



DESIGNING A NEW NARRATIVE TO BUILD AN AI-READY WORKFORCE

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Foreword

MITRE's Center for Technology and National Security (CTNS) is pleased to present "Designing a New Narrative to Build an AI-Ready Workforce."

In promoting new ideas of how to attract talent into the Defense Department (DoD), the report focuses on two themes: crafting a compelling narrative about the Department and its pursuit of artificial intelligence (AI)-enabled technologies, and discrete recommendations for intaking and retaining these sought-after individuals. While the latter section has solid policy ideas, we specifically bring the idea of narrative to your attention. AI thought leaders and defense officials often underemphasize the importance of selecting messages and communications channels that will resonate with the desired audience. This makes the authors' already well-crafted analysis all the more compelling.

The report asserts that, to date, DoD's approach to messaging to the AI community has not been successful. Efforts to convey the value of working with DoD—with vague appeals to national security and a sense of civic duty—often fall flat and in some cases create more barriers than they remove. As the authors highlight, expressing frustrations over employee protests and a perceived lack of patriotism, rather than taking the time to better understand and discuss the underlying concerns about the Department's use of these systems, only exacerbates the disconnect between the two sides.

The authors advocate for a more authentic, transparent conversation from the Department, which begins with acknowledging and accepting public opposition to previous military decisions perceived as unethical. Only after this recognition can the DoD build trust by defining the narrow uses of AI envisioned, the rigorous testing all systems go through before deployment, and checks put in place once in the field to ensure they perform the way human operators expect them to perform.

The authors also call on the Department to better listen to and understand the audience and its motivations. In doing so, DoD can appeal to the AI workforce through a series of messaging types that have a higher likelihood of resonating with many in the community.

Finally, understanding which channels should best be leveraged, including AI conferences and partnerships with other agencies pursuing these technologies, is another critical element of reaching the desired talent pool.

We encourage senior defense and service leadership, particularly those in policy, research and development, and personnel and readiness organizations, to read this report. By keeping in mind how their messaging and engagement with the AI community might be adjusted, they can better meet the audience where it is, and better attract the best it has to offer.

Executive Summary

The Department of Defense (DoD) is struggling to keep pace with technological acceleration in the field of artificial intelligence (AI). DoD realizes that significant changes must occur for the military to sustain overmatch (advantage in combat capabilities over potential opponents) in this era of the great power competition, but the Department lacks enough of the in-house AI skills and the ability to attract and retain the talent it needs to compete in the future.¹ Those AI skills primarily lie in the component of private industry that falls outside the traditional defense-industrial base.

Unfortunately, DoD and these companies have a mixed history in terms of establishing productive partnerships, in part due to organizational speed and bureaucratic requirements, differing primary objectives, and cultural differences. While flawed practices have often reinforced skepticism in commercial technology communities about DoD's motives, the Innovation and Communications Technology industry shares responsibility for the damaged relationship between DoD and industry.

To strengthen the bridge to industry, DoD has taken positive steps, including periodic visits, summits, hackathons, partnerships, and successful one-off projects. However, to establish an ongoing, trusted, mutually beneficial, and more open relationship, DoD must take two actions: 1) change its narrative when reaching out to private industry and its employees—emphasizing the mutual benefits of partnership and how values and objectives align and carefully targeting those messages where they might be most effective; and 2) make internal changes in the way DoD integrates the potential new workforce into its organization.

This paper identifies shortcomings in the way DoD and the larger federal technology community have sought to explain the benefits of intended adaptations of AI for national security applications to potential industry partners, the American public, and other stakeholder communities to gain their support. DoD recognizes this as a problem and has taken some steps to resolve it.

One of the ways DoD can bring about change is by creating conditions where AI practitioners want to partner with the government. That means DoD must lead by example and share stories of past collaborative successes, increase trust by making existing oversight and ethical processes known, and convey its messages and values in the language of the people it seeks to attract.

Competition for AI talent is so intense that salary is unlikely to bolster DoD's ability to recruit and retain top talent. Retaining a robust AI workforce requires creating pathways for career development, demonstrating a willingness to learn from industry successes and challenges, and creating diverse and inclusive environments. Bringing in new AI talent requires a fresh look at novel incentives that DoD could offer, expanding the eligible talent pool to include more foreign nationals, applying lessons learned in DoD's successful creation of the cyber workforce, and exploring new recruitment concepts. Partnerships play an important role in building and sustaining the AI workforce, and DoD can learn lessons from the Intelligence Community and from connecting with startups.

A better communications strategy to support engagement with the public and with commercial industry will enhance DoD's ability to acquire the services of external talent. At the same time, a willingness to address cultural impediments that stymie the development of internal talent will enable an enduring approach to retain those very valuable people beyond mandated commitments. DoD should lead by example in the deployment of responsible AI and must rethink how to attract and retain capable people. Recommended actions include creating increased opportunities for onboarding AI talent, further fostering the career development of AI staff already working with DoD, providing this workforce with technology that enables them to do their jobs, and partnering with other government and private organizations.

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The Department of Defense Needs a Workforce That Can Effectively Apply Artificial Intelligence

The Department of Defense (DoD) is struggling to keep pace with technological acceleration in the field of artificial intelligence (AI). DoD certainly recognizes that significant changes must occur for the military to sustain overmatch (advantage in combat capabilities over potential opponents) in this era of great power competition, but the Department does not have the in-house AI skills or the ability to attract and retain the talent it needs to compete in the future.³ This deficit is emblematic of the global shortage in AI talent. According to a Chinese (Tencent) report cited by Forbes in 2018,⁴ there are only 300,000 AI professionals worldwide, with millions of AI-related jobs that need to be filled. Much of the emerging AI talent base is foreign-born, creating additional pressure to attract talent from non-domestic sources. The gap between the increasing demand for AI workers and the numbers of AI-trained individuals is growing.⁵

If DoD is to acquire the services of this limited external talent pool, it must employ a better communications strategy to support engagement with the public and with commercial industry. At the same time, a willingness to address cultural impediments that stymie the acquisition and development of internal talent would enable an enduring approach to retain these very valuable people beyond mandated commitments.

Addressing these cultural and environmental barriers must involve re-examining the role played to date by the Information and Communications Technology (ICT) industry and DoD activities. This paper identifies various shortcomings in the way DoD and the larger federal technology community have sought to explain the benefits of intended adaptations of AI for national security applications to the American public and other stakeholder communities to gain their support. Some of the miscalculations and errors of judgement may have originated with DoD and resulted in reinforcement of a skewed, skeptical view among technology communities

in and beyond Silicon Valley regarding DoD's motives and intent in advancing AI, machine learning (ML), and related algorithmic technologies in the next wave of AI rollout. However, the ICT community also bears a share of responsibility for the damaged relationship between DoD and industry that continues to burden efforts to fully realize the legitimate potentials of AI.

Imperative for Action

We are living in a different research and development environment than when DoD's processes were originally developed. While DoD and the National Science Foundation (NSF) are still the big players in government basic research, the innovation ecosystem has evolved, and funding for this innovation is dominated by non-government entities. DoD's percentage of funding of the national investment has been decreasing for decades, primarily because non-U.S.-government investments have grown significantly faster than DoD's.⁶ For many technologies like AI, DoD is no longer considered a major player. This trend isn't going to reverse itself—industry's contributions will continue to rise, and DoD's share will continue to shrink, making it more necessary for DoD to focus outwardly toward non-government innovation sources.

Cutting-edge innovations are therefore no longer primarily coming from DoD labs but from commercial industry. While in some cases DoD effectively harnesses the outputs of their basic research (e.g., when commercial industry does not address a DoD problem set), in many others they lag the private sector. Additionally, DoD labs sometimes trail nation-state competitors in embracing our own industry's innovations. Thus, the evidence shows that DoD must face outwardly to keep its edge.

