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Building integrity into the dawn of AI for foreign military sales

ADAPTIVE EDGE
CECOM SEC's continuous approach to readiness

ALL ACCORDING TO PLAN
Digital planning tools prepare us for the battlefields of tomorrow

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To contact the Editorial Office:
Email: **armyalt@army.mil**

Mailing Address:
DEPARTMENT
OF THE ARMY
ARMY AL&T
9900 BELVOIR ROAD
FORT BELVOIR, VA
22060-5567

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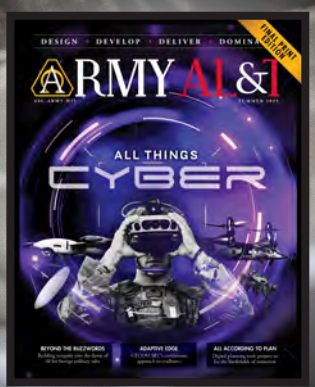

ON THE COVER

The U.S. Army is advancing cloud connectivity, cybersecurity, AI and software modernization to enhance network development and deliver secure, modern solutions to warfighters through its acquisition enterprise.

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FEATURE ARTICLES

CRITICAL THINKING

WORKFORCE

From the Editor-in-Chief

We live in the future. Artificial intelligence (AI) is becoming an ever-present entity within daily life—you have an AI assistant on your cell phone now—and we are connected inextricably with the Cloud. Washing machines, thermostats and smoke alarms come in WiFi-enabled, fully customizable varieties and there are various ways to secure all your smart-home devices.

The U.S. Army, particularly the acquisition enterprise, is working to bring that same connectivity, convenience and security to the warfighter through an increased focus on cybersecurity, network development, software modernization and incorporation of AI into the development of systems and policies.

Read about how AI is streamlining processes and enhancing analysis in foreign military sales in "Beyond the Buzzwords," Page 12. The U.S. Army Communications-Electronics Command (CECOM) Software Engineering Center is establishing strong and dynamic software readiness via the CECOM Software Repository in "Adaptive Edge," Page 20. Of course, you can't have a reliable future state without a solid plan—in "All According to Plan," Page 40, learn about how planners are using a new set of digital tools to face the next generation of challenges. These and other exciting articles await inside this final print edition of Army AL&T magazine.

That's right—Summer 2025 is our last hardcopy edition. After 65 years, Army AL&T is going all online! We'll continue to publish your contributions and the latest in acquisition news on a rolling, timely and condensed format on the United States Army Acquisition Support Center website. Subscribe to our email notifications—or adjust your current subscription—to receive the latest updates.

As always, we look forward to your submissions and your feedback. Stay in touch at **armyalt@army.mil**.

Jacqueline M. Hames
Editor-in-Chief

TWICE AS FAR, TWICE AS FAST

by Cheryl Marino

The FLRAA program, powered by digital engineering, is set to revolutionize Army aviation with a faster, more adaptable aircraft designed to meet the demands of modern warfare.

EXCEEDING EXPECTATIONS

The FLRAA team shows Col. Matthew Scher, the 25th Combat Aviation Brigade commanding officer, what his Soldiers can expect from the FLRAA in the 3rd Battalion, 25th Aviation Regiment hangar on September 9, 2024. A tiltrotor aircraft, FLRAA will have the hybrid capabilities of both planes and helicopters. (Photo by Spc. Charles Clark, 25th Infantry Division)

As the battlefield evolves, so must the aircraft that support and protect Soldiers on the ground. The Army's Future Long Range Assault Aircraft (FLRAA) aims to do just that—ushering in a new era of speed, range and adaptability. Backed by cutting-edge digital engineering, FLRAA isn't just a new rotorcraft, it's a leap forward in how the Army plans, flies and fights in tomorrow's conflicts.

"It's a game-changing capability in terms of speed and range," said Col. Jeffrey Poquette, FLRAA project manager at Program Executive Office (PEO) for Aviation. He characterized the next-generation tiltrotor assault aircraft (designed by Bell Textron) as "twice as far, twice as fast" at the annual Association of the U.S. Army Global Force Symposium, held in Huntsville, Alabama, in March 2025. The implementation of digital engineering will be "a digital engineering pathfinder for the Army," serving as a model for how digital engineering can be adopted and implemented by the Department of Defense (DOD) acquisition enterprise to improve efficiency, reduce costs and accelerate the development and test of capabilities. The challenge, he said, is that this is new territory, but the level of insight that the government gets into the design is unprecedented and "what we get from that is ensuring that we build the right thing."

Gone are the days of building something, setting it aside and forgetting it. Digital engineering allows the Army to leverage the power of technology to create a design digitally and determine the impact of changes to that design prior to bending metal.

"Digital engineering isn't magic," said Poquette. "It's just a really deep look in a common environment where we have a single source of truth. We never don't know what the design is today. I can take my phone out right now and look at the design and see where we are … that's powerful."

