Policy Brief

Honchoing AI in the Air Force

If AI Is Important, the People Are Indispensable

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Executive Summary

Popular visions of military artificial intelligence (AI) might evoke an all-seeing superintelligence directing autonomous drone swarms—while servicemembers sit far from danger and decision-making alike. This AI hype does not yet comport with reality. More importantly, it distracts from the real opportunity facing the U.S. Air Force (USAF): integrating AI in ways that improve mission effectiveness now.

The USAF can best harness AI by diffusing the technology across the institution to offload onerous, low-complexity tasks from humans to machines. This requires:

- **Embedding AI engineers** in operational and support units to rapidly identify, develop, and iterate applications.
- **Empowering a senior trilingual AI leader**—fluent in technology, operations, and acquisition—with a six-to-ten-year tenure to guide and scale innovation.
- **Retaining critical talent**, including the operators, engineers, and leaders needed to build and sustain effective capabilities.

While diffusion drives AI innovation's breadth and speed, leadership and expertise ensure that its depth and direction align with USAF goals. This places primacy on USAF personnel taking charge of (*honchoing*) AI adoption while maintaining their central role in executing the mission. Doing so will result in a practical, better-sensing, better-knowing, and better-executing force that balances time, cognitive workload, and risk to better achieve a military advantage.

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Introduction

Artificial intelligence (AI) is poised to shape the future of military competition, but not in the way many headlines suggest. Visions of autonomous drone swarms or all-knowing algorithms distract from the real and immediate challenge: organizing the U.S. Air Force (USAF) to harness AI in ways that are practical, scalable, and aligned with its mission.[*]

While emerging technologies often generate hype, the real test of innovation is not invention, but integration. The USAF's success will hinge not on isolated breakthroughs, but on how well it can diffuse AI tools across the force to improve operations, offload routine burdens, and unlock human potential. That diffusion requires more than technology. It requires people.

This brief argues that the USAF's ability to win future conflicts will depend on how well it **embeds**, **empowers**, and **retains** the talent needed for AI adoption.

This brief first explores how embedded engineers can drive innovation from the ground up by offloading time-consuming, cognitively taxing, or risky tasks. Second, it addresses the organizational leadership required to steer AI innovation around institutional obstacles and scale successful practices. Third, it highlights the retention challenges the Air Force must overcome.

AI is not a silver bullet, but with the right people in the right roles, the USAF can diffuse AI in the form of many "bronze bullets" that collectively deliver a military advantage. That effort must begin now, and it must focus on the people.[†]

[*] ChatGPT, response to author's prompt, assisted in drafting sentence, OpenAI, May 20, 2025.
[†] ChatGPT, response to author's prompt, OpenAI, May 20, 2025.

Background

This brief is intended to inform USAF senior leadership and defense policymakers seeking to accelerate AI adoption without compromising warfighting effectiveness. It uses the following definition of AI: a machine learning system that uses computing power to execute algorithms that learn from data.[1] Any AI advantage is bound by available data, algorithms, and computing power. Additionally, AI's utility depends on its applicability. AI could use the purest data, most efficient algorithm, and an unrivaled amount of computing power, but if its use is irrelevant to the intent or ill-suited to the environment, then it is as useless as a stealth aircraft in the Stone Age. Although the technology may be advanced, if it does not fit a need or lacks the infrastructure, knowledge, or skills to be used, then it is an expensive pursuit for a worthless gain.

While the definition of AI used here highlights the system's components, it also hints at AI's much-hyped potential as a general-purpose technology like electricity, the automobile, or the internet. These technologies offer great potential for continual improvement, are pervasive, and have strong technological complementarities (e.g., electricity and electric appliances, automobiles and navigation systems, and the internet and cloud computing).[2] AI has these attributes. Thus, previous general purpose technology advancements offer lessons for how the USAF can harness AI in its current form, better organize for its future forms, and hedge against cost overruns and unrealized hype.

Engineering AI Innovation: Offloading Time, Cognitive Workload, and Risk

During the industrial revolution, countries gained economic advantages not through leading in the cutting-edge research and development that generated innovations, but through inserting these innovations broadly into many industries and applications.[3] Nations that excelled during and after a technological revolution did so because of the technology's broad adoption, and nations declined in the same periods not from a "failure of innovation but of diffusion."[4] Notably, "a country's ability to generate fundamental, new-to-the-world innovations can widely diverge from its ability to diffuse such advantages."[5]

While pushing the technological frontiers forward may attract media attention, "the hardest hurdles in the [general purpose technology] trajectory are in the diffusion phase."[6] The following four factors proved pivotal in clearing those hurdles.[7]

- Widening the skill base and knowledge of general-purpose technology engineers.
- Enmeshing those engineers in application sectors.
- Experimenting in real-world applications.
- Improving the feedback among and between those critical nodes and frontier research.

The same will be true for AI. The USAF can gain the most from AI not through isolated breakthroughs, but by embedding innovation in everyday operations. This process hinges on engineers who can identify opportunities to shift time-consuming, cognitively taxing, and risky tasks from humans to machines. Their work reveals the practical, layered ways AI diffusion enhances mission performance—not by replacing operators, but by empowering them.

The story of one engineer's journey illustrates how offloading time, cognitive workload, and risk is less a sequence of phases than an overlapping, evolving set of contributions.

