often ends when that leader rotates out. Interviewees also discussed senior leaders, noting their importance in whether AI workforce initiatives were prioritized or not. While many interviewees stressed the importance of executive education in helping senior leaders

appropriately define AI and AI use-cases, they also expressed concern for what happens when senior leaders who champion AI leave their positions. For example, the fate of a planned initiative for six new officer career pathways in the Army Special Operations Forces, two of which are designed to leverage technical expertise, lies with the championship of a senior commander.[56] Additionally, interviewees also expressed that members of senior and middle management may not have the technical, political, and mission awareness of where AI is suitable and appropriate for implementation.

Interviewee Perspective

"[Flag officers] knew how to spell AI, they knew how to spell ML, and that was the extent of it."

Middle management lacks incentive to take risks. AI, as a big unknown, represents a large risk. In terms of leadership, many interviewees discussed the "frozen middle," middle management that—for reasons noted above—lacked incentives to prioritize AI workforce development. Many middle managers are focused on the mission at hand, avoiding political risk, and circumventing distractions that might veer them from their career path or promotion potential. These managers, like senior leaders, may or may not understand what AI is, but unlike senior leaders, lack a sense of urgency to make AI adoption a priority.

Finally, there are concerns about the lack of AI literacy across the organization. This is particularly relevant for operators who work or could work with AI-enabled systems, and for acquisition talent that will be involved in the purchase and delivery of such systems. Interviewees questioned what types of training should be available, how such training should be delivered, and who should take it.

Processes

By far the largest issue cited related to leveraging AI talent was the state of uniformed and civilian talent management procedures and practices. These challenges begin before talent is

even hired, commissioned or enlisted, and affect each part of the talent management life cycle.[57] Issues are rooted in budgeting, personnel regulations, data infrastructure, culture, and organizational processes. The result is an environment where AI talent is very difficult to identify, measure, track, and promote. This leaves the idea of a clearly defined "AI workforce" as just an idea, unless larger changes or adjustments are made.

On the uniformed side, few opportunities or incentives exist within the current talent management structure to cultivate and leverage AI expertise. Officers and enlisted members follow a formal process of occupational assignment, training, and duty assignments or rotations that do not prioritize technical expertise. In addition to occupational taxonomies that are mission or operation-centric instead of skills-based taxonomies, each occupation has a defined career pathway.

Interviewee Perspectives

"The guidance I was given was to go to a lab or go back to academy. . . . I'm the only uniformed officer with my [AI] expertise and I can't use it."

"The Navy had been taking an all or nothing approach. It was either this two year [operations research advanced degree] program, and if you do anything for two years outside of your community, you're no longer promotable."

"So the path for becoming good at AI was in direct odds with the track for promotion . . . the Navy doesn't value its AI talent. If you have the skillset on the data analytics/ML/advanced computing/AI—you can have these skills and you have done your time out of the community to get these skills, and then you are unpromotable. Of all the people that have these skills, none can get promoted. Anyone who touches NPS is done."

"I can jump around to software factories but that is a huge risk. I remember when I just got to [X] and [X] said, 'You know all of your careers are at risk coming here, but we're gonna try something new.' It was very motivational but it was also very honest."

While it seems the Marine Corps demonstrates more talent management flexibility than the other services, it too is plagued by

bureaucratic challenges. Our discussions revealed that the timing, eligibility, and tracking for the new MOS codes are not final. Moreover, extensive discussion and planning went into their establishment, including a strong and vocal push by a few "rock stars," hundreds of white papers, and now an AI workforce strategic plan.

For civilians, there are at least 12 occupations that comprise the AI workforce, with no clear way to identify AI expertise. When asked what billets civilian AI talent are found in, interviewees noted a range of about 12 occupations (analyzed above). Not only are there limitations of OPM's occupational taxonomy that make AI talent identification difficult, but it is often the case that positions are filled based on what is funded and available. Instead of reclassifying billets, which is a timely process, units are more likely to hire in whatever billet is already available and vacant, tailor the announcement, and when the hire arrives take on the desired roles and responsibilities. We spoke with several civilian practitioners with AI skills who either did not know what billet they were formally hired under or acknowledged their daily work did not actually align with their formal position description.

Interviewee Perspectives

"People come in with these titles that have very little to do with what they actually do. I'm a research scientist and some come in with research scientist titles and end up doing acquisition or program engineering. You come in based on your past experience and prior education and you are assigned a title based on that, and I'm not sure if your title ever really changes."

"There is no one type of code that you can say 'that's AI talent,' right? Yes. AI and software development are not synonymous. You can be an ethicist and contribute to AI and not code or anything."

AI-related project assignments for civilians are ad hoc, particularly at the research labs. Here we learned of an interplay where researchers appreciated the internal labor market and some autonomy over which projects they worked on. It provided flexibility to work across groups and build networks. However, it

was also noted that word-of-mouth and active network cultivation was a major factor, and that these networks tended to be haphazard and tenuous. There is also the issue of not knowing the right people which can result in missed opportunities. This challenge is further exacerbated by not having a centralized repository or database of personnel with AI or AI-adjacent skills that could aid in talent identification.[58]

Interviewee Perspective

"It's just sort of run-of-the-mill scientists and engineers who have read some books, taken some classes, and are now trying to do this. When I got the job descriptions [of different job titles] in the read-ahead [our interview questions], I just kind of laughed because . . . you get what you can get [on the AI/ML projects]."

Many interviewees raised serious concerns over current budgeting, requirements, and acquisitions processes that inherently limit AI adoption. Several interviewees noted that discussion about AI-enabled capabilities and AI workforce were moot if AI was not included in requirements. They explained that all roads lead through requirements, and that personnel were incentivized to follow their part in the process. If AI was not included in the requirements, there would not be AI embedded into the capability, nor would funding be available to integrate AI.

Also regarding requirements drafting, interviewees noted the potential for disconnect in leveraging AI expertise due to the division of roles and responsibilities across different units or groups. That said, interviewees did note at least one area of progress beneficial to integrating AI—the creation of cross-functional product teams in the Army Futures Command. These teams coordinate with each other and with the Army AI Task Force on drafting all requirements.

Technology

Interviewees expressed concern over current limitations in service-level data curation, integration, accessibility, and software availability, all needed for AI development and

deployment. For example, several interviewees discussed the difficulty of obtaining licenses for current AI and AI-adjacent software packages, due to funding constraints and outdated policies still in place in some parts of the DOD for software acquisition. As with any technical skill, there is critical dependency on the tools required to deliver capability. So successfully onboarding AI talent requires an equal focus on ensuring the right tools and development environment is in place and is adequately supported. However, without appropriate access to software and tools, the process for leveraging and retaining AI talent is further hindered.