Poquette said when prototypes are built and tested, often things are found that have to be fixed. Some of those fixes could be big, some could be expensive, and they inevitably will extend the timeline of the acquisition because the test program gets much longer.

"I'm not even going to say that digital engineering is faster upfront. It's an investment in time. It's an investment in intellectual capital. But when we build the prototypes we're going to be so confident that anything we need to fix should be small, should not be expensive, and that we can quickly fix those prototypes, continue on with the test program and get the capability into Soldiers' hands as soon as possible," Poquette stated. "Together [with industry] collaboratively, we're going to build the aircraft that meets the Army's requirements and is truly going to change the nature of the assault aviation platform."

FLRAA COMES TO FRUITION

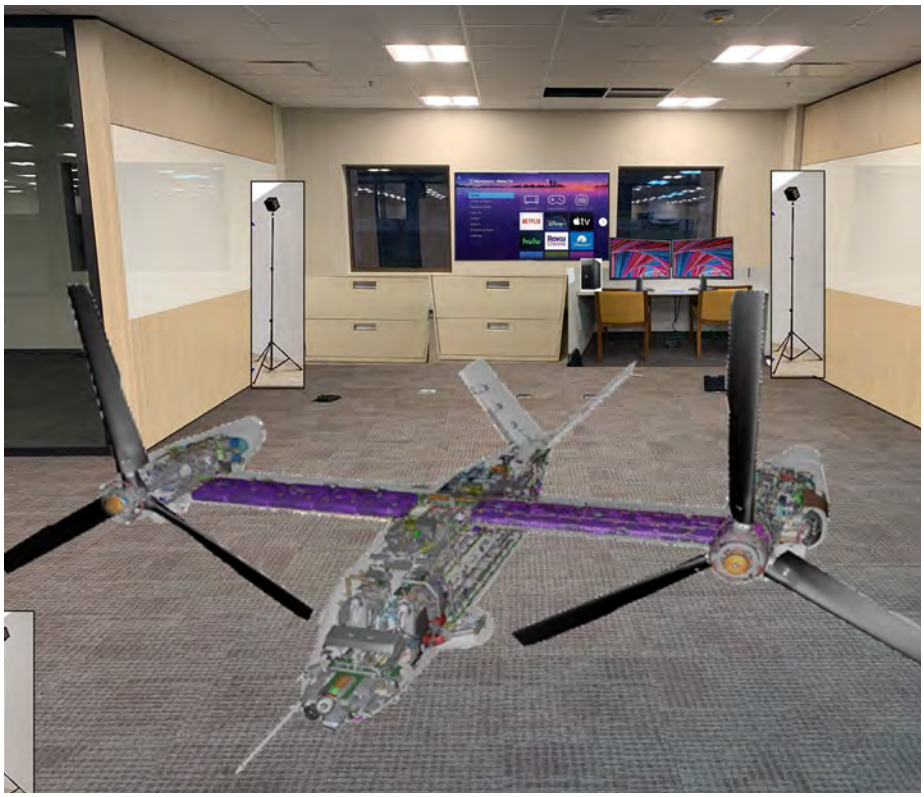
The science and technology (S&T) effort behind FLRAA began in 2013 as the Joint Multi-Role Tech Demonstrator program, which was aimed at proving out a platform that could fly twice as far, twice as fast and be sized appropriately for the Army. As the S&T effort transitioned to an acquisition program, the question became

how to approach the program differently and succeed.

"We went and looked at published lessons learned from various programs, not just Army, but across the DOD. We identified a theme that [the] lack of upfront systems engineering attributed to increased cost and schedule on many programs," explained Michelle Gilbert, technical management division chief at PEO for Aviation FLRAA Project Management Office (PMO). She and her team were then tasked with developing a strategy that would ensure rigorous upfront systems engineering while supporting an accelerated program schedule beyond historical timelines. "That's what initiated the development of our digital engineering strategy. We found that if we did some upfront investment in digital engineering, it would give us some of the tools that we needed to help support those two objectives."

Initially, a technology demonstrator (constructed as a proof of concept) was built to demonstrate "twice as far, twice as fast" capabilities, but it was not fully compliant with all requirements. The FLRAA program is currently executing a detailed design to ensure that the FLRAA system meets all requirements (survivability, sustainability, integrated mission systems, etc.).

As part of the Engineering and Manufacturing Development (EMD) phase, Gilbert said, Bell Textron will build six prototype aircraft, as well as two "limited user" test aircraft—the prototypes will be used to verify that the system meets performance and airworthiness requirements and to validate operational effectiveness, suitability, safety and survivability. There are also virtual prototypes, which are like aircraft simulators that accommodate a pilot and co-pilot, with surrounding screens that emulate the view and behavior of the system itself. These virtual prototypes are used to help inform the design as well as the development of operator tactics, training and procedures.