In its November 2019 report, the Congressionally appointed National Security Commission on AI identified five lines of effort to sustain and advance U.S. advantages in AI:

1. Invest in R&D
2. Apply the technology to national security missions
3. Train and recruit AI talent

4. Protect and build upon U.S. technology advantage
5. Marshal global cooperation on AI issues

Each line of effort merits sustained attention and discussion. This paper, however, focuses primarily on DoD's need to recruit, train, and retain a skilled, committed workforce and on an additional line of effort that the commission did not include: the need for a new national-level narrative about the value of cooperating with government efforts to master these modern technologies at least as quickly as our international adversaries do.

CUTTING-EDGE INNOVATIONS ARE THEREFORE NO LONGER PRIMARILY COMING FROM DOD LABS BUT FROM COMMERCIAL INDUSTRY.

“National security agencies,” the commission notes, “need to rethink the requirements for an AI-ready workforce. That includes extending familiarity with a range of relevant AI technologies throughout organizations, infusing training on the ethical and responsible development and fielding of AI at every level, and spreading the use of modern software tools.”⁷ A literature review suggests that the commission's belief is widely shared, yet implementing the suggestions requires a willingness to accept more risk in how innovative technologies such as AI are institutionalized and implemented within the defense bureaucracy. Effective institutionalization requires, at a minimum, transitioning to a less brittle bureaucracy that accepts change, is willing to collaborate across organizations, and is amenable to less rigid hierarchical structures, including those for policy, research, development, test and evaluation (RDT&E), acquisition, and personnel.⁸

Effective implementation also requires a focus on people themselves—paying attention to the actual needs of the workforce, present and future. The outcomes of that attention may improve with two additional lines of effort. The first is to encourage leaders to model the

sort of data-driven decision making they want from the workforce by learning to use it themselves—in plain sight of their employees. Further, DoD leaders should engage the existing workforce in telling a compelling story about the value of defending the country with honor and about its commitment to the ethical deployment of modern technologies that, at present, make segments of the public uneasy.

Document Scope

Our research is based on publicly available information and interviews with AI, cyber, national security, and enterprise strategy experts at MITRE and in other organizations focused on national security topics. We assert that it is both critically important and relatively feasible to design and communicate a compelling narrative for engaging the public and key stakeholders. The goal of this work is, ultimately, to help build a technologically sophisticated government workforce that can accomplish its missions cooperatively, effectively, and ethically on behalf of the American people.

Changing the Narrative to Change the Outcomes

Collaborate and Cooperate with Commercial Companies

During a 2017 Committee on Armed Services confirmation hearing, Sen. John McCain expressed the need for better relationships between U.S. technology companies and DoD, stating: “I suggest you go out to Silicon Valley... They have answers, and they have equipment, and they can sell it to you off-the-shelf. And the CIA's relationship with Silicon Valley has been excellent. DoD's relationship with Silicon Valley has been—it will be another one of these disgraceful chapters that will be written about.”⁹

DoD had already recognized and responded to this frayed relationship with industry when Sen. McCain made this statement. One of the most substantial efforts

by DoD was to establish in 2015 (and make permanent in 2018) an organization committed to helping DoD rapidly acquire innovative technologies, including AI.¹⁰ The Defense Innovation Unit-Experimental (DIU-X), now known simply as DIU, was backed by then-Secretary of Defense Ash Carter; it expanded to include branches in Silicon Valley, Boston, Austin, and Washington, D.C. While several chief executive officers¹¹ and senior leaders¹² in DoD have expressed optimism, DIU still faces challenges.

Why? DoD introduced DIU as an organization dedicated to innovation in order to address a need, but a significant part of the challenge for DoD innovation stems from the Department's culture. Government processes are designed to be repeatable to produce anticipated and fair outcomes. This is often the exact opposite of how commercial innovation occurs. Mike Madsen, DIU's director since June 2018, noted how DoD's preference for a single acquisition of a final product differs from industry's culture of rapid iteration and learning: "[DoD] has an innovation adoption problem... There's a reluctance to iterate, a reluctance to embrace that Silicon Valley mantra of 'fail early, fail often, fail fast.'"¹³

Steven Walker—director of the Defense Advanced Research Projects Agency (DARPA), which is DoD's research agency aiming for long-term, transformational change¹⁴—agreed and highlighted that DoD's tolerance for risk and failure differs from that of industry: "If you have [an industry] culture that rewards program managers for coming up with ideas and programs that are high-impact—programs that will change the world if successful—then we [at DoD] have to accept that risk."¹⁵

Changing culture takes significant time and effort, as well as honest self-evaluation and an environment willing to experiment with new approaches. DoD has already made serious efforts to address some of industry's frustrations with its current culture. For example, DoD has taken steps to shorten acquisition timelines; create new acquisition pathways for rapidly evolving systems, such as software-intensive systems; and clarify the acquisition process to be better understood.¹⁶ DoD leadership and operational users make regular visits to industry in an attempt to understand and replicate "best practices" in iterating and failing early and failing fast. However, the Department has not moved fast

enough for industry in implementing these changes, so frustrations remain. While the Department is changing at its own pace, DoD must also improve its public and private messaging and narrative to bridge the gap and build more ties between the two cultures.

WHILE THE DEPARTMENT IS CHANGING AT ITS OWN PACE, DOD MUST ALSO IMPROVE ITS PUBLIC AND PRIVATE MESSAGING AND NARRATIVE TO BRIDGE THE GAP AND BUILD MORE TIES BETWEEN THE TWO CULTURES.

Cultivate a Public AI Workforce That Wants to Engage with DoD

The challenges involved in developing partnerships between DoD and industry range from the manner in which corporate leadership presents what it wants, to how the current workforce perceives what's being offered and messaged, to what the budding workforce considers personally and professionally desirable.

Through actions that range from employee walkouts¹⁷ to advocacy,¹⁸ activists at big technology and consulting companies are voicing their concerns over their employers partnering with components and missions of the federal government they perceive as going against their values. As a result, for example, in 2018 Google walked away from helping DoD with Project Maven (analyzing drone footage) in response to pressure from its employees and outside academics.¹⁹ Microsoft felt similar employee discontent after it announced a contract with the Army for augmented-reality technology.²⁰ Amazon, Palantir, Salesforce, Wayfair, Deloitte, and McKinsey & Company have all seen their employees essentially force company leadership to reexamine contracts with those parts of the government with which employees take exception.²¹

In response, DoD and its advocates have largely dismissed these protests as irrelevant, instead

of recognizing the concerns and adjusting DoD's messaging or practices to address them. However, as noted above, DoD does not carry all the blame, either for miscalculating the depth and sincerity of these concerns among the industry's emerging workforce or for failing to acknowledge these aspects of Silicon Valley culture and practice that have resisted certain aspects of AI activity—whether development, collaboration, or use of tools.

DOD AND ITS ADVOCATES HAVE LARGELY DISMISSED THESE PROTESTS AS IRRELEVANT, INSTEAD OF RECOGNIZING THE CONCERNS AND ADJUSTING DOD'S MESSAGING OR PRACTICES TO ADDRESS THEM.

Importantly, concerns with how government has advanced automation technologies are not new. They originated and grew in the era after the fall of the Soviet Union and the emergence of the WWW-enabled internet generation. This has included the U.S. ICT community as a whole beyond Silicon Valley, Microsoft, and other individual AI-industry players that has, even to the present day, been fertile ground for skepticism about the cultural norms of the U.S. defense community that have been in vogue since the Vietnam era. No amount of admiration—and organizational responsibility as vendors—for stealth, smart weapons, casualty-free stand-off weapons, and over-the-horizon radar can blunt the collective fears of the fully unleashed military-industrial complex President Eisenhower warned of in his 1961 farewell address. Thus, the techies themselves bear some responsibility for the less-than-comfortable relationship between DoD and ICT entrepreneurs.