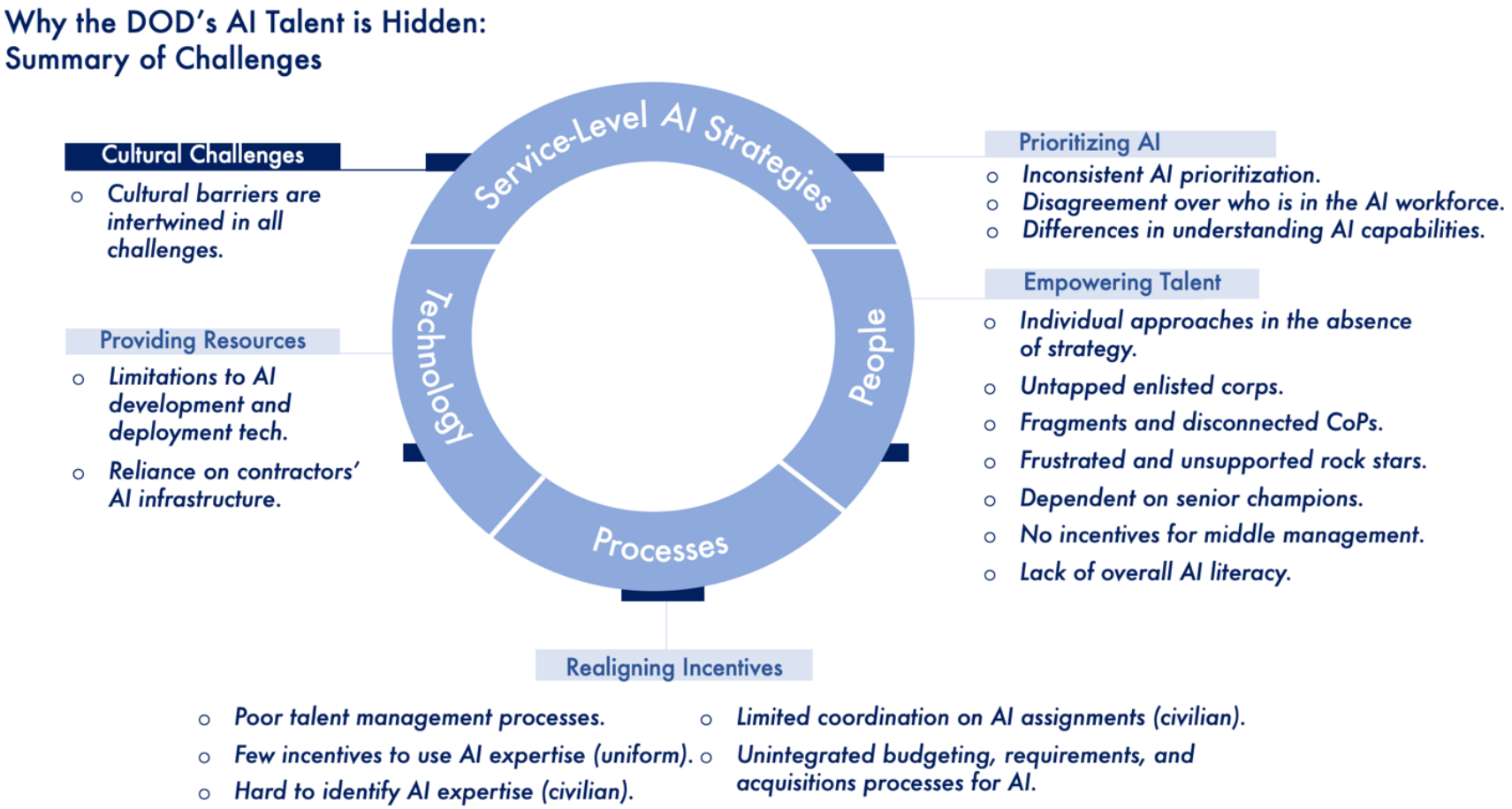
Interviewee Perspectives

"The requirements to get a piece of software were designed in the 1990s and had not been updated since. The requirements were impossible and prevented people from putting software onto NMCI [Navy/Marine Corps Intranet], [it's] something like 13 steps to get it on legally. You have to run the latest version, and if an update comes out you had run the whole process again. Obviously, now software updates come out on a more frequent basis and the process was just impossible. We came to a work-around—there are science and tech seats and you can download the software and then test them out."

Some interviewees reiterated points made in other related reports on the DOD's AI readiness pertaining to the DOD's fragmented and legacy data systems and infrastructure.[59] While less directly related to AI workforce as other observed challenges, this impacts the ability of the DOD to "do AI." That matters for attracting and retaining civilian talent, as well as for creating opportunities to train and leverage uniformed AI expertise.

Finally, interviewees noted substantial reliance on contractors for data warehousing and analytics because of inherent challenges. They believe substantial technology investment is needed to modernize systems, although we note the public discussion of ongoing initiatives now taking place in this regard.[60]

Figure 6. Summary of Why the DOD AI Talent is Hidden



Source: CSET and MITRE interview analysis.

Leveraging the DOD's AI Talent: Recommendations

Given that safe and effective adoption of AI requires a team, we believe the DOD should include the relevant technical and nontechnical talent as part of any effort to better identify, measure, track, and leverage AI talent. Moreover, we believe some AI capabilities cannot be contracted to the private sector. This implies that services should cultivate some amount of top-tier technical talent in-house. Our recommendations therefore consider all of the above talent, in addition to managers and leaders who are important change agents.

The recommendations presented here stem from the challenges identified above. We begin with an overarching strategic recommendation as it sets the foundation. We then present recommendations in relative order of actionability to promote the identification → experimentation → implementation → harmonization framework. We also note that our recommendations focus on leveraging the potential of the DOD's existing workforce, so we do not focus on attracting and recruiting new talent although this is also clearly important.

It may not be the case that each service-level recommendation is appropriate for each service. Moreover, some of these recommendations are complex, intertwined with bigger issues that are difficult, time-consuming, and potentially costly to change. However, we believe that all of our recommendations are critical to effectively leveraging and sustaining the DOD's AI workforce.

Service-Level AI Strategies

Without actively prioritizing AI adoption in each service, there will be limited prioritization and investment in their AI workforce. Each service should therefore clearly and publicly create a strategy for cultivating its AI talent.

Rec 1: Clearly and explicitly make AI adoption and organization a priority by having each service create an AI workforce strategy and implementation plan.

Given the variation in organizational AI across services, it is important that each service create a strategy specific to their AI workforce. This should include defining technical and nontechnical AI talent, the associated roles and responsibilities needed to execute the service-level AI strategy, existing AI talent gaps as determined by an AI workforce assessment to major commands and component functional community managers (CFCMs), and plans for how this talent will be identified, assigned, and promoted. It should also consider how the defined AI workforce relates to the JAIC's six AI workforce archetypes, as defined in the AI Education Strategy,[61] and be consistent with the DOD's AI Strategy.

People

Armed with an AI workforce strategy, services must now put in place building blocks to effectively identify and leverage its AI workforce. This includes short-term measures in AI talent identification, harnessing the AI potential of the enlisted corps, connecting AI communities of practice, rewarding AI "rock stars," and investing in AI education and training.

Rec 2: Engage in short-term AI talent identification and tracking techniques using a skills-based assessment.