GRASPING REALITY
The mockup design of FLRAA's extended reality lab. (Photo by U.S. Army)

THE DAWN OF NEW DIGITAL

Digital engineering enhances FLRAA missions by enabling faster, smarter and safer operations. This includes the use of model-based systems engineering tools like Cameo—a collaborative environment for defining, tracking and visualizing all aspects of a system through models and diagrams. Additionally, 3D models support design, manufacturing and assembly processes, streamlining development from concept to execution.

Gilbert explained that FLRAA is using model-based systems engineering to create the digital models of the systems architecture and requirements, merging them into a digital twin that defines the system, demonstrates its behavior and predicts performance. "[This is] establishing a digital thread which captures the relationship between system and program data. The digital thread provides the PMO, stakeholders and Bell [Textron] with a better understanding of the system. We are also utilizing a collaborative digital environment to enable near real-time access to this data."

The performance models are used to emulate and simulate the performance of the FLRAA aircraft to understand the behavior and tweak flight control laws (modifications to the flight control system's algorithms, which govern how pilot inputs translate into aircraft control surface movements).

FOR GOOD MEASURE
A member of the FLRAA team measures a 25th Infantry Division Soldier for improvements for the FLRAA in the 3rd Battalion, 25th Aviation Regiment hangar on September 9, 2024. (Photo by Spc. Charles Clark, 25th Infantry Division)

"We can also use it to help ensure that from a user interface standpoint everything is correct and suitable before we go and actually build the system, [and] we're doing all of this digitally," she explained. "We have a lot of digital models that represent our system that have allowed us to reduce the risk before we go and bend metal on our prototypes."

The digital engineering strategy, Gilbert noted, is incremental. She and her team are currently focused on using digital engineering to design and document the system during development. As the program progresses, these efforts will expand into testing, eventually incorporating sensor data from the aircraft and linking it to various enterprise sustainment tools. For now, the priority remains on building a solid digital foundation before moving into test and evaluation.

"Using our digital environment to link test data together with the system design of the aircraft can help make the verification process more efficient. It can help correlate information together, where before there wasn't a linkage between information, and provide easier access to all supporting program data," Gilbert said. "For our stakeholders who are trying to qualify our system, that's very helpful. And then our digital engineering efforts will expand beyond that to support sustainment. Conceptually, every single aircraft in the field could have its own digital representation."

Gilbert noted that one outcome they've already encountered from using the digital tools is that it forces both Bell and the U.S. government "to have a deeper understanding of the system and how onboard systems interact with each other."

Additionally, the digital tools have enabled the team to create linkages to all of the data. Before this, Gilbert explained, "we were dealing with siloed pieces of information, so you weren't able to make those correlations. By utilizing these tools, we're finding things like architecture concerns that we may not have found before, just because now it's all connected and it's easier for us to consume and assess if the design meets our objectives."

Crews also benefit from immersive virtual training, accelerating readiness for unfamiliar or high-risk scenarios. This makes FLRAA more agile, reliable and adaptable to the demands of future battlefields.

"We have a virtual reality [VR] capability that's here in our office and it's updated regularly to reflect the system under design," Gilbert said. "We have monitors set up; we have the VR headsets. It doesn't take a lot of infrastructure and that capability is there for us to utilize whenever we want it. This is truly a revolutionary capability that informs engineers or logisticians and any stakeholders who need to understand the system better."

During system design, acquisition engineers may not fully grasp design specifics, such as how the hydraulic system will fit into the system, Gilbert said. "It doesn't exist yet in physical form, but we are able to go in, put on a virtual reality headset and they can see exactly where it is in the current design. Our engineers or maintainers can look at it and say, 'I'm never going to be able to maintain that system with the way it is now.' We're able to catch things like that earlier and influence a design change."

GETTING THE MOSA FOR YOUR MONEY

While digital engineering provides the tools to design, simulate and evolve systems faster, a Modular Open Systems Approach, or MOSA, ensures those systems are built in a way that allows rapid, flexible upgrades.

DEMONSTRATOR IN FLIGHT
Bell's V-280 technology demonstrator in forward flight. (Photo courtesy of PEO Aviation)

According to Gilbert, the MOSA is an approach to achieving certain objectives, not just through open standards but by following specific design processes to ensure the architecture supports those goals. She and her team developed an architecture framework to guide how the system should be built and analyzed to confirm it meets MOSA objectives. Examples are enabling third-party upgrades without full reliance on the prime contractor or rapidly fielding a capability update with minimal delay. The framework defines these expectations and the prime is required to comply.

"The other thing that we're doing is we put in a requirement for an infrastructure on our aircraft that we call the digital backbone. The digital backbone is the onboard network that's responsible for all data exchanges between different components. Any component integrated on the system must follow the defined open standards," she said. "And what that does is it allows for easier integration by not having to update multiple systems on the aircraft when upgrading a capability." This concept is similar to the MOSA plug-and-play concept.