First, imagine the USAF creates an AI engineer career field with engineers educated in AI applications. As part of the engineers' follow-on training, they visit the Department of Defense (DOD) and USAF offices responsible for AI development and integration.* These visits give the engineers first-hand knowledge of applications currently in

* E.g., Integrated Capabilities Command (ICC), Defense Advanced Research Projects Agency (DARPA), Defense Innovation Unit (DIU), Air Force Research Laboratory (AFRL), and the Chief Digital and Artificial Intelligence Office (CDAO)

development and experts to whom they can reach out later with questions. The engineers have the access and security clearances to ask meaningful questions, get meaningful answers, and build relationships with the people involved.

The engineers are next assigned across the service. One AI engineer gets assigned to a fighter squadron, perhaps with visions of AI-enhanced dogfights dancing in their heads. Along with their cohort, their elation turns to frustration because of the onerous self-service USAF administrative functions they encounter as they prepare to move to the new base. The shift to placing more administrative burdens on individual service members began after the Gulf War as the USAF cut staff for the nation to reap a peace dividend.[8] This shifted administrative burdens from supporting staff to service members, which drove an institutional and cultural shift from valuing mission effectiveness to valuing installation efficiency. However, the enterprising engineer views these burdens as opportunities for AI to gain back time for the people to focus on mission effectiveness.

Leading up to the move, the engineer realizes an AI agent—a program that performs tasks and pursues goals—can be used to save out-processing service members' time from administrative tasks, which they can use on their primary jobs. After work each day, the engineer searches for a house that balances their family's needs: an affordable and available home in a safe neighborhood near affordable and available schools, daycares, in-network clinics, and extracurricular activities that is within driving distance of the engineer's and their spouse's workplaces. The engineer proposes another AI agent that uses the above data around installations to assist members in finding homes that fit their requirements, and can also enroll their dependents in the schools, daycares, clinics, and extracurricular activities that match their family's needs.

Administrative problems can also benefit from AI workflows. Out-processing and security checklist steps can run in parallel, and previous self-service tasks can become automated to save members time they can, again, use for their primary jobs. The engineer reaches out to their cohort and finds similar self-service issues. They begin crowdsourcing solutions while funneling assistance and coordination requests back to their AI career field leadership. While these solutions may not address the root causes of these issues, they can improve the status quo for all USAF airmen by freeing up time they can better allocate elsewhere.

At their new unit, the engineer encounters opportunities to fix localized problems where the unit has autonomy to effect solutions.

Table 1: Localized Problems and AI Solutions

Problem	Solution
Operators missed mission planning meetings (e.g. mission planning cell–[MPC]) because of the time required to make daily and weekly schedules	Scheduling AI agent and workflow
Making mission materials and synthesizing different packages' outputs into briefs and products is time-consuming	Generative AI can take inputs during MPC to produce draft mission briefs and products

The engineer's initial problems and proposed solutions continue to focus on gaining back time for the airmen to focus on their primary jobs. As the engineer understands more of the unit's mission sets and processes, they identify more nuanced problems and develop solutions.

Table 2: Mission-Level Problems and AI Solutions

Problem	Solution
Precision-guided munition planning software takes time to find the correct inputs for a desired output	AI system can find inputs given a required output
Fuel planning uses heuristics when members are short on time (often) and can lead to poor outcomes when planning is wrong	AI agent can quickly show fuel planning bounds and assumptions

The engineer moves from finding broad administrative burdens that can be shifted from human to machine to uncovering unit-specific tasks that can be delegated to AI programs. As this process continues, the engineer can spot decision and execution errors rooted in human cognitive workload limits that AI could effectively address. Real-time AI tools that ingest changes in the airborne environment to recommend decision changes (e.g., refueling changes, targeting changes, threat sorting, weapon allocation) can relieve operator burden and yield a unique human-machine team advantage. This is when AI shifts from administrative assistant to reliable airborne partner.

This partnership is predicated on having viable commercial AI platforms capable of hosting and running operational applications. These platforms—such as a large language model (LLM) on a DOD network—must be adaptable, secure, and compatible with the needs of military missions. Engineers must provide candid feedback on these platforms' performance to leaders, enabling more informed industry engagement and driving platform improvements. That feedback should also flow laterally, to and from operators, assessing not just how well the applications fit the task, but how well operators are able to use them. One way of doing this is already in practice in some units.

Fighter squadrons often use intelligence personnel to "red-team" during mission planning. They simulate an adversary's technology, tactics, and doctrine to probe for vulnerabilities. Similarly, AI engineers should "red-team" how operators use AI applications. This can identify vulnerabilities, biases, misuse, and unintended behaviors under a watchful engineer's eye, which can further application development and improve testing and evaluation.

Additionally, stress-testing AI applications should match scenarios to the required level of safety. For example, a new fuel-planning tool should not be debuted on a transoceanic flight. Initial use in lower-stakes environments is a smarter form of risk acceptance. Negating unacceptable risks and mitigating the impact of acceptable ones is already a part of mission planning and daily operations. AI engineers can leverage existing practices to help operators incorporate AI-related risks into planning assumptions. And when safety hazards do occur, using the established safety reporting and investigating infrastructure can support AI's adoption by not recreating the proverbial safety wheel.

As in past industrial revolutions, the engineer does not exist in isolation. They reach across units and up the command chain to identify shared problems and help crowdsource solutions. Leaders, in turn, can coordinate common applications and provide targeted support. As collaboration deepens, engineers and operators may find that the solutions evolve from pure software fixes to new hardware requirements for autonomous systems.