Nevertheless, the DoD leadership's dismissive reaction toward the attitudes and behaviors of Silicon Valley's workforce, though undesirable, is understandable. DoD's challenges seem real and looming, especially because they are the focus of everyday work. The importance of addressing them can be seen as self-evident. China is a rising AI superpower, and DoD fears

losing an arms race to China, with the resulting shift in the global balance of power.²² But citizens at large do not perceive these threats to the same degree. For example, one poll conducted by the Chicago Council on Global Affairs found that in 2018 only 39 percent of Americans believed that China becoming a world power represented a critical threat to U.S. interests²³ (which by way of crude comparison, is significantly less than the 60 percent of Americans who viewed the USSR as a very serious or serious threat to the United States at the end of the Cold War).²⁴

Another justification for maintaining the status quo (i.e., limited partnership with industry) is the argument over numbers: dissenting corporate employees are in the minority and therefore from DoD's perspective do not rise to the level of true concern. In response to the more than 3,000 Google employees voicing concerns over working with DoD, one U.S. Senator is quoted as saying that “[Google] basically acquiesced to a woke [i.e., those with a perceived awareness of issues concerning social and racial justice] segment of their workforce.” He further expressed his anger by saying that civilian agencies should “... tell [Google] to turn around and get the hell out.”²⁵ These kinds of statements do nothing to establish common ground with a knowledgeable sector of the industry workforce and only reinforce their existing concerns.

IT IS IMPORTANT TO FIND EXAMPLES OF THE POSITIVE IMPACTS OF PUBLIC-PRIVATE COLLABORATION, TO PROMOTE THEM, AND TO CHANGE MINDS.

When DoD does turn to bridge-building and messaging to industry, those messages convey fear, guilt, and blame rather than inspiration and opportunity. However, Matthew Colford, a former Obama-administration official and former partner at Andreessen Horowitz, a venture capital firm based in California that has backed several defense start-ups, suggested that the messaging problem lies with the recipient and not with the messenger: “At the end of the day, the things

their products are used for often times are not fully understood... They are very easy to portray simplistically and overgeneralize that these are products to help kill women and children.”²⁶

In response to the frayed trust between corporate activists and DoD, former Secretary of Defense Ash Carter emphasized the necessity of industry participation in DoD’s missions if the United States is to be successful. Hypothetically addressing Silicon Valley employees, Secretary Carter argued, “If you know the most about this technology, how are we ever going to get it right if you won’t participate?... But there are 300 million of us in this country, you don’t get your way all the time anyway. But if you’re not in the game, some dummy, or whatever you fear the government is like, is going to make the decision you don’t want to make. You are the best, get in the game. By the way, you have a responsibility to do so.”²⁷

Secretary Carter’s Deputy, Bob Work, sought to appeal to patriotism, choosing to highlight America’s superiority to China by contrasting the American and Chinese governments: “Google has a center in China, where they have a concept called civil-military fusion... Anything that’s going on in that center is going to be used by the [Chinese] military.”²⁸

Despite the good intentions, often valid arguments, and far-reaching vision, DoD and military communities miss opportunities to harness American’s civic duty and pride by using language that could be interpreted as confrontational and unapproachable, rather than welcoming and inclusive. Further, they neglect to showcase stories of legitimate, non-kinetic impact on the lives of civilians and for creating a safer world. By far the best approach to changing people’s minds is through stories. It is important to find examples of the positive impacts of public-private collaboration, to promote them, and to change minds.

Industry owns much of the technical baseline and the talent for AI development. Therefore, DoD must change the stories it tells and how it tells them if it wants to partner with the very groups it needs most. If opposition to DoD continues from the very workforce required, then DoD will continually struggle to apply the country’s most skilled resources to national security missions that matter most. DoD must identify and use messages and

approaches appropriate for engaging and partnering with the public. This new narrative must acknowledge feelings of distrust or neutrality as valid and work from there to inform a more effective public relations campaign.

The Time Is Ripe for a Change in Narrative

Lead the Deployment of Responsible AI by Example

The public is coming to see how AI has already been established and continues to be integrated into daily life. As both familiarity and frustration with AI grow, DoD can demonstrate responsible AI partnership and deployment and reflect its leadership in these activities through a broadly disseminated public narrative.

The public is unsure about DoD AI usage, governance, and concerns levied that DoD would misuse these technologies by offloading decisions with important consequences to unsupervised, uncontrolled machines. For example, the Future of Humanity Institute at Oxford University collected responses suggesting that Americans have mixed attitudes toward the development of AI, but that DoD is one of the more trusted entities to develop AI in the interest of the public.²⁹ A poll by the University of Texas focused on the Intelligence Community (IC) reports that while Americans generally consider the work of the IC effective in terms of mission success, “few understand the institutional framework for supervising and overseeing this part of our government, despite more than a decade of public debate over controversial intelligence programs.”³⁰ If the public does not understand the supervision and oversight procedures used by the IC, it is likely they also do not understand these procedures for DoD. That, in turn, can lead the public to assume that AI would be used to make decisions of consequence without proper vetting and adherence to policies that prevent its misuse and misapplication. Since the national conversation on AI is only beginning, the U.S. government can and should define and publicly share its internal governance

mechanisms and publicly set expectations with industry partners for deploying AI responsibly.

Proactive messaging is nothing new for DoD. The U.S. military has repeatedly worked with media producers to create products and messaging to move public sentiment in wartime and in peacetime operations. In the modern era, DoD has hired public relations and advertising firms to help improve the Department's messaging, including television ads that have aired for decades, aimed to increase recruitment by emphasizing courage, adventure, and leadership opportunities as benefits for those who join the armed services.^{31, 32, 33} DoD has been, and continues to be, directly involved in designing workforce development strategies to attract and recruit the right skill sets through such public relations techniques.³⁴ The Department should apply the most effective techniques to shape public opinion regarding DoD's use of AI and to promote participation by highly skilled professionals.

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Recognize that Authenticity Is Essential for Acceptance

DoD has always experienced healthy public skepticism toward government use of new technologies for military missions. To be widely accepted, a messaging strategy must acknowledge the nature of public perceptions and the poor track record of many government institutions regarding cost savings, exceeding their declared charter, or violating international expectations. From a baseline of transparency, DoD can build messages that address misperceptions, increase trust, and shift the narrative. A starting point must be a frank assessment of DoD's

credibility. Focus groups, a common tool for public relations firms, offer one means to identify pain points and test messaging with participants.³⁵

With regard to AI, the opportunities for misinformation only compound. According to Lt. Gen. Jack Shanahan, Director of the Joint Artificial Intelligence Center (JAIC), there are "grave misperceptions"³⁶ about technology DoD is developing. Rumors circulate about basement DoD laboratories where an artificial general intelligence free-will agent will "roam indiscriminately across the battlefield." Associations with Skynet and the Terminator are all too easy to conjure up. Nonetheless, Shanahan described AI as a tool built to address very specific challenges. He pointed out that DoD will evaluate ethical, moral, and legal considerations associated with AI usage as thoroughly as considerations for other technologies it has fielded. DoD must therefore demonstrate its long-standing practice of responsible technological deployment and accentuate how its missions and oversight involving AI will be a model for civilian and international organizations going forward.

What a New Message Might Look Like

Share DoD's Long History of Legal, Ethical, and Accountable Practices

DoD understands that American democracy has a long history of operating under the rule of law, governing authorities, and a code of ethics that guides its use of powerful technologies, while reducing risks associated with deploying new technology too quickly.³⁷ A powerful message could be delivered by demonstrating how DoD has performed such risk reduction in the past and by explaining how the Department will make decisions about AI integration in the future.

Gen. Mike Holmes, the commander of Air Combat Command, appreciates the challenge at hand and wants to better communicate that DoD's role is to be in "in the business of avoiding major war."

“Americans have expectations about what their government does and whether the government uses technology and tools to infringe upon their rights, so we are going to have to work through, as Americans, our comfort level on how technologies are used and how they are applied,” Holmes said.³⁸ One way to do that is to be more open about existing processes.

With conventional weapons, military commanders work side by side with legal advisors who approve their use if they comply with international humanitarian law or advise against their use if it could result in a violation of that law.³⁹ The Defense Innovation Board, an independent federal advisory committee that provides guidance and recommendations to DoD senior leaders, lays out how AI might be interpreted under existing law.⁴⁰

Evidence for [how DoD makes and executes decisions] is reflected through various statements, policy documents, and existing legal obligations. Formal accords include the Law of War and existing international treaties, while numerous DoD-wide memoranda from Secretaries of Defense highlight the importance of ethical behavior across the armed services. In isolation and taken together, this body of evidence shows that DoD’s ethical framework reflects the values and principles of the American people and the U.S. Constitution. ...