"It's a game-changing capability in terms of speed and range."

MOSA offers a modular and scalable solution for aircraft upgrades, eliminating the integration complexities associated with legacy systems. This approach significantly reduces downtime and modification work by enabling the rapid installation and interchangeability of components.

"For FLRAA, we ensure we have robust processes and requirements in place to design and analyze our architecture and the onboard digital backbone. This, coupled with a robust intellectual property strategy that ensures the right level of data rights are acquired by the

PMO, summarizes the FLRAA open systems approach," she explained. "To ensure that, we do have an open architecture on our platform."

This, she said, will make it easier and more affordable to upgrade and sustain, with the ability to do some of that sustainment on the government side or with third parties. Because of how the system is architected, there's less reliance on the prime contractor, which can help with sustainment costs.

SOLDIER TESTING AND TIMELINES

Soldier testing and feedback are crucial when implementing new digital technology to ensure it meets real-world operational needs. Direct input from end users helps identify usability issues, improve functionality and ensure the technology enhances mission effectiveness and Soldier readiness.

For the FLRAA program, there are two ways of achieving Soldier feedback. One is through special user evaluations, or Soldier touch points, using mockups of the aircraft to ensure optimal seat configurations and whether users can egress and ingress from the aircraft safely, etc. A user evaluation in spring 2025 observed how Soldiers conduct mission planning on the system, which will impact the software requirements for mission planning.

Another Soldier touch point is through virtual prototype simulation.

"We're using the virtual prototype to help us get user feedback that can either support changing the user interfaces, our flight control laws, etc.," Gilbert said. "We're planning on using the virtual prototypes as part of special user evaluations all the way through our development stage. This will support iterative user feedback through development until we have physical aircraft prototypes."

CONCLUSION

The FLRAA program has come a long way since April 2024, when FLRAA took a hybrid approach with a preliminary design using a middle tier of acquisition pathway and developed virtual prototypes. In July 2024, at Milestone B, it transitioned to a major capability acquisition program and program of record.

"We're going to be focused on the detailed design in the near term, but our acquisition strategy is such that we don't wait to complete our detailed design before we begin building our prototypes. We deliberately did that when we set up our acquisition strategy so that once a subsystem reaches the appropriate level of maturity, it can immediately move into build and assembly," Gilbert said. "Even though the design and supporting analysis may not be fully documented, we can begin building those subsystems with an informed level of risk. This helps support schedule objectives while maintaining rigor."

Currently, the Army is scheduled to begin equipping the first Army unit in fiscal year 2030 and completing the first unit equipped in fiscal year 2031. "Our current focus is on getting the design right, which is crucial for successfully prototyping and future production," Gilbert said. "We are building and testing prototypes to make a production decision by Milestone C, which is currently scheduled in 2028."

"It [development] takes a few years, especially on an aviation platform because there's a lot we have to do from an airworthiness perspective to ensure it's safe," Gilbert said. "We have a lot that we have to do before a Soldier can begin operating the system. That's why using things like the virtual prototype and other things like mockups are so important to us—because it's a way of getting them in early while we're still proving out the airworthiness of the aircraft itself."

*For more information, go to **https://www.army.mil/PEOAviation**.*

CHERYL MARINO provides contract support to the U.S. Army Acquisition Support Center at Fort Belvoir, Virginia, as a writer and editor for Army AL&T magazine and TMGL, LLC. Before USAASC, she served as a technical report editor at the Combat Capabilities Development Command Center at Picatinny Arsenal for five years. She holds a B.A. in communications from Seton Hall University and has more than 25 years of writing and editing experience in both the government and private sectors.

AI-PROPELLED SECURITY

Joint Munitions Command is leveraging AI analytics to safeguard the Organic Industrial Base.

by Brig. Gen. Daniel Duncan

EYE IN THE SKY
A drone gets a closer look at intruders while flying above the Blue Grass Army Depot—the only DOD installation testing AI software to enhance physical security.
(Photo by Greg Kocher, BGAD)

The U.S. Army's Joint Munitions Command (JMC), headquartered at Rock Island Arsenal in Illinois, is at the forefront of revolutionizing security systems within the ammunition Organic Industrial Base (OIB). Given today's unpredictable world, its evolving threats and technological advancements, safeguarding the OIB is essential to safeguarding critical infrastructure, protecting sensitive information and ensuring operational continuity—but it requires innovative solutions, which ultimately deliver cost savings.

In collaboration with the Department of Defense (DOD), United States Secret Service, Department of Homeland Security and other agencies, the JMC is leveraging advanced artificial intelligence (AI) analytics integrated with existing Army sensors to significantly improve security and safety within the OIB. This technology supports multidomain integration and extends protection across air, land and bodies of water. Unlike traditional security systems, this AI-driven technology identifies potential threats in real-time, allowing site commanders to respond at the speed of decision.