Table 3: Hardware Problems and AI Solutions

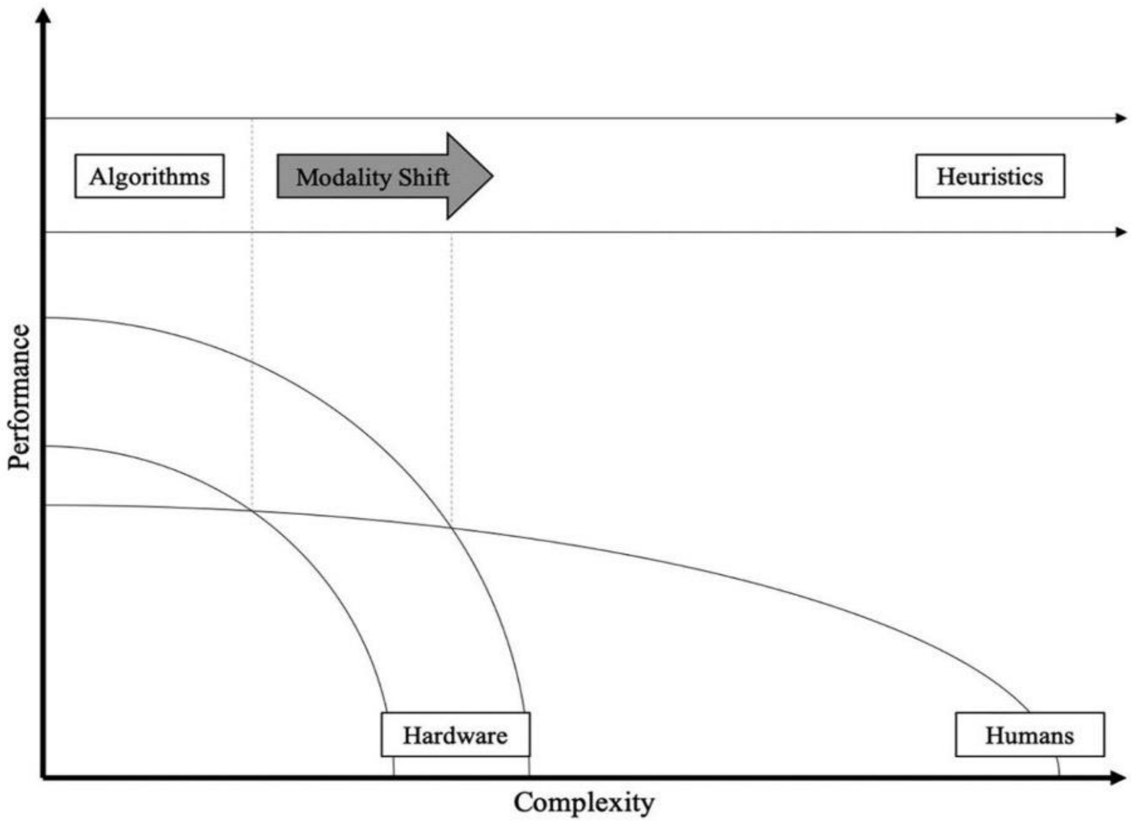
Problem	Solution
Strike package delayed while escort fighters executed high-risk intercept of high and fast adversary fighters employing electronic attack; led to fighter deaths, unsupported bombers targeted by surface-to-air missiles (SAMs), and mission failure.	Load-shed risk from manned fighters to autonomous system capable of killing or negating high-risk threat

The journey of our imaginary engineer highlights two key insights. First, Air Force AI integration works best when applied to onerous, low-complexity tasks, allowing engineers and operators to iterate together in real-world settings. Second, diffusion succeeds through embedded feedback loops in which engineers understand operational realities and operators guide AI's application.

These lessons apply broadly across AI applications, but they take on even greater significance when the stakes are higher. One of the most consequential frontiers of military AI lies in autonomous systems, often cited as central to the next revolution in military affairs.[9] The Department of Defense defines autonomous weapon systems as those that "once activated, can select and engage targets without further intervention by an operator."[10] That definition can be expanded to describe autonomous systems more broadly as machines that can perceive, decide, and execute without human input. Whether these systems prove revolutionary or not, their practical utility depends on a clear-eyed assessment of what they can do and the guardrails within which they must operate.

Four active duty military officers assessed autonomous systems in support of National Defense Strategy uses and found, "[f]or the near future, humans will outperform machines past a threshold of complexity, and machines will outperform humans in contexts of lesser complexity."[11] This is due to how humans and machines make sense of complexity. Machines employ math-centric (e.g. algorithmic) sensemaking, whereas humans employ judgment-centric (e.g. heuristics-based) sensemaking.[12] Both sensemaking techniques decay under increasing complexity, but machine sensemaking decays more rapidly.[13] The officers showed this construct in the below graph (Figure 1).

Figure 1: Performance-Complexity Graph



Source: Dave Blair, Joseph O. Chapa, Scott Cuomo, and Jules Hurst, "Humans and Hardware," *The Conduct of War in the 21st Century* (London: Routledge, 2021), 96.