Services should engage in immediate technical and nontechnical AI talent identification, leveraging, training, and sustainment practices until a more formal strategy and implementation plan is in place.[62] There are practices the services can execute in the near term. These include:

- Competency assessments issued by each functional community.
- Processes for self-reporting of AI and AI-related skills on personnel files.
- Recording AI and AI-related skills identification through special identifiers added to billet information.
- Creating a service-wide skills database or repository (instance to existing platform) accessible at a minimum to X1, component functional community managers (CFCMs), OSD functional community managers, established AI

Centers of Excellence, and recognized AI-related communities of practice.
- Tracking AI-related educational attainment in both personnel files and the central repository.
- Ensuring timelines of training enrollment deadlines align with internal assignment processes (e.g., submitting university application materials before the due date).

Rec 3: Create more opportunities for enlisted service members who possess AI and AI-related skills.

We recommend empowering the enlisted community by creating opportunities to upskill for AI, bring AI expertise into assignments, and participate in strategic and tactical conversations surrounding AI deployment and operation. Such opportunities include increasing the number of rotational opportunities with industry (e.g., Education With Industry), tours at service-level AI Centers of Excellence and software factories, and increased eligibility for pilot AI education and training programs.

Engaging the expertise and experience of the enlisted community is a critical part to leveraging AI talent—investing in an AI workforce cannot be exclusive to officers. Enlisted service members work side by side with officers in addition to being on the front lines of all operations, from back office processes to combat and mission support.

Rec 4: Encourage and coordinate AI and AI-related communities of practice by establishing a dedicated communication platform that connects to CoPs across services.

Formal and informal networks dominated how many of our interviewees identified AI talent. However, one-off connections are neither scalable nor sustainable. Leveraging AI talent should therefore institutionalize what works, by encouraging, facilitating and coordinating AI communities of practice.

Services could bring together their disparate network of AI and AI-adjacent practitioners, along with domain experts who possess AI or related knowledge, by coordinating their efforts. Creating a marketplace for AI and AI-related communities, by providing a

convening platform, will further enable cross-pollination of ideas and applications in addition to reducing duplicative efforts. This could increase AI diffusion while creating a community and culture of belonging for this talent, particularly for more organic or smaller communities. Moreover, it could help with efforts to identify AI and AI-adjacent talent, particularly if they are domain experts not in technical billets.[63]

Rec 5: Connect, empower, and reward AI "rock stars" by (1) creating a dedicated intraservice working group for service-nominated and appointed AI rock stars, and (2) establishing an annual DOD AI Achievement Award that comes with a monetary prize.

Our interviews made the importance of AI "rock stars" in advancing AI workforce goals clear. These rock stars are strategically skilled and positioned to make these recommendations—to make sure AI talent is identified and leveraged—a reality. Rock stars are not necessarily senior officers, but rather come in all ranks and are immersed in the day-to-day operations of their command or service.

We recommend the working group be unlike traditional working groups that consist of senior or senior-appointed leaders and carefully managed agendas. Instead, we recommend a group that operates outside of the usual DOD hierarchy, where members are nominated by relevant CoP representatives. The group could be chaired by the JAIC and meet quarterly to raise issues and share best practices.[64] The DOD AI Achievement Award should be awarded to a peer-nominated service member or civilian who has advanced AI literacy, AI workforce goals, or safe, ethical, and trustworthy AI adoption in a significant way.

Rec 6: Invest in AI education as professional military education (PME) for senior leaders.[65]

Senior leadership training would be strategic-focused for understanding their service's organizational AI strategy, along with appropriate uses and limitations of AI. It would also include

understanding what personnel, resources, and technology needs are and what flexibilities may need to be approved to access them.

Rec 7: Invest in AI education as PME for uniformed and civilian middle management.

This training would be more tactical, teaching managers not only about the importance of prioritizing AI deployment, but learning how to know when AI may be an appropriate solution, along with how to manage projects that build AI-enabled capabilities into research, requirements, budgeting, and acquisitions. Training would also include what personnel and technology needs are helpful to be successful on an AI project, how to best leverage personnel, and how to obtain any necessary senior-level approvals.

Rec 8: Inspire broader AI literacy across the DOD by creating training and exposure opportunities.

Effectively leveraging talent includes empowering them with the knowledge needed to trust and responsibly engage in AI-enabled tools and solutions. Specifically, general and targeted AI training could consist of:

- DOD-wide: AI literacy course for all personnel, (i.e., civilian and uniformed).
- For technical and technically-apt talent: AI coursework and credentialing from military colleges (e.g., Digital University) and third party microcredentials or certifications that are recorded in personnel files.[66]
- For acquisition talent: AI in requirements course and certificate at DAU.
- For requirements talent: Provide training so that requirements personnel can document consideration of AI-embedded capabilities for each non-materiel solution
- For operators: Training modules as part of basic military training (uniformed only) along with routine PME required for promotion.
- AI engagement and exposure: Create a contest/challenge for officers, enlisted, reservists, guardsman, and civilians to

share and submit ideas to integrate AI into current processes and operations.

Processes

Current uniformed and civilian talent management practices, including career field assignment, tour of duty assignments, and promotion pathways do not effectively cultivate and leverage the DOD's existing AI talent. We recommend each service experiment, evaluate, iterate, and eventually implement realigned talent management processes for AI and AI-related career fields to incentivize AI adoption and deployment. Importantly, the same approach may not be what is best for each service. That will depend on service AI strategy, force structure and deployment, operational needs, and organizational culture.

Rec 9: Conduct service-wide inventories of uniformed and civilian technical billet and assignments.

This is the first step to ensuring that individuals with technical talent are placed in assignments where they may leverage their expertise. Our findings show technical billets are scattered across career fields. Civilians can be found in at least 12 occupation codes. For both uniformed and civilian personnel, assignments do not always correspond to career fields. A workforce assessment is needed to understand where existing technical assignment opportunities exist.

The assessment should come in two parts: (1) taking an inventory of currently available technical assignments, and (2) surveying commands for opportunities to create new technical billets or transition existing positions. Surveys should also ask commands to assess high-demand positions or currently unfilled technical positions.

Rec 10: Experiment with career pathway pilot initiatives that can be measured, evaluated, and iterated upon. Eventually, in accordance with timelines laid out in each services' AI workforce strategy, establish clearly defined career pathways with promotion potential up to and including the rank of general/flag officer.

Pilot initiatives should include the necessary stakeholder engagement and regular reporting for lessons learned and best practices. Ultimately, implemented approaches to AI talent management should incentivize AI-relevant training, assign talent in a way that uses their AI expertise, and provide routine engagement with industry, academia, combatant commands and joint duty assignments for continued partnership and learning. If appropriate, we recommend creating a separate promotion board for non-leadership technical career fields with technically-oriented promotion criteria (e.g., in lieu of command posts or broadening experiences).

Technical career tracks can vary by service and career field (e.g., working within existing fields, creating new career fields, or both), exist for active and reserve components, and include opportunities for leadership track individuals to switch to a technical track. For example, recent years have shown examples of the services both creating new niche technically-oriented career fields and modifying existing ones. In 2020, the Army established an "Enterprise Marketing and Behavioral Economics" career field, for which selected officers must have education and expertise in marketing and data analytics.[67] In 2019, Air Force Operations Research Analysts were moved out of the engineering and acquisitions functional community to create a separate technical career track.[68]

Rec 11: Each service should leverage its civilian AI workforce by creating a central competency and skills database that allows civilian personnel to self-identify technical expertise, project or research experience, technical publications, and links to Github or other repositories.[69]

Many of our civilian interviewees did not know their assigned billet, and relied on word-of-mouth for identifying other AI-able talent and AI-related projects. Interviews suggest a large share of civilian talent with AI or AI-adjacent skills is housed in the services' respective R&D organizations, particularly research labs. Effectively leveraging this talent starts with formal talent identification, followed by a mechanism to match this talent with special projects and assignments. Skills databases should be widely searchable across the service enterprise.