Existing Law of War rules can apply when new technologies are used in armed conflict. ...The fundamental principles of the Law of War provide a general guide for conduct during war, where no more specific rule applies, and thus provide a framework to consider novel legal and ethical issues posed by emerging technologies, like AI. For example, if AI was added to weapons, such weapons would be reviewed to ensure consistency with existing legal requirements, such as the requirement that the weapon not be calculated to cause unnecessary suffering or be inherently indiscriminate. Additionally, under the Law of War, commanders and other decision-makers must make decisions in good faith and based on the information available to them and the circumstances ruling them at the time. The use of AI to support command decision-making is consistent with Law of

War obligations, including the duty to take feasible precautions to reduce the risk of harm to the civilian population and other protected persons and objects.⁴¹

When it comes to legal and ethical accountabilities, DoD appears to believe that evolving and introducing innovative AI technology will be no different than introducing other technologies. DoD needs to convey that message to the public in a way that describes the accountability and responsibility that individual decision makers take on when using any potential system of consequence, including AI systems that support national security missions.

Tell the Story of How DoD Deals Responsibly with Disruptive Technologies

Developing a national narrative on AI must overcome a pervasive Western cultural bias: the belief that, without direct intervention, scientists and military members of the national security establishment will always “do their worst” and develop technologies unencumbered by moral or ethical boundaries. What must be better communicated to the public is a nuanced view that considers intent, long-standing moral and ethical norms, and the doctrine espoused by states that are bound by the rule of law in their behaviors.

Perhaps the most illustrative examples of the American and Allied approaches to addressing disruptive technologies are in the nuclear, biological, and chemical arenas. Due to the horrors of World War I, in which the widespread use of chemical warfare by all the major combatants characterized the battlefield environment during 1915–1918, 16 of the world’s major nations signed the Geneva Protocol in 1925, pledging never to use gas warfare again.⁴² While the impact of the Geneva Protocol could be disputed, the public revulsion over the use of gas, which resulted in immense casualties during that war, had a clear impact on the politically acceptable employment of these weapons in the West. A similar negative view emerged about the development of biological weapons.

The consensus that emerged in most Western international security establishments was that these weapons are too inhumane, uncontrollable, ineffective, or even obsolete compared to modern conventional weapons and did not have military utility. During World War II, no large-scale employment of chemical or biological weapons occurred, despite all the major combatants having stockpiles of chemical weapons. Even as odious a regime as Nazi Germany did not employ chemical weapons *en masse* against the forces of the United States, Britain, France, and the USSR, even when it became obvious to all but the most irrational Nazi leaders that they would lose the war and pay the ultimate price for their crimes against humanity.

The United States and Britain handled the development and potential employment of these weapons in largely the same way. They established a small group of technical experts, coupled with a small, highly disciplined group of military units, that aimed to provide a deterrent capability against a potential state adversary, but not the widespread employment of such a capability.⁴³ This approach, especially the emphasis on strict discipline and highly trained forces, was emulated later by military figures such as Air Force Gen. Curtis LeMay, who made Strategic Air Command into America's premier deterrent force, and Adm. Hyman Rickover when he fielded the U.S. Navy's ballistic missile submarine force.

The case of nuclear weapons is particularly illustrative of America's method of handling truly disruptive national security technologies. Even during World War II, the strong coupling of policymakers, technologists, and combatants in the decision-making process ensured that while the United States did eventually employ the weapons, the decision was not based on the operational or strategic whims of Allied military leaders. Control of their employment would ultimately reside with civilians in the national security establishment. Nuclear weapons were more than just a "bigger bomb."

This recognition has governed the U.S. national security establishment's view of nuclear weapons ever since.⁴⁴ The non-partisan, civil-military understanding concerning the development, fielding, and control of America's most potent weapons explains why the challenges in the U.S. nuclear enterprise that emerged

in the early 21st century propelled vigorous corrective action by the Department.

There is no compelling evidence that the U.S. national security establishment will deviate from such a sober and careful approach to fielding disruptive technologies today. For example, when examining the fielding of cyberspace weapons, the United States developed such a cumbersome hierarchical and bureaucratic process for cyberspace employment it actually surrendered strategic, operational, and tactical advantages. These were yielded in the post-9/11 military and intelligence environments because of concerns about political and technical blowback, operational precedent setting, and ability to discriminate effects. It was not until 2018 that significant U.S. policy decisions were made that allowed a loosening of restrictions on cyberspace weapons development and employment that could be commanded and controlled at the tactical level.⁴⁵

Given existing concerns about trusted AI technologies, the public should have high confidence that DoD and policymakers in the Executive Branch and Congress will not adopt a cavalier approach to fielding this class of weapon systems. Discussions about developing and fielding AI weapon systems that could deliver autonomous lethal military effects also demonstrate caution. The healthy public debate in national security circles, as exemplified by the thoughtful points raised in a briefing given by Air Force Gen. Paul Selva (then Vice Chairman of the Joint Chiefs of Staff) on the "Terminator Conundrum" in 2016 exemplified an early positive trend and should be reinforced.⁴⁶ These kinds of clearheaded deliberations on the nature of warfare and the implications of rapidly advancing technologies reflect the kinds of policy, technical, operational, and ethical debates that characterize the American approach to the use of force, and the overarching recognition that political concerns trump military efficiency.⁴⁷

Adjust the Government's Message to Reflect the Values of Industry Founders and Modern Employees

DoD's existing messages to Silicon Valley and the AI industry reflect Pentagon frustrations over a perceived

lack of participation and patriotism in industry. For example, Frank Hoffman, a retired Marine infantry officer and former Pentagon official, argues that the employee activist community “feels it’s on the moral high ground if it puts more Americans in danger or restricts the Defense Department from developing capabilities that could enhance U.S. weapons systems by making them more accurate and better at defending the country and its allies.”⁴⁸ Even if this were true, blaming a non-cooperative partner is unlikely to motivate that partner to cooperate.

James Joyner, a professor at the Marine Corps Command and Staff College, and Matthew Bernius, the Lead User Researcher at Measures for Justice, summarize this disconnect best, saying appeals to Silicon Valley to avoid harming U.S. security interests “alas, are likely to fall on deaf ears. If Pentagon leaders are going to persuade tech executives to listen, they’re going to have to do some listening of their own first.”⁴⁹

Joyner and Bernius lay out a compelling blueprint for how to adjust the content and tone of existing DoD messaging to communicate with Silicon Valley. According to Elsa Kania, “only a small proportion of Americans... are sharing the burden and honor of military service. Typically, personal relationships, proximity to the military, and perception of service all inform propensity to serve, leading to the creation of a so-called ‘warrior caste.’”⁵⁰ That being the case, Joyner and Bernius argue for the need to change the methods of persuasion that resonated with previous generations. Whereas higher value was placed on issues of military dominance and projection of power in the Cold War era, DoD should promulgate a new message that highlights the values that many modern tech workers and industry founders espouse, including preservation of civil liberties, the value of civil service, and humanitarianism.

Each of the following missions and tasks summarizes and expands on their blueprint. They could benefit from AI applications and expertise. By asking for help in these specific spaces, DoD may improve AI workers’ receptivity to the Department’s missions.