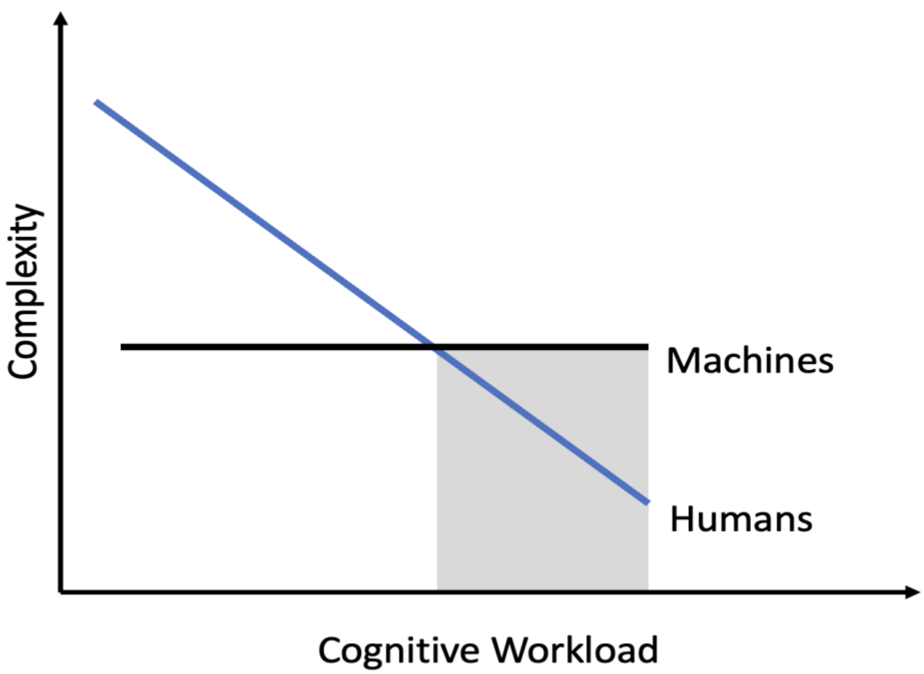
The authors did not explicitly define complexity. They cite literature that resists narrowing complexity into one definition.[14] Still, when considering complexity in human versus machine roles, a useful implicit definition emerges: a system of many variables or unclear rules. Readers should not fixate on a rigid definition of complexity, but rather on how well AI aligns with the structure of its environment and the nature of its task.

AI's data and algorithm limitations help clarify where humans or machines are better suited. As a system's components multiply or its rules become harder to discern, more data is needed to accurately capture it in an algorithm. Machines struggle with systems that exceed these limits until a breakthrough occurs (represented as a modality shift in Figure 1).

This is why both the current pursuit of artificial general intelligence (AGI) and past successes in narrow AI—such as outperforming humans in games such as Chess or Go—can mislead thinking about how the U.S. Air Force should use AI today. The real advantage lies not in full autonomy, but in smart integration: offloading routine or lower-complexity tasks to machines, while preserving human focus for complex, judgment-driven decisions.

AI engineers' efforts should reflect this insight: humans can handle high-complexity tasks, but only when their cognitive workload remains manageable. As workload increases, their capacity to manage complexity declines. In contrast, a machine's ability to handle complexity remains unaffected by cognitive load. This creates a point of human cognitive overload beyond which machines can perform higher-complexity tasks than humans. The graph below (Figure 2) illustrates this relationship.

Figure 2: Complexity-Cognitive Workload Graph



Source: Adapted from Ryan Hefron, *ACE: Air Combat Evolution* (Washington, DC: DARPA, Department of Defense, September 15, 2024), https://www.darpa.mil/research/programs/air-combat-evolution.

The graph's shaded region represents the area of human cognitive overload, where machines are capable of more complex tasks than humans. As an example, air refueling changes can necessitate a type of decision-making that falls within this cognitive region. Imagine four aircraft are defending a high-value asset against probable attacks. Their refueling aircraft moves to an unplanned location. The four aircraft need to keep at least two defending the asset at all times. Calculating the new fuel-level triggers for two aircraft to transit to the refueling aircraft and return with enough fuel to allow the remaining two aircraft to do the same is not complex, but it is cognitively tasking. It uses variable fuel burn, transit, and refueling rates along with constraints such as minimum fuel levels and minimum aircraft overhead to find a dynamic solution. Machines can quickly solve this problem with an algorithm. Humans, especially when multitasking, are less likely to solve this low-complexity problem quickly or with ease, and may instead rely on heuristics that are good enough but not optimal.

Effective human-machine teams could address these trade-offs between performance and complexity, and complexity and cognitive workload. Outsourcing less complex but higher cognitive workload tasks—such as refueling calculations—improves team performance at a given complexity and increases the team's capacity to handle more complex scenarios. By offloading these calculations to machines, humans can devote their cognitive effort to more critical tasks, positioning the team to better handle current challenges and prepare for future complexities.

There are other constructs that can be offloaded to machines for a military advantage. First, as mentioned previously, time. In an institution with decades of time-intensive inertia, engineers will encounter many time-intensive tasks of low complexity that can be outsourced to machines. Second, risk can and should be offloaded. Tasks that place humans under unacceptable levels of risk are ripe for outsourcing to open up more opportunities for mission success. Thus, AI's fit as a general-purpose technology in the USAF can be guided by finding realistic opportunities to remove high cognitive workload, time, or risk activities from the human, and place those burdens on the machine. Shadowing airmen doing daily tasks, as the embedded engineers would do, would reveal applications that buy back cognitive workload, time, and risk to the benefit of the individuals and the institution.

As the operators and engineers propose solutions and learn more about what is possible, they highlight current limitations of AI and autonomous systems. Table 3 outlined a proposal for an unmanned autonomous system capable of killing or negating high-risk threats. This scenario requires framing the complexity in such a way that shows manageable machine tasks.

One way to categorize complexity is by how "bounded" the system is.[*] A tightly bounded system is the least complex and one in which a "human can precisely identify the bounds of a problem."[15] Board games such as chess or Go are tightly bounded. The rules are defined and all system variables are perceived.