Technology

AI talent needs access to data, software, and equipment to design, develop, and deploy AI, and therefore leverage their skills and expertise. However, interviewees consistently mentioned this as a persistent challenge. The DOD should empower talent by investing in the needed digital infrastructure.

Rec 12: Create a mechanism for all DOD personnel to submit their experienced challenges regarding software, data access, computing facilities, internet connections, classification barriers, data cleaning and integration, and other issues creating barriers to AI use and adoption to service-level chief data officers, chief technology officers, and chief information officers.

On a regular basis, service CDOs, CTOs, or CIOs should review these challenges. Upon reviewing these submissions, the services should (1) create a course of action with milestones to address the final assessment of these challenges, and (2) use them as an input to prioritize technology investments.

Leveraging the JAIC

The JAIC provides an important infrastructure that should be harnessed. These recommendations leverage the coordinating function of the JAIC to help the services and, importantly, to harmonize AI workforce identification across disparities in approaches to AI talent management.

Rec 13: The JAIC should convene an annual AI workforce conference to facilitate communication of ongoing activities and share best practices. To help establish best practices, the JAIC should provide support for services to evaluate initiatives and pilots for outcomes and potential to scale.

Our discussions revealed several different approaches across and within services, including pilots and initiatives in progress. For example, we heard a range of current and planned approaches including:

- Small cadre of talent in labs or flyaway teams.
- Special experience identifiers.
- New technical career fields with separate promotion tracking.
- Skills or competency repository to facilitate project matching.
- Making 5-10 percent of each career field technical experts.
- Continued reliance on contractors for technical expertise.

Leveraging AI talent effectively involves having services evaluate these approaches, and share lessons learned and best practices. Conference participants should include: (1) those leading initiatives highlighted in the "rock star" working group recommended above, (2) those leading other initiatives recognized by AI-related CoPs, by the JAIC through its routine service-level engagement, and as nominated by commanding officers. This could not only elevate existing initiatives but reward services for taking on new approaches with an evaluative component.

Rec 14: The JAIC should issue service-level guidance on crafting AI workforce strategies and implementation plans in line with the JAIC publishing its overarching AI workforce goals.

In line with the JAIC's efforts to ensure an AI-ready DOD workforce, the JAIC should facilitate service-level workforce strategies. At a minimum this includes issuing guidance, and at its best would include providing active consultation.[70] Basic guidance could provide freedom for the services to design the approach best for them; for example, articulating that it is not necessary to put all technical AI talent under one or two career codes, encourage service-wide competency repositories, and inventory and coordinate AI-related communities of practice.

Rec 15: Create two-digit function codes for each of the JAIC's archetypes that are standardized across services to harmonize AI talent identification and tracking.

Function codes for all DOD billets already exist but are rarely used.[71] A benefit of these codes is that they can be applied to joint commands and assignments, and enable a DOD-wide inventory.

We propose updating these codes in a way that embodies the JAIC's six archetypes, along with embedding flexibility in these codes through regular review to accommodate other emerging technologies.

OSD and Service-Level Culture

Across our interviewees, one theme was clear: the need to create an environment where all personnel are working toward the safe, ethical, and trustable use of AI across applications and capabilities. However, similar to funding and requirements, this is an extremely complex issue that is outside the scope of this paper. We instead suggest that implementing the above recommendations will help relieve existing cultural tensions related to leveraging the latent potential of the DOD's existing cadre of AI talent.

Finally, related to culture and similarly outside the scope of this study, we note interviewees repeatedly stressed the challenges raised by existing budgeting and requirements processes. They noted the importance of having the incentives, funding, and ability to integrate consideration of AI-enabled capabilities, tools, and applications into solutions as part of leveraging and cultivating AI talent. The sentiment was: "no requirement, no AI, no need for an AI workforce." While we do not propose a recommendation here, we do acknowledge its importance.

Alignment with NSCAI Recommendations

Our recommendations are consistent with those provided by the National Security Commission on Artificial Intelligence's (NSCAI) *Final Report* when it comes to leveraging the DOD's existing AI talent. This is particularly true regarding the education and training of enlisted, officer, and civilian personnel across the DOD and in the need to expand access to tools, datasets, and infrastructure.

An additional recommendation covered by NSCAI, but not in this report, is complementary to our recommendations. This is the recommendation to update the Armed Services Vocational Aptitude Battery Test to include computational thinking.

Our recommendations differ from the NSCAI report in that they do not explicitly recommend the establishment of new digital career fields in the services for software developers, data scientists, and artificial intelligence, as well as new civilian occupational series for software development, software engineering, knowledge management, data science, and artificial intelligence. We recommend the services approach AI and AI-related talent identification, assignment, and management using the best approach for them, which may vary by service. We instead propose creating a functional code that will be DOD-wide and align with the JAIC's six archetypes. We also attempt to keep our recommendations to actionable items in the short- and medium-term, appreciating the DOD's current realities and constraints. It may be the case that in the longer term, the establishment of new digital career fields could prove useful to the services.

Other NSCAI recommendations focus on recruiting civilian technical new talent whether through novel pathways into government, modifying hiring practices, or expanding existing programs. For example, considerable focus is put on creating Digital Corps, National Reserve Digital Corps, a Digital Service Academy, and an AI Scholarship for Service program. As this report is focused on leveraging existing talent, those recommendations are outside of the scope of this study.

Summary: Challenges and Recommendations

Service-Level AI Strategies

What is considered AI, and its relative strategic importance, varies widely across services and within organizations. This means there is disagreement on who makes up the AI workforce and how much investment and prioritization should be given to cultivating AI talent in-house.

Rec 1: Clearly and explicitly make AI adoption and organization a priority by having each service create an AI workforce strategy and implementation plan.

People

Each service has an inconsistent interpretation of its AI workforce, AI workforce needs, and in their ability to identify AI talent.

Rec 2: Engage in short-term AI talent identification and tracking techniques using a skills-based assessment.

We also heard accounts of enlisted service members taking the initiative to build AI expertise, but commissioned officers being prioritized for the few opportunities that exist to use these skills.

Rec 3: Create more opportunities for enlisted service members who possess AI and AI-related skills.

Formal and informal AI and AI-related communities have been an important convening mechanism for talent, but remain frail and fragmented.

Rec 4: Encourage and coordinate AI and AI-related communities of practice.

AI rock stars are critical players in cultivating an AI workforce, but thrive in spite of, not because of, their organizations' incentives.

Rec 5: Connect, empower, and reward AI "rock stars."

Senior leaders championing AI adoption and workforce development are essential, yet their understanding and appreciation of AI is highly inconsistent and support often ends when that leader rotates out.