THE COLLECTIVE ARGUMENT. Modern-day tech workers are young and removed from the burdens of fighting a war. In addition to suggesting that the United States is the “good guy,” DoD can appeal to a sense of duty and emphasize the collectivist belief that “every single person has a positive obligation to society and the government can help people... into making a unique contribution,” as expressed by Greg Ferenstein, an author who writes about Silicon Valley politics and culture.⁵² An example is the National Security Commission on AI task force,⁵³ which reached out to diverse groups, including technology companies, non-profits, universities, and adversarial groups, going so far as to state that a call for papers would result in a “guarantee [that] the commission staff will read every [submission].”⁵⁴

THE GLOBAL ARGUMENT. Modern-day tech companies, even if based in the United States, are not American entities; they are global. Of those domestic companies, 71 percent have immigrants in executive roles.⁵⁵ Many members of the domestic AI workforce were not born in the United States,⁵⁶ and Silicon Valley is leading the campaign to have U.S. authorities expand the number of visas granted to high-skilled individuals to make that needed international talent available. Therefore, as DoD frames the American military as a solitary leader, perhaps it should also accentuate participation in international partnerships and coalitions such as NATO and the UN, and international missions where the United States is an invited participant. For example, the Argentina Declassification Project is a marvelous story of how the U.S. IC responded to a request for help

from the Argentinian government in uncovering the truth behind Argentina’s “Dirty War,” in which hundreds of thousands were killed. The subsequent declassification and public release of 7,000 documents received the highest praise from a long-standing critic of the U.S. IC.^{57, 58}

THE HUMANITARIAN ARGUMENT. When workers strike against their leadership for partnering with the U.S. government, the reasons stem from missions that go against progressive principles; detaining immigrants seeking asylum or assassinating government leaders are two such hot button issues. Telling these workers to “grow up” or stating “we’re keeping you safe” is not going to work—in fact, it is counterproductive. Instead, sharing stories that emphasize humanitarian missions, such as delivering humanitarian aid to areas affected by natural disasters, enforcing peace agreements in areas difficult to avoid or de-escalate regional conflicts, and conducting search and rescue missions to save lives in areas of active conflict may be more powerful. For example, in 2014 during Operation United Assistance, DoD promptly provided nearly 4,000 troops to support humanitarian, logistical, and security assistance in response to the Ebola crisis in Liberia.

THE POWER TO THE PEOPLE ARGUMENT. When Silicon Valley executives discuss social media’s impact, they point to giving voice to the people and subverting existing power structures, as in the Arab Spring or the protests in Hong Kong.⁶¹ In concert with underscoring how the military is overthrowing dictators and training local militias to be self-reliant, DoD could also focus on how the military helps give voice to the people. Pushing back against oppressive regimes, whether

in Beijing, Havana, Pyongyang, Caracas, or Moscow, is aligns to American ideals. The U.S. military is vital to maintaining the international order that offers a stabilizing force for security and prosperity.⁶²

Build on DoD’s Existing Approaches to Strategic Messaging

Once the message is established, DoD needs to find the right avenues for circulating it. “Preparing the battlefield” for this messaging through individual engagements with established interest groups will be key to success. Organizations such as the Federation of American Scientists, American Association for the Advancement of Science, American Bar Association, and standards bodies with high-level DoD visibility such as the American National Standards Institute and Institute of Electrical and Electronics Engineers, are target audiences for roadshow teams from the services, DARPA, and other R&D-oriented DoD organizations. DoD can also develop key messaging with the National Aeronautics and Space Administration, an agency critically reliant on AI advancement and which routinely gets high marks in public opinion polling. Technical Exchange Meetings (TEMs), mini-conferences, industry conferences, DoD and academic think tanks, and federally funded research and development center (FFRDC) events can provide independent platforms for exchange.

DoD often offers messages via so-called earned media (i.e., independent media not directly created or paid for by the messaging organization). Commonly, DoD leadership participates in panel discussions and speaking engagements on national security topics. Academia, think tanks, not-for-profit, and partner organizations offer these platforms for relevant messaging. With the right outcomes identified, shaped to counter misinformation or misperceptions and to create alignment, these earned media opportunities represent ways to communicate DoD’s message to the public and to stakeholder communities.⁶³

DoD could also reach out to established venues for government engagement with private-sector expertise, committees established under the Federal Advisory Committee Act and the Defense Science Board and its annual battery of targeted subject matter studies. Of course, these bodies are not channels for one-way messaging but rather opportunities for engagement in pursuit of consensus and “common views.”

DoD can look to these and other classic communication methods to capture and shape the right messaging. But for these messages to result in an increasing, enduring pipeline of skilled AI workforce members, DoD must prepare and reshape its organizations for success.

The World Is Competing for the Same AI Talent, so DoD Must Rethink How to Attract and Retain Capable People.

Share DoD’s Long History of Legal, Ethical, and Accountable Practices

The government faces significant challenges in its ability to attract, recruit, and retain AI practitioners and expand opportunities for the current AI workforce. Bureaucratic barriers alone put hard limits on agencies’ ability to hire new graduates,⁶⁴ resulting in a shrinking number of workforce participants younger than age 30. The answer may come from renewed hiring authorities offered to agencies, but even then the government has an uphill battle to build its employer brand,⁶⁵ to compete with the incentives that private industry offers for the same talent base, and to train today’s workforce to integrate AI into government operations. Methods for attracting AI practitioners will vary somewhat across stakeholders, generations, and groups, but creating new opportunities and initiating purposeful messaging will play a role in any strategy that DoD can employ to close this widening gap.

Recruiting skilled engineers, and other disciplines necessary to operationalize AI for DoD, will require strategies that:

- Increase opportunities for onboarding AI talent—by casting a wider net,⁶⁶ reducing burdens for bringing in AI talent, and identifying competitive incentives for recruitment
- Increase opportunities for those working with DoD—by creating attractive career pathways, work environments and technology tools, and diversity that is necessary for the modern worker
- Increase opportunities for building partnerships—by creating competitive recruiting environments and conveying key messages that government service is meaningful and fulfilling

Increase Opportunities for Onboarding AI Talent

Bringing in new AI talent requires a fresh look at novel incentives that can be made available, expanding the talent pool to include more foreign nationals, learning from how DoD has built the cyber workforce, and exploring new recruitment concepts.

Use Incentives to Empower Recruitment

The government has several tools available for incentivizing the modern worker. The most obvious of these tools is monetary compensation. The National Security Commission on AI reported that the “DoD and the IC are failing to capitalize on existing technical talent because they do not have effective ways to identify AI-relevant skills already present in their workforce. They should systematically measure and incentivize the development of those skills.” The commission recommends that both DoD and the IC establish a financial rewards program for employees learning AI-relevant skills.⁶⁷

But compensation for AI talent is so competitive that salary is unlikely to bolster DoD’s ability to recruit top talent. Increasing educational financing options and student loan forgiveness will expand access to the educational pipeline necessary to keep pace with increasing demand for AI talent, both in DoD and private industry. Currently, the federal student loan repayment program⁶⁸ permits agencies to repay federally insured

student loans as a recruitment or retention incentive for candidates or current employees of the agency, with some limitations. Recruitment of skilled AI practitioners who might consider at least a few years of government service would benefit from improved employee financial and educational incentives that expand the flexibility of the program and increase its availability to attract needed talent.

There is also incentive for individuals to contribute to meaningful work. Experience in technical challenge events has shown that workers and students are highly motivated to produce tools and materials that are useful and impactful for stakeholders. That applies directly to working on DoD and IC missions that offer an opportunity to serve the country. Sue Gordon, former Principal Deputy Director of National Intelligence, speaking at the Georgetown Kalaris Intelligence Conference,⁶⁹ highlighted two reasons why working with the government on AI challenges would be “the best first five to ten years of your career.” They include working on “crazy hard problems” and taking on “more responsibility early.” She went on to conclude that these offer “a running advantage through the rest of your life.”

DoD can capitalize on these incentives by communicating key differentiated benefits and by expanding the flexibility of government programs to identify opportunities for newly trained recruits to apply advanced skills.

Re-examine Policies for Hiring Talented Foreign Nationals

Because of the shortfall in AI technical talent, because the overall talent pool has more non-U.S. citizens than U.S. citizens, and because the competition for talent is expanding globally, the United States has become increasingly dependent on foreign-born workers and on internationally outsourced R&D. According to Remco Zwetsloot of Georgetown University’s Center for Security and Emerging Technology, “more than 50 percent of computer scientists with graduate degrees employed in the country today were born abroad, as were nearly 70 percent of enrolled computer science graduate students.”⁷⁰ Further, the majority of U.S.-schooled,

foreign-born talent wishes to remain in the country, yet it is both complicated and expensive for these foreign nationals to remain in the country and apply their developed skills. Megan Lamberth of the Center for a New American Security⁷¹ points out that technology companies are increasingly reliant on the H1B visa program to recruit foreign talent, but “Since 2005, the cap on H1Bs has remained at 85,000 per year.” For the last 16 years, H1B applications far exceeded this cap.