[*] Note: this paper matches Blair et al.'s use of "bound" and "bounded" vice "bind" and "bound."

A loosely bounded system is a step up in complexity. In this system, rules and variables are generally, but not completely, perceivable.[16] There is a degree of perception ambiguity and cause-and-effect uncertainty that can complicate decision-making. For example, driving a car tends to take place in a loosely bounded system. The rules are generally—but not always—followed, and perception does not always match reality (e.g., one could perceive a motorcycle at night that is really a car with one burned-out headlight).

An unbounded system is the most complex. Any unperceived variables, unforeseen actions, or undefined rules lend this system a higher degree of unpredictability. Warfare and modern military systems are inherently unbounded. Stephen Biddle defines the modern military system as “a tightly interrelated complex of cover, concealment, dispersion, suppression, small-unit independent maneuver, and combined arms at the tactical level, and depth, reserves, and differential concentration at the operational level of war.”[17] Biddle prioritizes cover, concealment, and dispersion as ways and means of obscuring or foiling perception. Next, suppression, independent maneuver, and combined arms operate with often unpredictable actions or overwhelming effects. Last, having depth, reserves, and differential concentration at a higher level of war reveals a practically infinite number of ways that the tactical level may be supported by, or changed to provide support to, the operational level. In this system, perceiving is plagued by uncertainty, deciding is fraught with unknowns, and executing requires frequent updates by revisiting problematic questions of perception and decision-making.

Militaries that match an autonomous machine’s current capability to an appropriately bounded system stand a better chance at successful perception, decision, and execution. While technologies often operate as advertised in sterile developmental environments, reality is confounding. This is evidenced by autonomous cars continually missing promised roll-out dates.[18] Autonomous machine capabilities that fail to generalize outside of a restricted, bounded environment will not perceive, decide, or execute as necessary to perform like they do on paper or in the laboratory.

The USAF’s Collaborative Combat Aircraft program aims to field unmanned fighter aircraft that can load-shed risk from manned fighters in crucial moments. How well aligned an aircraft’s capability is with a bounded system will impact how well this program achieves its intent. The last two institutional diffusion factors (experimenting in real-world applications and improving the feedback among and between critical nodes and frontier research) are useful in getting this match right.

Another critical element is allowing as many units as possible to experiment with developing technologies to increase the lessons learned and feedback. In this way, by the time the technology is deemed operational, it has adapted from and withstood more of reality's cruel judgments. Additionally, current military acquisitions can "limit feedback from military operators to end-stage testing and evaluation . . . when it is too late to change fundamental system designs."[19] Giving the end users the technology earlier will achieve better outcomes. Before WWII, Germany used this principle to pair technology and tactics development to devastating effect in their Blitzkrieg campaign. Today, Ukraine is showing how experimentation in the field provides rapid lessons for the next iteration of drone software and hardware. The USAF should follow these examples.

What the German and Ukrainian examples highlight is that developing the technology is only part of what leads to successful military innovation. There are many examples of one nation's military developing a capability first while another nation transforms the capability into battlefield success. For example, the United Kingdom developed the tank, but Germany transformed the tank into a cornerstone of Blitzkrieg tactics.[20] Diffusing AI provides two avenues for mitigating this possibility.

First, it ties technology to force employment (how the technology is used doctrinally and tactically).[21] In this manner, technology is not only a small part of the story, its "effects are . . . secondary to force employment's and cannot be properly understood except in interaction with force employment: technology alone is a poor predictor of capability."[22] The Blitzkrieg example underscored the combat consequences of one side iterating technology and tactics until arriving at an effective complement of technology and force employment, while the other side developed exquisite machinery without much field experimentation.

Second, diffusing AI plants many seeds to see what bears fruit. It spreads risk and opportunity across many applications, and takes end user feedback to cultivate or prune those technologies to yield better results. The current process plants one seed and the end users are stuck with the fruit. Through necessity, the Ukrainian military continues exploring many types of drones for many types of uses.[23] Some will work. Others will not. But all contribute to a rapidly evolving technology and help to identify other seeds worth planting.

Constant experimentation with AI in real-world environments may also trigger a cultural shift in how the U.S. Air Force approaches innovation. Traditionally, the USAF sequesters a technology's development under a veil of secrecy that isolates it from many of its end users. This aligns with the U.S. military's default toward linear, analytical thinking: develop a technology, test it, then hand it off.[24] But that approach often disconnects development from application. Even if primarily done out of security concerns, developing and maturing a technology in a controlled environment can lead to a poor match between technology and force employment.

In contrast, prioritizing how a technology interacts with its environment and its operators while considering competing uses and outcomes has better revealed and informed previous revolutions in military affairs.[25] AI requires this mindset. Its value emerges when used by real users in real environments. In that sense, diffusion is not just a delivery method—it is an insight engine. Experimentation across diverse environments can reveal what works, what does not, and where novel uses might emerge.

AI diffusion fosters this type of thinking, as its force employment and operating environment directly inform the development, while its many applications can reveal insights from competing—and sometimes contradictory—uses.

Yet diffusion alone is not enough. Because it is bottom-up and often countercultural, it needs top-down support to align with strategic objectives. That role cannot be filled by bureaucracy—it requires committed leaders who are equipped and motivated to shape AI's trajectory without stifling its dynamism.

Pairing sustained leadership with embedded engineering enables a new kind of innovation culture—one that does not just steer AI development but learns from it. The story of the engineer underscores a central truth: diffusion and adoption need direction. That direction must come from leaders who understand the technology, operations, and acquisition—and stick with the mission long enough to see it through.[*]

[*] ChatGPT, response to author's prompt, assisted in drafting sentence, OpenAI, May 20, 2025.