Rec 6: Invest in AI education as PME for senior leaders.

Middle management lacks incentive to take risks. AI, as a big unknown, represents a large risk.

Rec 7: Invest in AI education as PME for middle management.

There are concerns about the lack of AI literacy across the organization.

Rec 8: Build broader AI-literacy across the DOD by creating training and exposure opportunities.

Processes

By far the largest issue cited related to leveraging AI talent was the state of uniformed and civilian talent management procedures and practices.

Rec 9: Conduct service-wide inventories of uniformed and civilian technical billet and assignments.

On the uniformed side, few opportunities or incentives exist within the current talent management structure to cultivate and leverage AI expertise.

Rec 10: Experiment with career pathway pilot initiatives that can be measured, evaluated, and iterated upon. Eventually, establish clearly defined career pathways with promotion potential up to and including the ranks of general/flag officer.

For civilians, there are at least 12 occupations that comprise the AI workforce, with no clear way to identify AI expertise. Moreover, AI-related project assignments for civilians are ad hoc, particularly at the research labs.

Rec 11: Leverage civilian AI talent by creating a central competency and skills database.

Technology

Interviewees expressed concern over current limitations in service-level data curation, integration, accessibility, and software availability, all needed for AI development and deployment.

Rec 12: Create a mechanism for all DOD personnel to submit their experienced challenges regarding software, data access, computing facilities, internet connections, classification barriers, and other issues creating barriers to AI use and adoption to service-level CDOs, CTOs, or CIOs.

Leveraging the JAIC

The JAIC provides an important infrastructure that should be harnessed. These recommendations leverage the coordinating function of the JAIC to help the services and, importantly, to harmonize AI workforce identification across disparities in approaches to AI talent management.

Rec 13: The JAIC should convene an annual AI workforce lessons learned conference.

Rec 14: The JAIC should issue service-level guidance on crafting AI workforce strategies and implementation plans in line with the JAIC publishing its overarching AI workforce goals.

Rec 15: Create two-digit function codes for each of the JAIC's archetypes that are standardized across services to harmonize AI talent identification and tracking.

Conclusion

Central to the adoption of AI tools, applications, and capabilities in the Department of Defense is the ability to recruit and retain an AI-able and AI-ready workforce. Indeed, growing and cultivating an AI-ready workforce is a top priority in the DOD's AI Strategy.

However, stakeholders within and outside of the DOD have repeated the claim that the department struggles to attract the necessary talent. Usually, these discussions emphasize competition for top-tier technical talent with industry.

"However, stakeholders within and outside of the DOD have repeated the claim that the department struggles to attract the necessary talent."

This report flips that narrative. Previous CSET research found the DOD was already a top employer of AI talent. Armed with this finding, we conducted interviews with 31 key experts across the services and OSD and analyzed civilian personnel data from OPM to understand the state of the DOD's AI workforce. In addition to revealing a hidden cadre of AI talent within the DOD, our analysis provides a detailed understanding of challenges and opportunities for the DOD's AI workforce policy.

Our research finds that while the department has a cadre of AI and AI-adjacent personnel, this talent remains hidden. Our analysis uncovers several reasons for this. At the service-level, there is not a consistent approach to defining or prioritizing AI. This translates to lack of investment in cultivating an AI workforce. On a more tactical level, we identified three types of challenges: people, processes, and technology.

The challenges pertaining to people, processes, and technology are diverse. Regarding people, each service struggles to define and identify their AI workforce. The enlisted community lacks opportunities to use their AI expertise. Convening communities of

interest are frail and fragmented, and individual AI rock stars within each service succeed despite, rather than because of, existing systems. Moreover, senior leaders' understanding and appreciation of AI is highly inconsistent, and middle management lacks the incentive to take risks in acquiring and adopting AI-capabilities.

Existing processes within the DOD offer another set of challenges. The overriding issue in this category is the current state of uniformed and civilian talent management procedures and practices. Today's performance incentive structures do not align with the pursuit of or leveraging of AI expertise at any level. Moreover, civilians with relevant skills and abilities are spread across multiple occupations and AI-related project assignments for civilians are ad hoc.

Technological barriers create yet additional obstacles. Interviewees highlighted difficulty in accessing necessary software, tools, and data platforms, and serious concerns related to data reliability and ownership were raised across the department.

Together, these challenges make it difficult to effectively identify and leverage the DOD's existing AI workforce. Our analysis found that each service has its own office or organization that oversees what it loosely considers "AI talent," either formally or informally. Across these entities, AI talent is most commonly identified through informal networks and personal connections, with interviewees across all services highlighted heavy reliance on such networks to find suitable talent. While other methods of identification exist, they are imperfect, such as equating an existing career field or educational credential with AI expertise. Interviewees across the enterprise stressed the lack of an effective, systematic means to identify AI talent quickly and accurately.

Our research suggests that properly identifying and leveraging this talent could go a long way in meeting the DOD's stated AI workforce goals. To this end, we provide 15 recommendations. While the initial recommendation provides a strategic umbrella for AI workforce prioritization, the remaining are structured to map the following framework:

Identification → Experimentation → Implementation → Harmonization

Each step in the framework offers guidance for sustained talent management process change. With identification, the organization should ask: How do we define AI talent and where might we find it within my organization? In experimentation, how might we try out new ideas that leverage AI talent, evaluate their success, and iterate? For the third step, implementation, how might we agree upon and deliver an approach? Finally, with harmonization, how might the service-level approaches work together to enable enterprise-wide AI talent assessment and empowerment?

Our recommendations should promote agility in talent management. Experimentation, evaluation, and iteration of pilot initiatives are critical in determining the best approaches to AI workforce cultivation for each service. The same process allows for flexibilities as priorities and missions evolve. We also recommend targeted training from operators and acquisition personnel to senior leaders, and rewarding department "rock stars" that are uniquely positioned to make change happen.

Several of our recommendations are also specific to the JAIC in its role as the central hub and coordinator for the DOD's AI activities. This includes repurposing outdated and underused two-digit function codes already assigned to every DOD billet for the AI archetypes, and to create a forum to harmonize service-level AI workforce initiatives and learned best practices.

Ultimately, the DOD should work toward a future where enlisted service members, officers, and civilians have a pathway to apply their AI and related expertise to deliver impactful outcomes that advance the DOD's AI Strategy. We hope this report provides a new perspective to advance that strategic goal.

Authors

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Appendix A. Interview Discussion Topics and Codebook

Discussion Topics

1. Do you have people in your organization performing AI design and development roles, or who perform tasks that are typical of these roles (see job descriptions below)? What occupational codes [billets] are they classified under or what titles do they currently hold?
2. In total, approximately how many people within your organization are in these AI roles, not including end-users? Are they mostly uniformed or civilian personnel?
3. How does your organization identify and assign people to fill these roles?
4. What challenges or internal barriers do you face when trying to identify people for these roles / with these skills? How does your organization plan to overcome them?
5. What other workforce changes, if any, is your organization planning to better enable AI development and deployment? What is the time horizon? Will this include changes in how this talent is recruited, classified, or assigned? [If unsure, what changes do you think are needed, if any?]
6. We have an initial hypothesis that the DOD has more talent capable of developing and deploying AI capabilities than it might realize. Does this resonate with you?
7. What advice would you give if someone came to you asking how your organization could better leverage its existing AI and AI-adjacent talent?
8. What is one small or achievable thing that you would recommend to better leverage existing AI talent immediately?