Given these conditions, policymakers must offer immediate reforms that increase ease and capacity for private companies, and the government, to recruit these skilled workers and take advantage of their willingness and desire to work in the United States. Additionally, in the face of increased international competition, the United States must take advantage of that continued interest by actively communicating democratic societal values and the comparative advantages to working and living in America for these workers.

Learn from How DoD Is Developing the Cyber Workforce

Comparisons to the establishment and implementation of the DoD cyber workforce are informative. DoD recognized early that defending its networks, information systems, and data required a knowledgeable and skilled DoD cyberspace workforce that could adapt to the dynamic cyber environment and quickly pivot its resources to meet mission needs.⁷² Like a DoD cyberspace workforce, a DoD AI workforce must be prepared to defeat highly sophisticated adversaries. This requires improved methods to attract, recruit, and retain the most capable individuals. Cyberspace is a modern warfighting domain, and it continues to evolve to address the ever-changing nature and complexity of the threat.⁷³

Despite the plethora of cyber workforce strategies initiated by DoD and the federal government, including the DoD Cyber Strategy, the 2018 DoD Cyber Strategy and Cyber Posture Review, the CyberCorps Scholarship for Service,⁷⁴ the Federal Cybersecurity Workforce Strategy, and DoD Cyber Excepted Service Personnel System, establishment of an effective DoD cyber workforce has received some criticism and has not

been championed as an example to be replicated or followed. For example, cyber job codes have now been applied across DoD for personnel hiring, but this has not remedied the problem because of the mismatch of categorizations for cybersecurity jobs.

While it encountered setbacks, the Cyber Exempted Troops effort has had one major success by removing the USAJobs platform requirement. Managers are now empowered to make hiring decisions to fill key cyber roles from the civilian workforce. This added flexibility has increased options for retaining these vital skill sets. The improved approach should apply to managers who hire AI staff and secure support capabilities.

An additional hurdle is the current Career Intermission Program. This program allows rotation between the private sector and DoD jobs. However, once participating individuals return to the Department, for every year in the private sector, they owe two years of service to DoD. For example, a person on rotation or filling a liaison position for two years owes four years back to DoD. For critical skills such as cyber and AI, a more equitable ratio would be more appealing.

Similar to other rotational programs, the Office of Personnel Management (OPM) manages the Intergovernmental Personnel Act (IPA) Mobility Program,⁷⁵ which “provides for the temporary assignment of personnel” between the federal government and qualifying intergovernmental, academic, FFRDC, and other eligible organizations. While the IPA program applies only to these select groups, the program can be expanded to include private-industry rotations to bring in much needed experience from the private sector and to forge key relationships necessary to advance game-changing technologies like AI.

Unfortunately, DoD’s current approach to recruitment does not address crucial skill requirements. When coupled with DoD budgetary cycle, this slows and diminishes the Department’s ability to anticipate and plan for emerging technologies such as AI. Broadly speaking, two areas where DoD can improve its ability to adapt to this changing environment are aligning messages and enhancing the AI/cyber employee experience. Topics DoD might consider include:

- Cyber and AI salaries remain an issue of concern. Higher salary ranges do not appear to guarantee advancement or effective placement within DoD organizations.
- Cyber (and, in the future, AI) will demand more flexibility regarding how jobs are billeted. DoD must flag top talent and groom technical people for future leadership opportunities.
- With both cyber and AI, DoD must work to ensure certifications are tied to needed capabilities.
- Over-classification prevents collaboration unless programs have a sandbox environment for testing. The government over-classifies everything cyber and risks doing the same with AI.

ADOPT A RADICAL RECRUITMENT CONCEPT: CREATE AN “ROTC+” AI PIPELINE

DoD needs talented people to develop, plan, operate, and execute effective military campaigns enabled by AI technologies. The accelerating rate of change of technology and the exploding growth of data puts a premium on recruiting, developing, and retaining professionals with the special skills in AI. The Department and the IC already have small cadres of uniformed and civilian members working in this arena (including additional assistance from staff at FFRDCs and academia), but these cadres are insufficient for the strategic competition the Department and the nation are facing. The nature of this competition is driving DoD, the services, and the IC to develop human capital strategies for accessing and managing a core of uniformed and civilian AI professionals.

The desired talent must include multi-disciplinary expertise in AI, strategic and economic theory, logistics and global supply chains, human behavior and decision making, and social and cultural understanding. AI and data science talent is critical, but not enough to properly leverage the revolution in

autonomy, AI, and ML. Many of these skills are also in great demand in the commercial market, which makes it difficult for DoD to recruit these professionals. One opportunity to leverage a recruiting mechanism already exists: the Reserve Officer Training Corps (ROTC). ROTC works well for its intended purpose, but to enable DoD to compete in both capability and scale, the ROTC mechanism should be modified into “ROTC+.”

ROTC today provides a systemized path of university- and college-based officer training programs for accession into the officer corps of America’s armed forces. Statistics for a typical year (2010) show that 30 percent of all active duty officers in DoD had been commissioned through ROTC, making it the largest commissioning source. A feature that ROTC programs have typically employed is to give ROTC scholarships to its most promising cadets. These four-year scholarships provide significant aid in giving middle- and lower-income students access to the nation’s most prestigious, and expensive, universities.

ROTC scholarships are typically “targeted” to certain fields of study, but these study requirements are generally very broad (e.g., a degree in any engineering discipline). Additionally, between the ROTC four-year curriculum and the ROTC scholarship deadlines, cadets typically forgo an opportunity for “co-op” or “work-study” opportunities that many of their civilian classmates can exercise. This could inhibit the capability to give potentially high-performing cadets in AI exposure to the absolute latest developments in the AI community.

The “ROTC+” program would feature efforts to specifically target certain universities (e.g., Virginia Tech Corps of Cadets program) and maximize flexibility for undergraduate research and other internship programs. ROTC+ detachments will be intentionally established in universities in geographic areas

that are considered the “hubs” of AI thought and research. While some universities might not initially be receptive to this approach, DoD should consider establishing “hub detachments” that allow cadets to participate in ROTC Professional Military Education (PME) if their university does not have its own detachment. The federal government should consider grants and other existing partnerships with those universities that participate in the AI ROTC+ program, to motivate participation by academic institutions.

For cadets themselves, the ROTC+ scholarship would be an important incentive. The scholarships should be aimed at AI-associated fields (e.g., “machine vision,” “advanced computational data science”), with the specific aim of leveraging those scholarships at the centers of AI excellence. While this might be perceived as reducing the flexibility offered by the ROTC+ scholarship program, it would ensure the Department’s needs are being met by accessing the best academic talent at the nation’s leading AI institutions.

Additionally, DoD should loosen the timing restrictions in ROTC curricula and scholarships to allow undergraduate cadets to participate in work-study programs, co-ops, and internships at labs, FFRDCs, and private entities that feature cutting-edge work in this demanding field. By participating in such activities, ROTC+ would not just produce officers with degrees in AI courses of study, but would also serve as the foundation for building long-term relationships with talent-rich private, commercial, FFRDC, and lab organizations outside the traditional defense industrial base. These relationships would generate important return on investments as these young officers progress in their military careers, or, if not on active duty, potentially work in such organizations as their “day job.”

Another aspect of ROTC+ would be a significant change from the original intent in establishing ROTC: direct accession of

civilians to the DoD and IC workforce. It is important to note these professionals would not be commissioned members of the armed forces (either active or reserve) but would be future government civilians recruited for follow-on roles in specific DoD components. This would also include leveraging scholarships and targeting specific AI-associated degrees, and universities recognized for their excellence in this field, similar to the changes for the ROTC cadets described previously. Their entry into the government civilian workforce would be based on their completion of their AI-associated degree. Furthermore, DoD should consider leveraging the ROTC detachment infrastructure; this would give civilians the opportunity for early exposure to Department or IC issues. This would enable the professional development of early government career professionals that are not just technically capable but understand the national security mission of the Department.