STRATEGIC BEGINNING

The initial focus of the DOD-trained AI commercial system is intrusion detection and weapon identification. By integrating cameras, radars and other technologies, the system can be deployed across existing legacy infrastructure. Utilizing the AI's algorithm with existing video feeds, the camera's transition into sensors with the ability to detect guns and intruders, and to perform facial recognition and vehicle tracking, enables the system to send real-time alerts to security personnel. These measures are further enhanced through training AI algorithms to support counter unmanned aerial system capabilities, increasing airspace awareness at OIB installations. Combining existing and new sensors ensures comprehensive coverage against both manned and unmanned threats while minimizing false alarms. Radars detect intrusions in all environmental elements, such as at night or during adverse weather, and allow multidomain sensing. Working alone, radar devices can create multiple false alarms. However, integrated with AI, the pairing creates an autonomous and highly accurate sensor platform.

The Blue Grass Army Depot (BGAD) in Kentucky has been instrumental in developing and training commercial AI technologies and has served as the critical testing ground. BGAD was the submitting organization through the Army's Physical Security Enterprise and Analysis Group for funding.

Personnel at BGAD have rigorously developed the threat detection system. This technology leverages AI with deep neural learning computer vision to enhance existing electronic security

infrastructures. The capabilities include transforming existing video so it can identify objects, intruders, weapons, behavior anomalies, slips and falls and smoke and fire. The lessons learned at BGAD serve as a foundation for JMC's broader efforts to modernize security across the OIB.

INNOVATION IN DESIGN

The core of this transformation lies in the integration of sophisticated system-agnostic AI analytics with the existing network of legacy sensors, utilizing new technology to cover security gaps left in the traditional security model.

Recognizing the need for adaptability, JMC is also developing a portable, trailer-mounted version of this technology. This mobile solution extends protection to remote- or low-infrastructure environments that currently lack sufficient security coverage. This also allows the Army to secure areas that have not been financially feasible to secure via traditional methods, like fencing, at a fraction of the cost—leading to increased security and safety across the OIB. The system can autonomously utilize dozens of cameras simultaneously and identify a gun thousands of feet away. Traditionally, it would take more than one individual to monitor that many cameras, and alerts were based upon what the operators could see with the naked eye one screen at a time. The new system removes the human element, monitoring all the cameras at once and pushing alerts to the operator in real-time. With an already short-handed security force, this system eliminates the need to send personnel to respond to nuisance alarms and allows more guards to be at key locations with threat risks or at security checkpoints versus watching monitors in the control room. This results in less fatigue, more efficient response to legitimate threats and an overall enhancement of the OIB security posture.

DETECTION WORK

As part of the new AI-based system, a drone can be used to detect vehicles. (Photo courtesy of JMC)

CONCLUSION

While JMC is still in the research phase, multiple real-world testing scenarios have taken place at BGAD, and the system has demonstrated an accuracy rate above 96%. The integration of AI into the OIB security infrastructure offers several benefits: enhanced detection of potential threats with speed and precision; faster, more effective responses by security personnel, reducing risks; and optimized allocation of resources, enabling more strategic deployments.

JMC is reshaping how security is managed across the OIB. This transformation ensures that critical national assets remain resilient in the face of modern threats. By embracing advanced technology, JMC is securing the OIB's future and setting a new standard for safeguarding vital infrastructure.

For more information about JMC and its mission, go to ***https://www.jmc.army.mil****.*

BRIG. GEN. DANIEL DUNCAN assumed the duties as JMC's commander on April 25, 2025. He was commissioned as an ordnance officer from Washington State University in 1994. He holds an M.S. in strategic studies from the United States Army War College, an M.A. in management and leadership from Webster University and a B.A. in political science from Washington State University.

BEYOND THE BUZZWORDS

Building integrity into the dawn of AI for foreign military sales.

by Marjorie Bishop

For decades, foreign military sales (FMS) has been the cornerstone of U.S. national security cooperation, fostering alliances and bolstering partner defense capabilities. Now, a new force is entering the equation: artificial intelligence (AI). While the potential benefits—streamlined processes, enhanced analysis and improved decision-making—are tantalizing, the infancy of this technology demands a sober assessment and, crucially, a commitment to integrity from the outset.