Codebook

1. Where is the DOD's existing AI Talent?

[*How organization **currently** defines, identifies, classifies, assigns, and recruits AI talent.*]

1.1. Defining AI talent [*Includes high level view of what kinds of personnel are and/or work on AI teams.*]

1.2. Identifying AI Talent [*How talent is identified currently*]

1.2.1. Talent Marketplace or equivalent database

1.2.2. Informal communities (e.g., Airmen Coders) [*includes whether interviewee engaged with them*]

1.2.3. Word of mouth

1.2.4. Advanced tracking

1.2.5. Other

1.3. Classifying AI Talent [*Formal methods the DOD uses to classify their AI talent*]

1.3.1. Codes [*specialty codes, experience identifiers, skills, etc.*]

1.3.2. Billets

1.3.3. Assessments and Certifications

1.4. Assigning AI talent [to *projects/programs*]

1.5. Recruiting and Retaining AI talent

1.6. AI Talent in other organizations [*For use when interviewee references AI talent in other organizations than the one they are representing*]

1.7. Use/Reliance on Contractors

2. Why is the DOD's AI Talent Hidden?

[*Why/How organization* ***struggles*** *to define, identify, classify, assign, and recruit AI talent.*]

2.1. Organizational AI Strategy

2.1.1. Defining AI and AI Literacy [*Ability of all levels of personnel to discuss, comprehend, and make informed decisions regarding AI*]

2.1.2. Organization's AI Activities/Projects

2.1.3. Organizational AI Strategy

2.2. Challenges in Organizational AI

2.2.1. People (e.g., middle management; lack of access to identifiable talent)

2.2.1.1. Individual Champions

2.2.2. Processes (e.g., requirements in acquisition, colors of money)

2.2.3. Technology (e.g., platform and data limitations)

2.2.4. Organizational culture

2.2.5. Use and reliance on contractors

2.2.6. Other challenges

2.3. Challenges in AI talent management

2.3.1. Identification challenges [*includes M&P system limitations and self-taught population tracking if don't self-identify formally*]

2.3.2. Classification challenges

2.3.3. Assignment and promotion challenges [*includes career pathways*]

2.3.4. HR/recruitment challenges

2.3.5. Training challenges

2.3.6. Other challenges related to having/identifying talent (e.g., acquisition stovepiping, funding, etc.)

2.4. Challenges in Expertise needed to build AI workforce [*Includes lack of people able to (1) design/develop AI (2) integrate AI (3) integrate big data (4) work through AI M&P challenges. Also includes the question of what happens when the people in place to realize the AI workforce vision leave.*]

3. Recommendations for Leveraging Existing AI Talent

[*How organization* ***can better*** *define, identify, classify, assign, and recruit AI talent, in order to more effectively leverage this talent.*]

3.1. Interviewee Recommendations [*Interviewee's low lift recommendation and/or king for a day recommendations*]

3.2. Current initiatives or pilots [*includes Army labs, Marine MOS, AF SEIs, etc.*]

3.3. AI Talent Desired Talent End State [*Whether the services need everyone to know how to code, or just a few PhDs, or any other level in between*]

3.4. Informal Communities

3.5. Building Trust

4. JAIC [*all things JAIC-related*]
5. Quotes/Stories
6. Miscellaneous

Appendix B. Top Employers for Selected AI Occupations

This appendix provides the complete list of top 10 employers for selected AI occupations as compiled on LinkedIn Talent Insights.

Table B1. Top 10 Employers Across Selected AI Occupations.

Rank	Computer Research Scientists	Software Engineers	Mathematicians, Statisticians, Data Scientists	Project Management Specialists	Aerospace Engineers	Electrical/ Electronics Engineers	Mechanical Engineers	Operations Research Analysts	Purchasing Managers
1	Apple	Google	Microsoft	Microsoft	Boeing	Boeing	Boeing	Microsoft	Amazon
2	Adobe	Microsoft	Facebook	Amazon	Lockheed Martin	Lockheed Martin	Lockheed Martin	United States Air Force	United States Air Force
3	Georgia Tech Research Institute	Amazon	IBM	AT&T	Northrop Grumman	Northrop Grumman	Northrop Grumman	Amazon	US Army
4	Ford Motor Company	IBM	Wells Fargo	Google	Intel Corporation	Intel Corporation	Intel Corporation	US Army	FedEx
5	Southwest Research Institute	Facebook	U.S. Census Bureau	IBM	General Motors	Raytheon	General Motors	Google	FedEx Ground
6	Facebook	Amazon Web Services (AWS)	Amazon	United States Air Force	Ford Motor Company	Microsoft	US Army	Lockheed Martin	The Home Depot
7	United States Air Force	Apple	Apple	Boeing	United States Air Force	Apple	Raytheon	IBM	Walmart
8	Intel Corporation	Lockheed Martin	Google	Hewlett Packard Enterprise	US Army	General Motors	Ford Motor Company	Boeing	Bank of America
9	Lawrence Livermore National Laboratory	Oracle	Booz Allen Hamilton	Wells Fargo	AT&T	United States Air Force	AT&T	Wells Fargo	Target
10	United States Department of Defense	Northrop Grumman	UnitedHealth Group	Cognizant	Apple	AT&T	Apple	Northrop Grumman	AT&T

Source: LinkedIn Talent Insights, CSET analysis.

Note: We restricted our geographic search to the U.S. data for computer research scientists, software engineers, mathematicians, statisticians, data scientists, and project management specialists accessed December 2020. Data for aerospace engineers, electrical and electronics engineers, mechanical engineers, operations research analysts, and purchasing managers accessed March 2021.

Endnotes

[1] See the "Final Report" issued by the National Security Commission on Artificial Intelligence: National Security Commission on Artificial Intelligence, *Final Report* (Washington, DC: March 2021), https://www.nscai.gov/wp-content/uploads/2021/03/Full-Report-Digital-1.pdf.

[2] For example, see Lauren C. Williams, "Pentagon readies new policy to boost cyber workforce amid recruitment challenges," *Federal Computer Week* (FCW), April 22, 2021, https://fcw.com/articles/2021/04/22/williams-dod-cyber-workforce.aspx.

[3] Diana Gehlhaus and Santiago Mutis, "The U.S. AI Workforce: Understanding the Supply of AI Talent" (Center for Security and Emerging Technology, January 2021), https://cset.georgetown.edu/wp-content/uploads/US-AI-Workforce_Brief-2.pdf.

[4] See the "Summary of the 2018 Department of Defense Artificial Intelligence Strategy:" U.S. Department of Defense, *Summary of the 2018 Department of Defense Artificial Intelligence Strategy* (Washington, DC: Department of Defense, 2018), https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF.