To establish an ROTC+ initiative for both uniformed military and civilian participants, DoD should:

1. Review and change relevant policy and instructions (e.g., Chairman of the Joint Chiefs of Staff Instruction 1800.01E Officer Professional Military Education Policy, and Department civilian policy/instructions) to incorporate AI-targeted educational goals across the PME continuum.
2. Work with universities to develop educational paths in ROTC+ PME that leverage civilian academic institutions and commercial internships to develop talent in emerging AI technologies, techniques, and concepts.
3. Investigate and potentially revise undergraduate military-civilian exchange programs with interorganizational partners (e.g., other government organizations, Allies, foreign partners, academia, FFRDCs, and industry) to aid mutual understanding, technical development, and skills development for integrating autonomy, AI, and ML across the spectrum of conflict.

Increase Opportunities for Those Already Working with DoD

Retaining a robust AI workforce requires creating pathways for career development, a willingness to learn from industry successes and challenges, removing barriers to impactful work (i.e., technology barriers), and creating diverse and inclusive environments.

Create Career Pathways for AI Staff

Today, DoD does not know how and where to best deploy AI professionals. The uniquely skilled staff who both support national security missions and are capable of developing and operationalizing AI applications enter the DoD workforce with little opportunity to apply their skills; many have difficulties establishing their career path. Laying the groundwork for onboarding this next generation of workers is critical to the success of building up DoD's AI workforce.

AI-enabled technologies applicable to DoD missions are as varied as logistics analysis and image classification. These applications require employees who can understand, use, and apply their knowledge of these technologies—and who want to work for the government, particularly the military. Talented employees expect to see evidence that their development efforts directly impact the mission they were hired to support; they are uninterested in executing meaningless tasks. Securing their commitment requires eliminating technology barriers, ensuring they see value in their work, and optimizing the processes that manage it. Each of these must be effectively addressed, as failure in one will likely drive talented employees to seek employment elsewhere to reach these ideals. This is observed today; the government is losing AI talent to the commercial sector.

The commercial sector, particularly startup companies, not only gives AI developers the tools to get the job done from the onset but also encourages these employees to take risks, express their ideas, and design innovative products. By contrast, DoD organizations use onerous information technology processes and tools (e.g., computers, virtual private networks, etc.) that are slow, insufficient, and restrictive, and often lead to work environments that are a decade behind those in the commercial world. DoD also follows a strict, hierarchical

management process that limits the flexibility of new employees to engage across their new organization. DoD should emulate commercial examples that empower skilled AI staff with opportunities to connect their work to mission impact and to offer new platforms for risk taking within the wider constraints of disciplined use of AI.

Learn from Industry's Successes to Create and Accelerate Educational Opportunities

In the broadest sense, workforce development is about creating opportunities for employees to learn and grow. Attracting, equipping, and training an AI-ready workforce is a baseline requirement that benefits from understanding how these potential employees learn. Unfortunately, while developmental and training opportunities are available to DoD employees, the process of applying for and obtaining training is laborious.

Millennials have many of the most desirable digital skills and are expected to play a big role in populating the coming AI workforce. The oldest Millennials are now 35 and have significant work experience; the youngest are 19 years old and preparing for their careers. The latter are less interested in lectures than in team-oriented collaboration, and less interested in learning for learning's sake than in acquiring relevant information. They are less motivated by authoritarian learning styles and instead want to learn in an environment where rapport with instructors contributes to their success.

Although research supports tailoring the training environment to generational expectations, DoD culture is behind the curve in adopting this approach.⁷⁷ However, DoD still has the opportunity to adopt new approaches and to identify and extend enablers for talent development. This workforce tends to learn best in environments that foster:⁷⁸

1. **Research-based methods:** building learning materials to suit varied learning styles
2. **Relevance:** ensuring information is relevant to them in context
3. **Rationale:** including explanations that reinforce the need for policies and regulations

4. **Relaxed:** establishing low-pressure learning environments with creative freedom
5. **Rapport:** providing personalized training with connections that go beyond rote learning materials

Commercial organizations understand they cannot hire themselves out of talent shortfalls. Large technology companies offer internal training programs for new hires and current employees. For example, Amazon created the Machine Learning University (which it has since made available to the public at large⁷⁹) to teach employees what they need to know to execute their tasks in a company that relies heavily on ML. Microsoft and Google have followed a similar model, offering training programs within their own enterprise for equipping workers with new skills to address projected workforce hiring shortfalls.

These training programs offer options that range from two-day workshops to extended programs for hands-on AI training. Internal educational investments like these are expensive and time-consuming,⁸⁰ but making them more accessible and paying DoD employees for their time to attend these classes increases access to these critical skill sets.

DoD is not keeping pace. To date, no widespread, systematic AI training approach has been adopted across the Department. However, some DoD organizations have looked to industry examples on how to invest in empowering both the uniformed and civil servant DoD AI workforce to support developing, using, and acquiring AI technologies. The Air Force, for example, has already recognized the importance of building an AI-ready workforce and has partnered with the Massachusetts Institute of Technology (MIT) on a program called the MIT AI Accelerator (a collaborative effort with the Air Force Basecamp program⁸¹) for recruitment and training.⁸² The Accelerator approach avoids one-size-fits-all AI training. Because the AI workforce will have differentiated roles, beyond the necessary skills required for coding and algorithm development, the training structure comprises four different learning paths:

1. **AI for users** teaches basic theory and requirements so that non-technical staff, across the spectrum of warfighters and senior leadership, can understand how AI-enabled systems operate.

2. **AI for acquisition** focuses on the particular need for AI technology and capability development in Programs of Record.
3. **AI for developers** enables uniformed personnel and civil servants who work in Science & Technology and operations to develop new capabilities to meet particular mission needs.
4. **AI for policymakers** provides senior decision makers the adequate understanding of AI capabilities necessary to develop and implement appropriate policies that ensure uniform application of the technology across DoD.

A tailored approach to AI training is particularly important for DoD considering the differentiated roles of those who will be required to decide, acquire, develop, and use AI capabilities. For instance, only a small subset of AI users will need to develop algorithms themselves to apply those tools to their datasets. The larger group of users would be better served by training that reflects their expected environments for exploiting the benefits of AI and understanding its limitations so that they may apply it judiciously to empower mission outcomes.

Diversity and Inclusion Are Key to Retaining Tomorrow's AI Workforce

Among the factors contributing to the overall trend of reduced DoD ability to attract and retain a skilled AI workforce is a lack of diversity and an inclusive environment. As national demographics shift, the AI workforce will be even less representative of the overall makeup of the population. For example, according to a 2013 RAND study, only five percent of those with college degrees who work in a science, technology, engineering, and mathematics (STEM) occupation are Hispanic, yet Hispanics make up more than 20 percent of young adults in the United States, and the gap is widening. For the AI workforce of the future, this type of underrepresentation poses problems.

Silicon Valley leadership lacks diversity,⁸⁴ which by comparison offers opportunity for DoD to reflect a more diverse leadership structure. Employees must feel supported, respected, and valued throughout their careers. According to the Kapor Center for Social Impact (as cited in Forbes),⁸⁵ technology employees cited unfairness and mistreatment as the most common reasons why they left their organizations. The article goes on to state that the perceived lack of fairness is exacerbated by lower rates of advancement to higher levels in the company. Companies must make conscious efforts, not only to attract diverse candidates for staffing but also to analyze their processes to ferret out biases and create more representative leadership teams.

Market forces alone are not enough to address the diversity challenge. According to the Pew Research Center,⁸⁶ employees in STEM fields have significantly higher earning potential than those in non-STEM occupations, yet this potential has not resulted in closing the gap in representation for women, Blacks, and Hispanics. This disparity can be attributed to the lack of educational opportunities afforded to underrepresented populations and demand signals that fail to reach them.