Leading AI Innovation

If a military advantage is the destination, then AI diffusion is the vehicle, personnel are the engine, and an AI leader is needed at the wheel to steer this innovation forward. Past military innovations have taken at least a decade to overcome individual and institutional resistance.[26] No organization can be designed with perfect foresight to shepherd institutional-level changes through this resistance, not to mention the political, budgetary, or other unforeseen obstacles that inevitably emerge over such a long timeline.

For this reason, a senior USAF leader should be given the clearly defined responsibility of instituting AI innovation and given a long tenure to build the necessary organizational structure and operating concepts. When organizational structures have fallen short in past innovations, a persistent, empowered, and visionary leader has been essential in adapting and overcoming. These breakthroughs have been predicated on one key component currently missing from the USAF leadership positions: tenures of at least six years.

Organizational structures can become outdated because of any number of factors. But, an individual endowed with time to understand the problem, the vision, the environment, the stakeholders, and the pathways for success or failure has shown a propensity to overcome and to employ more creative problem-solving than can be gained in the traditional two- or four-year command lengths. As one senior member of the disestablished U.S. Joint Forces Command lamented, “It takes a year to figure out the job. By the time you’re here eighteen months, you’re a lame duck.”[27] The time between figuring out the job and becoming a lame duck is when a leader can be most effective. The USAF’s current design of only six months of effective time—or best case, two years and six months for a four-year command—severely limits the impact and role a leader can have in steering an innovation.

In analyzing four successful cases of disruptive military innovation, Andrew F. Krepinevich, Jr. found they were all “characterized by visionary leaders receiving extended tenure.”[28] The British Royal Navy’s Admiral “Jackie” Fisher spent eight years exploiting emerging technologies as First Sea Lord to maintain Britain's maritime superiority during his namesake “Fisher Revolution” era. German General Hans von Seeckt drove Blitzkrieg’s development for six years. Admiral William A. Moffett directed the rise of U.S. Naval Carrier Aviation for 12 years as head of the Navy’s Bureau of Aeronautics. The world’s first operational “reconnaissance-strike complex” can be partially credited to General “Bill” Creech’s six-and-a-half year tenure heading USAF Tactical Air Command. Other examples abound. USAF General “Bennie”

Schriever oversaw the development of ballistic missiles for over a decade.[29] As head of Naval Reactors for 33 years, Admiral Hyman Rickover orchestrated the development of nuclear submarines and surface ships against a tide of culture, tradition, politics, and other impediments that someone with less "time in the seat" would have likely not overcome.[30]

In one telling instance, Admiral Rickover's innovative plans kept running into bureaucratic walls erected by the Atomic Energy Commission (AEC). The AEC controlled nuclear reactor budgeting, designing, and development, while the DOD controlled everything else in the construction and maintenance of nuclear submarines and surface ships. If innovating within one government agency is tough, pushing a common innovation through two competing government agencies may be Sisyphean. Rickover recognized the futility of maintaining the status quo and maneuvered for change.

After witnessing one of his officers correct Nobel laureate Enrico Fermi, Rickover set sail for Washington, DC, for a meeting with the chairman of the Joint Committee on Atomic Energy with his officer in tow. Having dealt with the chairman previously, and having a nuanced understanding of Enrico Fermi's humility, Rickover steered the conversation toward his Navy team being "smarter than" Fermi, and by easy extension the AEC.[31] The senator called Fermi, who corroborated Rickover's assertion. Rickover laid out a logic trap that the senator walked into before finally suggesting that Rickover personally take over the naval nuclear core portion of the AEC. It is difficult to fathom a leader with only a few years of experience navigating the nuances of personalities to wrest control from a government agency with such minimal collateral damage. Extricating the nuclear navy from an uncooperative government agency likely would not have occurred on such a short timeline had Rickover not had his tenure to develop a detailed understanding of the environment and the stakeholders upon whom his innovation relied.

There is recent precedent for long tenures—particularly in organizations charged with overseeing new or consequential domains.[*] General Keith Alexander led the National Security Agency for over eight years, including four years dual-hatted as the first commander of U.S. Cyber Command.[32] His predecessor, General Michael Hayden, served from 1999 to 2005, providing consistent leadership during a period of rapid and far-reaching change.[33]

[*] ChatGPT, response to author's prompt, assisted in drafting sentence, OpenAI, May 20, 2025.

While the details in these cross-cutting examples may differ, the throughline is clear: military innovation requires a leader who acts as the primary agent of change. Entrusting one individual with the better part of a decade in command demands more than institutional trust—it demands deep qualifications.

A recent success story from the U.S. Army's 18th Airborne Corps, which operationalized AI to improve artillery fires, underscores this point.[34] At its helm was a "trilingual" leader—proficient in three critical domains:

- technology,
- military operations, and
- acquisition and contracting.[35]

18th Airborne Corps leadership tapped their trilingual fluency "to cultivate and iterate on workable technical solutions for military challenges."[36]

Developing trilingual leaders requires more exposure to these three domains than DOD military personnel typically receive, and fixing this deficiency is key to successful AI adoption. The 18th Airborne Corps' model of success echoes elements of the diffusion imperatives. Embedding AI engineers and applications within operational units produces a valuable second-order effect: it exposes personnel to technology, operations, and acquisition simultaneously. This not only accelerates mission-focused innovation but also builds trilingual fluency in a practical, efficient way.