[5] For example, see Lindsay Sheppard, "To Compete, Invest in People: Retaining the U.S. Defense Enterprise's Technical Workforce" (Center for Strategic and International Studies, November 2020), https://www.csis.org/analysis/compete-invest-people-retaining-us-defense-enterprises-technical-workforce. Similarly, the Future of Defense Task Force, Reagan Foundation, National Commission on Military, National, and Public Service, and the Cyberspace Solarium Commission have all published research and recommendations related to technical talent in the DOD.

[6] See the "Final Report" issued by the National Security Commission on Artificial Intelligence: National Security Commission on Artificial Intelligence, *Final Report*.

[7] This was the Federal Cyber Workforce Assessment Act of 2015. See for more: Chief Information Officer, "Federal Cyber Workforce Assessment Act (FCWAA)," U.S. Department of Defense, https://dodcio.defense.gov/Cyber-Workforce/FCWAct.aspx.

[8] This means we are not including OSD, independent DOD subagencies, combatant commands, or the DOD's intelligence branch.

[9] With the exception of reaching out to each service's headquarters personnel offices (X1). We were able to communicate with personnel in each but for the Navy's N1, which did not respond to our request.

[10] That is, offices across the strategic, operational, and tactical levels of command for each service as well as every combatant commander, research laboratory, and resource sponsor (e.g., those with authority to fund AI-enabled tools and capabilities). Even then, such an assessment would still likely miss some ongoing efforts.

[11] Gehlhaus and Mutis, "The U.S. AI Workforce."

[12] Analysis of uniformed personnel data is a cumbersome process. It requires special access and permissions which only select entities can legally obtain; further, all requests must also go through a time-intensive human subjects review process on the front end and back end for publication. Moreover, an assessment of military occupation and specialty codes, which are publicly available, quickly show there are no clear "AI" occupational groups to cleanly analyze, similar to the civilian component. The hidden nature of this talent through classification taxonomies is part of the basis for this report.

[13] A goal stated in the DOD's AI Strategy. See U.S. Department of Defense, *Summary of the 2018 Department of Defense Artificial Intelligence Strategy*.

[14] Called "Technical Team 1" and "Technical Team 2" in previous CSET reports.

[15] Called "Product Team" and "Commercial Team" in previous CSET reports.

[16] Gehlhaus and Mutis, "The U.S. AI Workforce." The DOD does not have the same occupational classifications as used for these categories. We therefore considered the most closely matching occupation and uniformed specialty classifications.

[17] Similarly, previous CSET research identified two categories of nontechnical talent—product team and commercial team. However, given the nature of DOD occupational classifications, along with the associated roles and responsibilities, we considered a subset of each nontechnical category and we considered these subsets jointly. For example, the DOD does not employ user experience designers or sales engineers as separate occupations, and on the civilian side many product and commercial team occupations are likely rolled into "program and management analysts" (OPM code 0343).

[18] Gehlhaus and Mutis, "The U.S. AI Workforce." Here "national security community" refers to U.S. government agencies that engage in activities related to national security or international affairs.

[19] Industry codes are defined by the North American Industrial Classification System (NAICS), where Public Administration is NAICS 92 and the national security and international affairs subsector is NAICS 928. The range for nontechnical talent is based on CSET's nontechnical categories; 6 percent of Product Team employment was in public administration compared to about 8 percent for Commercial Team occupations.

[20] This is double the national average; the national security sector comprised 1.5 percent of total U.S. employment in 2018.

[21] Diana Gehlhaus and Ilya Rahkovsky, "The U.S. AI Workforce: Labor Market Dynamics" (Center for Security and Emerging Technology, April 2021), https://cset.georgetown.edu/publication/u-s-ai-workforce/. See Appendix D.

[22] For this analysis, we used a compiled list of job titles associated with each occupation.

[23] There were a handful of interviewees for which this question was not appropriate given their expertise or current position.

[24] However, a guidance document from General John Raymond indicates that a new Technology and Innovation Office within the Space Force will be leading the digital transformation of the service, which includes workforce components. See U.S. Space Force, "U.S. Space Force Vision for a Digital Service," U.S. Department of the Air Force, May 2021, https://media.defense.gov/2021/May/06/2002635623/-1/-1/1/USSF%20VISION%20FOR%20A%20DIGITAL%20SERVICE%202021%20(2).PDF.

[25] Civilians are managed independently from uniformed personnel and have a separate occupational hierarchy. However, they are also classified in "functional communities" alongside uniformed personnel, for which Table 3 applies. This discussion focuses on civilians' talent management separate from functional communities, and we note each service's civilian corps had overlapping approaches.

[26] Our own review of OPM job postings also shows a fair number of data scientists are hired as management and program analysts. We list the types of engineers in the next chapter.

[27] See USAF-MIT AI Accelerator website, "About Us," USAF-MIT AI Accelerator, https://aia.mit.edu/about-us/.

[28] Coding factories include Kessel Run, BESPIN, Space CAMP, Red 5, and Tron, to name a few.

[29] They will retire outdated codes and replace them with coding language and potentially other technical skills identifiers.

[30] Efforts are also underway to coordinate with the reserve component for analysis.

[31] Related areas of concentration can be grouped together into broader functional areas (FA).

[32] Related to several new authorities granted in the 2019 National Defense Authorization Act.

[33] Much of which is in coordination with ATMTF and TRADOC.

[34] Applications for the first cohorts far exceeded the number of available slots, and the opportunity was made available to all servicemembers. Interviewees noted the huge demand indicated large latent technical expertise among the enlisted corps.

[35] See Talent Management Task Force Annual Report, 2019-2020: U.S. Army, "Talent Management Annual Report 2019-2020," https://talent.army.mil/wp-content/uploads/2021/03/TMTF-Annual-Report.pdf.

[36] One interviewee noted the Army's timeline for submitting a candidate to a university's graduate degree program occurs after the due date of the university.

[37] For more, see Navy Personnel Command, "Manual of Navy Officer Manpower and Personnel Classifications: Volume I," U.S. Navy, October 2020, https://www.mynavyhr.navy.mil/Portals/55/Reference/NOOCS/Vol1/Entire%20Manual%20I%2073.pdf?ver=rpCPz8Vt4b52x7ETh2GP8A%3D%3D.

[38] Military Occupational Specialty (MOS) codes define the occupational taxonomy used by the Marine Corps and by the Army for enlisted service members. Other services use different occupational taxonomies.

[39] For example, the Space Force is leveraging the uniformed recruiting and civilian hiring infrastructure of the U.S. Air Force. It is also sharing education and

training resources for its service members. This is because the Space Force was set up to be a small and lean service, and to leverage its parent service.

[40] This also includes working with the Defense Innovation Unit (DIU) on a new technical talent identification and matching app that will more readily employ reserve and guard personnel across the DOD. More on the AI-enabled app, called Gig Eagle, can be found here: David Vergun, "App Aims to Match Reserve, Guard Talent With DOD Needs," U.S. Department of Defense, June 29, 2021, https://www.defense.gov/Explore/News/Article/Article/2675967/app-aims-to-match-reserve-guard-talent-with-dod-needs/.

[41] For more on Kobayashi Maru, see: Assistant Secretary of Acquisition, "Kobayashi Maru," U.S. Air Force, https://software.af.mil/softwarefactory/kobayashi-maru/. For more on Space CAMP, see: "Space Camp," U.S. Space Force, https://spacecamp.il2.dso.mil/#/home.