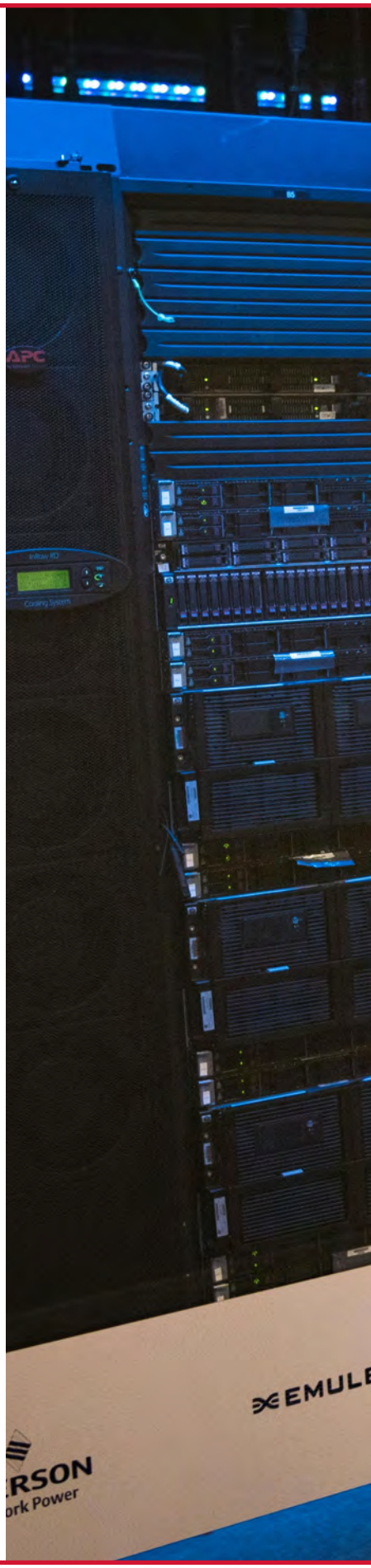
This approach to AI is not about fearing "killer robots." It is about understanding that AI, at its core, reflects the data and the intentions of its creators, and in the complex world of FMS, where trust and accountability are paramount, a flawed or biased AI system could have far-reaching consequences. For this reason, a proactive cybersecurity strategy for AI in FMS is a must.

THE PROMISE FOR FMS: EFFICIENCY AND INSIGHT

AI offers significant benefits to the FMS process by increasing efficiency, enhancing decision-making and reducing operational risks.

For example, through automated case management, AI can handle repetitive tasks such as document review, data entry and case routing, thereby reducing the administrative burden on FMS case managers and accelerating case processing.

In predictive maintenance, AI analyzes data from weapon systems to anticipate maintenance needs, optimizing logistics and minimizing system downtime. AI also plays a crucial role in enhanced threat analysis, quickly processing large volumes of intelligence data to identify potential risks and support strategic security assistance. Additionally, AI-powered training and simulations provide partner nation personnel with highly realistic and adaptive training environments, improving readiness and operational effectiveness.



A PROACTIVE CYBERSECURITY STRATEGY

Organizations must define and understand what correct data and system states look like prior to deploying tools such as firewalls or intrusion detection systems. Cybersecurity measures are used to preserve and protect integrity, ensuring that data remains accurate, complete and unaltered without proper authorization. (Photo by Christina Morillo, Pexels)

When it comes to compliance, AI helps ensure adherence to complex regulatory requirements by automatically verifying documentation and processes, reducing the likelihood of penalties and delays.

Finally, AI-optimized logistics and supply chain management streamline inventory control, transportation routes and resource allocation, cutting costs and ensuring timely delivery of critical equipment and support.

Of course, there is also the broader, more general use of AI that transcends mission-type. Generative AI used in tandem with large language models promote efficient content production across modes such as text, image and video generation using text-based data.

THE INTEGRITY IMPERATIVE: GUARDRAILS FOR A NEW ERA

These benefits, however, come with inherent risks. AI systems are only as good as the data they're trained on, and biased data can lead to biased outcomes, potentially impacting decisions related to arms transfers, training programs and partner relationships. Furthermore, the "black box" nature of some AI algorithms can make it difficult to understand why a particular decision was made, hindering accountability.

Here is where integrity becomes paramount. Ensuring integrity and embedding safeguards into the development and deployment of AI for FMS is vital to maintaining trust, accountability and operational effectiveness.

High-quality, representative data is the foundation of reliable AI systems, making data validation and bias mitigation essential to preventing discriminatory outcomes and flawed decisions. The ability to understand and explain the reasoning behind an AI model's predictions, or Explainable AI, should be prioritized, allowing stakeholders to understand how AI-driven conclusions are reached—an important factor in building trust with partner nations and internal decision-makers.

MORE EFFICIENT FMS

A Bradley M2A2 Infantry Fighting Vehicle in Gasinci, Croatia, on August 26, 2024. Sixty-two Bradleys will be refurbished in Croatia as part of an FMS case with the USASAC. AI can benefit the FMS process by increasing efficiency, enhancing decision-making and reducing operational risks. (Photo by Sarah Zaler, USASAC)

While AI can significantly enhance efficiency, human oversight remains critical—qualified personnel must review all key decisions to ensure sound judgment and accountability. In an era of increasing cyber threats, robust security measures are necessary to protect sensitive FMS data from unauthorized access or manipulation.

Establishing ethical frameworks aligned with U.S. values and international law sets the tone for responsible AI use that upholds shared principles. Continuous monitoring and evaluation of AI systems are needed to track performance, identify emerging issues and ensure that systems remain accurate, fair and effective over time.