As AI leaders emerge, their responsibilities must extend beyond cultivating trilingual fluency—they must share insights with industry to shape the platforms on which AI applications run. Without reliable, adaptable platforms, even the most capable personnel and promising applications will struggle to gain traction. AI engineers and operators cannot fully integrate, test, or scale their solutions if the underlying hardware, software, or networks are unwieldy, outdated, or misaligned with operational needs. Leaders must therefore champion platform suitability as a core enabler of AI adoption, ensuring the service prioritizes digital infrastructure alongside human capital.

With the personnel mechanisms and leadership responsibilities now identified for successful AI adoption, the remaining question is what organization should lead AI's integration within the USAF.

The USAF recently stood up a provisional Integrated Capabilities Command (ICC) as the single entity to look after all capability development and modernization efforts across the service.[37] As the name and description imply, this new command is uniquely positioned to integrate and manage AI capabilities in the USAF. For these reasons, the ICC should oversee USAF AI adoption and have a six-year AI command position with an option to extend to ten years. This AI leader should have a trilingual background with extensive operational experience. Lastly, the AI leader should be a general officer because this rank provides more authority to implement the necessary changes. Charging the ICC with this task, and enabling a trilingual general officer via a six- to ten-year tenure, establishes important innovation components that would otherwise be missing.

Retaining AI Innovation

AI engineers develop relevant solutions. Leaders steer innovation around bureaucratic barriers. Military end users integrate AI applications and force employment. At every stage, people are the indispensable ingredient in an AI military innovation.

These professions—engineers, leaders, and operators—require long and expensive time horizons to acquire and hone the knowledge and skills to be effective. Unfortunately, the USAF has a poor track record of retaining this type of talent. An August 2024 USAF memo highlights the severity. While the service is short by 1,848 pilots, 1,142 of those are fighter pilots.[38] The fighter pilot shortage has been growing for decades, and it is clear the problem is systemic and unlikely to improve by continuing the status quo.[39]

The USAF should not only prioritize retaining its traditional warfighting talent but also offer its AI engineers and leaders salaries and bonuses that retain the indispensable trilingual talent and experience that successful AI adoption requires. Research institutions repeatedly show the cost-effectiveness and cost-efficiency in offering higher compensation for increased service commitments in critically manned and difficult to replace career fields.[40]

Being 1,142 fighter pilots short is a long-standing problem impacting the service's ability to win current wars. Being 1,142 fighter pilots short *and* lacking enough experienced AI engineers and continuity of AI leadership to field relevant and effective AI applications is a recipe for losing future wars.

The deeper risk posed by low retention is strategic: a military that cannot hold onto critical talent cannot expect to prevail in future AI-enabled conflicts. The USAF should not train and retain pilots merely to fly airplanes, but to ensure the operational capability and capacity to win wars. The same logic must now extend to AI. Winning is what it is all about. Talent—traditional and emerging—is how we get there.[*]

[*] ChatGPT, response to author's prompt, assisted in drafting paragraph, OpenAI, May 20, 2025.

Honchoing AI Innovation

"What is it all about?" is the question a World War I marshal would pose to his subordinates as a way to focus their thoughts and actions on a clearly stated goal.[41] In that spirit, whether training personnel, flying airplanes, or developing AI, the USAF's goal is to win wars. AI is not an end in itself. Its pursuit and adoption are secondary to winning.

Winning in the near future may not look like the all-sensing, all-knowing superintelligence from popular headlines. It may instead look like AI handling time-consuming, risky, or cognitively demanding low-complexity tasks and freeing people to focus their thoughts and actions on the clearly stated, but often elusive goal of winning wars. As the psychologist B.F. Skinner famously quipped, "The real problem is not whether machines think but whether [people] do."

The USAF has the lessons and thinking to honcho AI in a way that ensures the service remains true to the core of its stated mission: to win.[*]

As this policy brief advocates, doing so requires:

- embedding AI engineers to rapidly diffuse and iterate applications;
- empowering trilingual leaders to guide and scale those innovations; and
- retaining critical talent.

* USAF's stated mission is to fly, fight, and win . . . airpower anytime, anywhere.

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Disclaimer

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Endnotes

[1] Ben Buchanan, “The AI Triad and What It Means for National Security Strategy” (Center for Security and Emerging Technology, August 2020), https://cset.georgetown.edu/publication/the-ai-triad-and-what-it-means-for-national-security-strategy/.

[2] Jeffrey Ding, *Technology and the Rise of Great Powers* (Princeton: Princeton University Press, 2024), 22–23.

[3] Nancy Stokey, “Technology Diffusion,” *Review of Economic Dynamics* 42, no. 1 (2021): 2, https://www.sciencedirect.com/science/article/pii/S1094202520300880; Ding, *Technology and the Rise of Great Powers*, 27, 28, 109.

[4] Ding, *Technology and the Rise of Great Powers*, 130, 145.

[5] Ding, *Technology and the Rise of Great Powers*, 25.

[6] Ding, *Technology and the Rise of Great Powers*, 26.

[7] Robert Fox and Anna Guagnini, “Sites of Innovation in Electrical Technology, 1880–1914,” *Annales historiques de l'électricité* 2, no. 1 (2004): 159–172, as quoted in Ding, *Technology and the Rise of Great Powers*, 25.

[8] Suzann Chapman, “The End of the Military Force Cuts Is in Sight, but for Air Force Civil Servants, the Reductions Roll On. Civilian Drawdown, Hard and Fast,” *Air Force Magazine*, January 1996, https://www.airandspaceforces.com/PDF/MagazineArchive/Documents/1996/January%201996/0196civilian.pdf.