[42] Joint Artificial Intelligence Center (JAIC), "DoD AI Education Strategy," U.S. Department of Defense, October 2020, https://www.ai.mil/docs/2020_DoD_AI_Training_and_Education_Strategy_and_Infographic_10_27_20.pdf.

[43] We discuss challenges with OPM's existing occupational taxonomy in identifying and measuring AI talent in the next chapter.

[44] Civilians are hired under many billet types using direct hiring authorities. Generally, civilians are hired under funded billets, which can add to the range of billets talent are hired in under. We discuss this further in the next section.

[45] In addition, positions are also classified under different pay schedules which determine pay rates, also managed by OPM. For example, "General Schedule"(GS) is the most widely used one; about three-quarters of federal positions are part of the GS system. Others include "GG" for cyber talent and "NH" for select acquisition talent.

[46] We note the OPM has only one code for all computer occupations except for computer scientists and computer engineers: 2210. This code is labeled IT Management. See [link] for the full taxonomy of OPM codes. We further note that not all personnel performing tasks typical of computer occupations are classified under 2210 due to how billets are allocated and filled in the federal government. We discuss this further in the next section.

[47] See the DOD's "Artificial Intelligence Education Strategy," published in October 2020:

https://www.ai.mil/docs/2020_DoD_AI_Training_and_Education_Strategy_and_Infographic_10_27_20.pdf. The JAIC is the DOD's central coordinating hub for artificial intelligence issues and strategy, including workforce. They are currently working with the services to pilot educational training for the leadership archetype, which informs senior leaders on appropriate definitions and uses of AI.

[48] We note the analogous challenge for software acquisition, which now follows a separate process.

[49] Whether there should be one common definition of AI is an active discussion. We appreciate there are advantages and disadvantages to this and ultimately believe different mission needs across services will drive different AI use cases, measures of performance, and degrees of human-machine interaction. However the services define or operationalize "AI," what matters is that each service align their AI workforce definition and investment accordingly.

[50] The key pieces of legislation are: NDAA (end-strength), and DOPMA and ROPMA (officer promotions for the active duty and reserve components, respectively).

[51] In the Navy, every other assignment is on a ship, in a combat-ready position. In the Army, it is required that officers command a battalion for promotion to colonel, and officers are trained from the beginning to command troops in combat. In the Air Force, "pilot culture" has historically celebrated pilots over other fields, limiting promotion opportunities for more technical fields like operations researchers and engineers.

[52] Enlisted service members comprise 80 percent of the uniformed service component, making them a larger talent pool. Moreover, they are equally if not more involved in operational roles that could feed back into designing and developing usable and trustworthy AI applications.

[53] We note the challenge of discrepancies between the enlisted and officer corps is not unique to leveraging AI talent. See, for example, see Andrea N. Goldstein and John Phillips, "The Strategic Corporal: Send Non-Commissioned Officers to College" (Center for New American Security, February 2019), https://www.cnas.org/publications/commentary/the-strategic-corporal-send-non-commissioned-officers-to-college.

[54] Senior Airman Grace Thomson, "Enlisted Forces Key to Future of AI," USAF-MIT AI Accelerator, February 8, 2021, https://aia.mit.edu/2021/02/08/enlisted-forces-key-to-future-of-ai/.

[55] The “valley of death” refers to the gap between R&D and actual deployment in the field. Many prototypes or research insights never make it into the hands of operators.

[56] As of this writing, it was unclear if the effort would proceed after a period of uncertainty, even though the details had been carefully planned and vetted internally among stakeholders.

[57] The talent management lifecycle refers to all talent engagement stages from attracting and recruiting to promotion and attrition.

[58] Some organizations we spoke with were working to build a competency database, but reliant on self-reported data and not specific to AI.

[59] See, for example: Defense Innovation Board, “Software Acquisition and Practices (SWAP) Study,” U.S. Department of Defense, May 2019, https://innovation.defense.gov/software/; Danielle Tarraf et al., “The Department of Defense Posture for Artificial Intelligence: Assessment and Recommendations” (RAND Corporation, December 2019), https://www.rand.org/pubs/research_reports/RR4229.html; Lindsey Sheppard, “Accelerating the Defense Department’s AI Adoption,” Council on Foreign Relations, April 9, 2020, https://www.cfr.org/report/accelerating-defense-departments-ai-adoption.

[60] Notably the creation of a Chief Data Officer and/or a Chief Technology/Innovation Officer across services; in addition, the establishment of Platform One and of the JAIC’s Joint Common Foundation (JCF).

[61] Joint Artificial Intelligence Center (JAIC), “DoD AI Education Strategy.”

[62] Which may or may not be the creation of new occupational specialty codes. See recommendations 9, 10, and 11 for our medium- to long-term proposed approach to AI talent management.

[63] For example, the Air Force has the Language Enabled Airman Program (LEAP), which is a selective community for airmen and guardians of any specialty code with foreign-language skills. Selected participants receive additional training and a special experience identifier that makes them eligible for incentive pay and special assignments. For more on LEAP, see Lori M. Quiller, “Language Enabled Airman Program application window now open,” Maxwell Air Force Base, May 4, 2021, https://www.maxwell.af.mil/News/Display/Article/2594929/language-enabled-airman-program-application-window-now-open/.

[64] This could be under Chatham Rules if discretion is preferred.

[65] Recommendations 6 and 7, and portions of 8, overlap directly with recommendations in the NSCAI's Final Report. We include them because our study explicitly validates the importance and inclusion of these recommendations as part of effectively leveraging the DOD's AI talent.

[66] AI and AI-related certifications are offered by a range of providers including industry, associations, online boot camps, and educational institutions. Access to technical upskilling should be available for those in technical billets and nontechnical billets with demonstrated interest and aptitude, as identified in Recommendation 2.

[67] See for more, U.S. Army Public Affairs, "Selection process for new Army functional area now open," U.S. Army, September 3, 2020, https://www.army.mil/article/238753/selection_process_for_new_army_functional_area_now_open.

[68] Staff Sergeant Susan Lee, "Air Force creates new AFSC for operations research analyst officers," U.S. Air Force, May 15, 2020, https://www.af.mil/News/Article-Display/Article/2188021/air-force-creates-new-afsc-for-operations-research-analyst-officers/. We do note, however, that a separate recent attempt to create a temporary duty data science career field was less successful, because there was no incentive to join a temporary duty field with no clear career ladder or promotion potential.

[69] While we support creating new occupation codes for civilian technical talent, particularly breaking up code 2210, we acknowledge this would be an extremely long process and offer an alternative in recommendation 15.

[70] Active engagement with the services has the benefit of ensuring there is coordination and, if needed, help services secure adequate access to implementation resources.

[71] Jessica Wolfanger, Tom Woo, and Jen Atkin, "DoD Function Codes: Assessment of Currency and Relevancy" (Center for Naval Analysis, April 2019), https://prhome.defense.gov/Portals/52/DoD%20Function%20Codes%20Study%20CNA%20Unlimited%20Distro.pdf.