DoD, though not without its own inequities, is more diverse than Silicon Valley and has unparalleled reach as the largest employer on earth.⁸⁷ The U.S. government, in partnership with industry and academia, must be more proactive in its outreach to underrepresented populations, extolling the value of working within a diverse, and representative, population of dedicated professionals and offering real opportunities for training in these highly desirable, and marketable, skills.

Increase Opportunities for Developing Partnerships

Partnerships play an important role in building and sustaining the AI workforce, and there are lessons to learn from the IC and from connecting with startups.

Consider Adopting Lessons from the IC's AI Modernization Approach for Equipping the Workforce

Compared to DoD, the IC has made greater progress in terms of bringing AI technology to its workforce and ultimately its mission. For example, the Office of the Director of National Intelligence (ODNI) launched the Augmenting Intelligence Using Machines (AIM) Initiative in 2018 to create an IC-wide framework that fully incorporates AI and ML technologies in its business practices.⁸⁸ The IC has had success in operationalizing these concepts, and AIM includes partnerships as a key component. The ODNI is working to implement an industry partnership strategy focused on:

- Giving industry access to government data for algorithm development
- Simplifying AI skill development and sharing between government and industry, as well as reducing security barriers
- Building ODNI advocacy for funding AI basic research
- Creating AI services addressing common concerns or specific capability contracts
- Updating intelligence and industry data- and capability-sharing policies and oversight⁸⁹

Many of the areas where AIM is executing its partner strategy could also apply to DoD. For instance, DoD's JAIC organization focuses on operationalizing AI for DoD missions. Collaboration between the AIM program and the JAIC has begun but today is not a large-scale effort. There is a rich opportunity to connect across these stakeholder organizations with areas of mutual collaboration to include sharing of datasets, coordinating DoD and IC R&D, computing and data purchases, and data labeling efforts.⁹⁰ Additionally, both DoD and the IC would benefit from cobranded communication with the greater stakeholder community. DoD should establish and empower teams to partner with the AIM and to make these connections more robust.

Partner with Startups

Another potentially powerful method for informing the perception of what DoD works on and how it conducts

its business is for DoD to become an active partner when new businesses are defining their identities. Startups would benefit from having DoD as a reliable and experienced customer to help guide their products based on user needs. DoD would gain the opportunity to advise the startup on technology development and demonstrate the Department's perspective on its missions and the rationale behind those missions. Pentagon Chief Information Officer Dana Deasy highlighted the importance of working with and emulating startups when he told lawmakers, "I believe it's going to be [a matter of] how do we move to a more startup mentality when moving to technologies like AI."⁹¹

Jeff Decker, Program Manager for the Hacking for Defense Project at Stanford University's Precourt Institute for Energy, emphasizes that "An innovative pivot inside the Pentagon would be best served by engaging startups early to shape the development of cutting edge, and often dual-use, technologies."⁹² Decker offers the following five incentives for forming Pentagon-startup partnerships:⁹³

1. Offer early-stage startups support that does not involve taking an equity stake in the company
2. Use existing resources to accelerate startup growth, especially in the Seeds and Series A rounds
3. Serve as an early adopter and a test case to demonstrate the value of a startup's product
4. Encourage startups to work with the U.S. military to get a head start on future commercial markets before they emerge
5. Partner with later stage startups to advance large-scale growth in new customer segments and markets⁹⁴

Decker believes such a model has a demonstrated track record in China and will work for the United States if defense-relevant startup partnerships are established quickly. Lt. Gen. Shanahan echoed Decker's enthusiasm for partnering with startups. At the September 2019 Kalaris Intelligence Conference, Shanahan stated that "Building a startup culture as part of an institutional bureaucracy... needs to happen to embrace AI as quickly as the private sector."⁹⁵

Conclusion

DoD is faced with the challenge of attracting and retaining an AI workforce capable of applying this important technology to national security missions. This challenge is only magnified in a time when talented AI workers are highly sought after by international and industry competitors. While DoD must address cultural barriers to better connect with the next generation of AI practitioners, certain strategies can be employed today to bridge gaps in understanding and to offer new opportunities for forging lasting partnerships. Through these strategies, a new national narrative emerges that cuts through preconceptions by key stakeholders and eases the way for bringing in critical skills to help DoD solve problems and contribute to a safer and more prosperous world.

Recommendations for Designing a New Narrative to Build an AI-Ready Workforce

DoD's messaging can and must change, and the Department has an opportunity to lead by example in the deployment of responsible AI. DoD should:

- Define and publicly share its internal governance mechanisms and publicly set expectations with industry partners for deploying AI responsibly
- Demonstrate its long-standing practice of responsible technological deployment reflecting the kinds of policy, technical, operational, and ethical debates that characterize the American approach to the utility of force
- Convey legal and ethical accountabilities to the public in a way that describes the responsibility individual decision makers assume when using any potential system of consequence supporting national security missions
- Adjust messaging to reflect the values of industry's founders and modern employees, including preservation of civil liberties, the value of civil service, and humanitarianism
- "Prepare the battlefield" for messaging through individual engagements with established interest groups and leveraging classic communication methods to shape messaging

The world is competing for the same AI talent, so DoD needs to rethink how to attract and retain capable people. Recommended actions include creating increased opportunities for onboarding AI talent, retaining and fostering the career development of AI staff already working with the Department, and partnering with other organizations. To improve recruiting, DoD must:

- Identify AI-relevant skills already present in its workforce and systematically measure and incentivize the development of those skills
- Establish a rewards program for employees learning AI-relevant skills
- increase educational financing options and student loan forgiveness
- Expand the flexibility of government programs to identify opportunities for newly trained recruits to apply advanced skills
- Offer immediate reforms that increase ease and capacity for contractors, and DoD, to recruit skilled workers and take advantage of opportunities to hire foreign nationals
- Deepen the appeal of working with the United States by actively communicating democratic societal values and the comparative advantages of working and living in the United States for foreign-born workers
- Develop more attractive, and equitable, rotational requirements between industry and government for programs such as the Career Intermission Program
- Look to examples from cyber workforce development by adding options for hiring and retaining vital skill sets for securing AI staff and support capabilities
- Consider disruptive concepts such as the ROTC+ pipeline, seek changes in relevant policy, work with universities to develop educational paths, and investigate undergraduate military-civilian exchange programs with interorganizational partners
- Remove technological and process barriers to employees accomplishing impactful work

Recommendations for Designing a New Narrative to Build an AI-Ready Workforce

To increase incentives for working with DoD, the Department should:

- Look to commercial examples that empower skilled AI staff with opportunities to connect their work to mission impact, and offer new platforms for risk taking within the wider constraints of disciplined use of AI
- Create and accelerate educational opportunities through a tailored approach to AI training
- Conduct proactive outreach to underrepresented populations, extolling the value of working within a diverse, and representative, population of dedicated professionals and offering real opportunities for training in these highly desirable, and marketable, skills

To increase opportunities for developing partnerships, DoD should:

- Consider the IC's AI modernization approach for equipping the workforce by enhancing collaboration between the AIM program and the JAIC, which would include sharing datasets and coordinating DoD and IC R&D, computing and data purchases, and data-labeling efforts
- Develop cobranded DoD and IC communications with the greater stakeholder community and establish teams to partner with the AIM and make robust connections
- Partner with startups to offer early-stage support without equity requirements, accelerate growth, serve as an early adopter, encourage working with the U.S. military for commercial market access, and advance large-scale growth in new customer segments

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Acronyms

AI	Artificial Intelligence
AIM	Augmenting Intelligence Using Machines
DARPA	Defense Advanced Research Projects Agency
DoD	Department of Defense
FFRDC	Federally Funded Research and Development Center
IC	Intelligence Community
ICT	Information and Communications Technology
JAIC	Joint Artificial Intelligence Center
ML	Machine Learning
NSF	National Science Foundation
OPM	Office of Personnel Management
PME	Professional Military Education
R&D	Research and Development
ROTC	Reserve Officer Training Corps
STEM	Science, Technology, Engineering, and Mathematics
TEM	Technical Exchange Meeting
USSR	Union of Soviet Socialist Republics (Soviet Union)

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