[9] Andrew Krepinevich, *The Origins of Victory* (New Haven: Yale University Press, 2023), 61.

[10] Undersecretary of Defense (Policy), *Autonomy in Weapon Systems*, DODI 3000.09, January 25, 2023, https://www.esd.whs.mil/portals/54/documents/dd/issuances/dodd/300009p.pdf.

[11] Dave Blair, Joseph O. Chapa, Scott Cuomo, and Jules Hurst, “Humans and Hardware,” *The Conduct of War in the 21st Century* (London: Routledge, 2021), 94.

[12] Blair et al., “Humans and Hardware,” 95.

[13] Blair et al., “Humans and Hardware,” 95.

[14] Melanie Mitchell, *Complexity: A Guided Tour* (New York: Oxford University Press, 2009), 110–111.

[15] Blair et al., “Humans and Hardware,” 100.

[16] Blair et al., “Humans and Hardware,” 101.

[17] Stephen D. Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton: Princeton University Press, 2004), 3.

[18] Erin Marquis, "Elon Musk Has Been Promising Self-Driving Cars for 10 Years [Update - We Are Now On Year 11]," *Jalopnik*, October 10, 2024, https://www.jalopnik.com/elon-musk-tesla-self-driving-cars-anniversary-autopilot-1850432357/.

[19] Jeffrey Ding, "Machine Failing: How Systems Acquisition and Software Development Flaws Contribute to Military Accidents," *Texas National Security Review* 8, Iss. 1 (Winter 2024/2025), https://tnsr.org/2024/10/machine-failing-how-systems-acquisition-and-software-development-flaws-contribute-to-military-accidents/.

[20] Dima Adamsky, *The Culture of Military Innovation* (Stanford: Stanford University Press, 2010), 3.

[21] Biddle, *Military Power*, 2.

[22] Biddle, *Military Power*, 190.

[23] Marc Santora, Lara Jakes, Andrew E. Kramer, Marco Hernandez, and Liubov Sholudko, "A Thousand Snipers in the Sky: The New War in Ukraine," *New York Times*, March 3, 2025, https://www.nytimes.com/interactive/2025/03/03/world/europe/ukraine-russia-war-drones-deaths.html#.

[24] Adamsky, *The Culture of Military Innovation*, 76–78.

[25] Adamsky, *The Culture of Military Innovation*, 22, 18–19, 78.

[26] Krepinevich, *The Origins of Victory*, 411.

[27] Krepinevich, *The Origins of Victory*, 427.

[28] Krepinevich, *The Origins of Victory*, 427.

[29] "Space Pioneers: General Bernard A. Schriever," U.S. Space Force, October 20, 2024, https://www.spaceforce.mil/Portals/2/Documents/Space_Pioneers/Space_Pioneers_Bios/SF_Space_Pioneers_Bio_Schriever.pdf.

[30] Dave Oliver, *Against the Tide: Rickover's Leadership Principles and the Rise of the Nuclear Navy* (Annapolis: Naval Institute Press, 2014), 1–5.

[31] Oliver, *Against the Tide*, 18.

[32] "Keith B. Alexander," Wikipedia, 25 April 2025, https://en.wikipedia.org/wiki/Keith_B._Alexander.

[33] "General Michael V. Hayden," Biographies, U.S. Air Force, June 2006, https://www.af.mil/About-Us/Biographies/Display/Article/104763/general-michael-v-hayden/.

[34] Emelia Probasco, "Building the Tech Coalition" (Center for Security and Emerging Technology, September 12, 2024), 8, https://cset.georgetown.edu/publication/building-the-tech-coalition/.

[35] Probasco, "Building the Tech Coalition," 19.

[36] Probasco, "Building the Tech Coalition."

[37] Laura Heckmann, "JUST IN: Air Force Activates New Command to Integrate Them All," *National Defense Magazine,* October 31, 2024, https://www.nationaldefensemagazine.org/articles/2024/10/31/integrated-capabilities-command-air-forces-most-impactful-effort.

[38] Fabrice Wolf, "US Air Force Shortage of 1142 Fighter Pilots," Meta-Defense, September 18, 2024, https://meta-defense.fr/en/2024/09/18/1142-pilotes-de-chasse-us-air-force/#:~:text=The%20US%20Air%20Force%20is,to%20meet%20its%20manning%20goals.

[39] Heather R. Penney, "What Combat Airpower? Then Fix the Air Force Pilot Crisis" (Mitchell Institute for Aerospace Studies, January 2025), 13, https://www.mitchellaerospacepower.org/app/uploads/2025/02/Want-Combat-Airpower-FINAL.pdf.

[40] Michael G. Mattock, Beth J. Asch, James Hosek, and Michael Boito, "The Relative Cost-Effective of Retaining Versus Accessing Air Force Pilots" (RAND Corporation, 2019), https://www.rand.org/content/dam/rand/pubs/research_reports/RR2400/RR2415/RAND_RR2415.pdf; Nolan J. Sweeney, "Predicting Active Duty Air Force Pilot Attrition Given an Anticipated Increase in Major Airline Pilot Hiring" (RAND Corporation, 2015), https://www.rand.org/pubs/rgs_dissertations/RGSD338.html.

[41] John Lewis Gaddis, "Grammar, Logic, and Grand Strategy," in *The New Makers of Modern Strategy* (Princeton: Princeton University Press, 2023), 1138.