A FUTURE BUILT ON TRUST

The integration of AI into FMS is not a question of if, but how. By embracing a proactive and principled approach, prioritizing integrity and acknowledging the limitations of this nascent technology, we can harness the power of AI to strengthen alliances, enhance security cooperation and uphold the values that underpin the FMS program.

The dawn of AI presents both opportunities and challenges. As the Army's security assistance enterprise moves forward, it is imperative to build a future where AI serves as a force for good, reinforcing the trust and partnership that have defined FMS for decades.

Some key security measures we can focus on include data loss prevention, input validation and output monitoring. These security measures can help monitor and protect sensitive information on premises, in cloud-based locations and on endpoint devices.

THE INSEPARABLE LINK

Integrity and cybersecurity aren't just related, they're fundamentally intertwined. Robust cybersecurity does not exist without a strong commitment to data and system integrity, and conversely, maintaining integrity requires robust cybersecurity measures. They operate as a reinforcing cycle, each bolstering the other. Here's a breakdown of how they work together:

1. **Integrity defines what cybersecurity protects.** At its core, cybersecurity is built on the CIA triad—confidentiality, integrity and availability—but in the interest of AI, integrity is a key factor in ensuring that data remains accurate, complete and unaltered without proper authorization. It's the foundation of trust in any digital system. In the context of FMS, maintaining integrity is critical—altered contract terms or tampered shipment records can result in significant diplomatic and operational consequences. Confidentiality alone is meaningless if the data itself cannot be trusted. Before deploying tools like firewalls or intrusion detection systems, organizations must first define and understand what correct data and system states look like. Cybersecurity measures are then used to preserve and protect that integrity, making it a baseline for all other security efforts.

2. **Cybersecurity mechanisms uphold integrity.** A range of cybersecurity tools and practices are specifically designed to ensure and maintain integrity. Cryptographic methods such as hashing and digital signatures help verify that data hasn't been tampered with and that it comes from a trusted source. Access controls, including role-based access and multifactor authentication, restrict who can modify data, reducing the risk of unauthorized changes. Built-in processes like version control and regular backups provide mechanisms to restore data to known-good states if corruption occurs. Meanwhile, intrusion detection and prevention systems, data loss prevention tools and Security Information and Event Management platforms monitor, detect and respond to threats that could compromise data integrity. Vulnerability management ensures that weaknesses are patched before they can be exploited. Collectively, these mechanisms form a layered defense that actively supports the integrity of FMS systems and data.

3. **The impact of integrity failures—and cybersecurity's role in preventing them.** Failures in data integrity can have wide-ranging and sometimes devastating effects. Threats like malware and ransomware are designed to encrypt or corrupt data, making it unusable or unreliable. Insider threats, whether malicious or accidental, pose serious risks as they often involve trusted access being misused to alter critical data. Supply chain attacks can introduce compromised components that enable attackers to manipulate systems from within. Even data breaches, typically associated with confidentiality concerns, can lead to the alteration or destruction of data. With the rise of AI and machine learning, the manipulation of training data has become a new frontier for integrity attacks, where poisoned data leads to biased or inaccurate AI outcomes. In all these cases, robust cybersecurity measures—from endpoint protection to monitoring and training—are essential to safeguard integrity and prevent potentially mission-critical failures in FMS operations.

4. **Integrity as a cultural component of cybersecurity.** Protecting integrity isn't just a technical task, it's also a matter of organizational culture. A strong cybersecurity culture places high value on data governance, with clear policies around how data is accessed, modified and stored. Change management ensures that updates to systems or data are controlled and documented, reducing the risk of accidental or unauthorized changes. Audit trails provide transparency and accountability, showing who accessed what data and when. Establishing clear roles and responsibilities helps ensure that individuals are held accountable for data integrity. Finally, organizations committed to integrity must embrace continuous improvement, using lessons learned from audits, incidents and evolving threats to constantly refine their practices. For FMS operations, embedding integrity into the culture ensures that security is proactive, not reactive—anticipating threats and fostering trust among international partners.

KEEP DOUBLE-CHECKING

While AI can enhance efficiency, qualified personnel must review decisions to ensure sound judgment and accountability. Continuous monitoring and evaluation of AI systems are needed to track performance, identify emerging issues and ensure that systems remain accurate, fair and effective. (Photo by Mikhail Nilov, Pexels)

While the full scope of AI's integration into FMS and other aspects of the enterprise is yet to be seen, the U.S. Army Security Assistance Command's (USASAC) G2/6 division is doing its part to stoke innovation and create a foundation of responsible AI use through two initiatives.

The first initiative, a hybrid USASAC Microsoft Copilot sandbox team, serves to guide the strategic and responsible implementation of Generative AI and large language models and assess Microsoft Copilot's impact on efficiency across existing end-user tools (Excel, Word, PowerPoint) and the potential of integrating it with other supporting applications and capabilities.

Secondly, the G2/6 is hosting a lunch and learn series that aims to position USASAC as early adopters and leaders in leveraging AI for increased efficiency and effectiveness through sessions focused on prompt engineering, identifying use cases, responsible AI usage and future trends and potential.

CONCLUSION

Cybersecurity is the means to protect integrity, and integrity is the goal that gives cybersecurity its purpose. Treating them as separate concerns is a dangerous oversight. A truly secure system is one that not only protects data from unauthorized access but also guarantees its accuracy, completeness and reliability. For FMS, where trust and precision are paramount, this connection is more critical than ever. By prioritizing data quality, cybersecurity and ethical considerations, FMS can unlock the full potential of AI and realize significant cost savings, improved efficiency and enhanced national security.

For more information, go to ***https://www.army.mil/usasac****.*

MARJORIE BISHOP is the command information system security manager for USASAC's G2/6 Cybersecurity Division and has over 18 years of relevant professional experience. She holds a Master of Information Systems from Florida Institute of Technology and a B.S. in business administration from Christian Brothers University. Her certifications include Certified Information Security Manager, Security+CE and Certified Data Privacy Solutions Engineer.

Changes are afoot

We'll be focusing our content more around the Army Acquisition Workforce as a whole, connecting the dots between the acquisition community and Army capabilities, services and equipment.

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ARCHIE C. KINNEBREW JR.

COMMAND/ORGANIZATION: U.S. Army Operational Test Command

TITLE: Military test plans analyst

YEARS OF SERVICE IN WORKFORCE: 10

YEARS OF MILITARY SERVICE: 7

DAWIA CERTIFICATIONS: Practitioner in test and evaluation

EDUCATION: Master of Information Systems, graduate certificate in business analytics and B.S. in information technology, University of Phoenix; A.S. in computer science, Central Texas College

AWARDS: Ten Year Civilian Service Award (2023); Civilian Service Commendation Award (2022); Medical Center of Excellence Hero of the Battlefield recipient (2021); Medical Test Evaluation Activity Civilian of the Year (2021); Southwest Asia Gulf War Veteran Service Medal (1991)

FILL YOUR CANVAS

As Archie Kinnebrew became more involved in Army modernization and the purchase of Army systems, he realized that while technology may help us make better decisions, it also "handicaps us in the knowledge transfer of experience." As the military test plans analyst for U.S. Army Operational Test Command, he embraces new technology, but he doesn't want to lose sight of what happens when things are missed.

"We should not have to learn by accident," he said. "[The whole of] My experience is crafted from mistakes and poor processes of the past. I have to instill in my peers and young leaders these lessons and pitfalls so they can be successful."

In his role, Kinnebrew develops detailed test plans that include resources, event design and cost accounting strategies to support Army resource development strategies for defense acquisition projects and programs, thereby ensuring that each piece of equipment is operationally tested before being placed in the hands of warfighters.

Throughout his career as a test officer, Kinnebrew has supported a range of organizations across the testing community, including the U.S. Army Medical Test and Evaluation Activity; the U.S. Army Operational Test Command; the U.S. Army Communications and Electronics Command; the U.S. Navy Space and Naval Warfare System Center (now the Naval Information Warfare Systems Command); joint services, NATO operations; the Federal Aviation Agency; and the U.S. Department of Homeland Security.

It's a diverse set of experiences with, he said, a significant commonality—giving back to the young warfighter and ensuring they have the latest and greatest to do their job right and to come back home safely.

"It's important to me to ensure my current position is accomplished to the highest standard and my work accomplishments are worthy of supporting the young warfighter in the battlefield, at home and abroad," Kinnebrew said.

While he was a sergeant in the Army, Kinnebrew worked on missile systems for the Bradley Fighting Vehicle as a land combat missile electronic technician. Two years after he medically separated from the Army in 1996, he landed a testing position at Operational Test Command at Fort Hood, Texas, and the first test was on the Bradley Fighting Vehicle. "I feel deeply immersed in the testing of all sorts of military systems, and this morphed into becoming heavily involved with the acquisition process," he said. Never having known what went into the development, testing and purchase of Army vehicles and weapons until getting involved in test and evaluation really "opened his eyes."

Training, which Kinnebrew sought voluntarily while trying to find ways to enhance his career, was a large part of the process. The most recent courses he took were the Defense Civilian Emerging Leader Program (DCELP) in May 2024 and the Civilian Education System (CES) Intermediate Course in June 2022.

"My greatest takeaway [from DCELP] was how to become influential to others—how to be vulnerable with my teammates as a strength." Completing CES was instrumental in "learning self-awareness as a leader, both shortcomings and strengths," he added.

Kinnebrew believes that showing your human side helps create trust and understanding. "I am a people first, performance second and process third type of leader. Creating trust and rapport with your peers and leadership is important. Showing vulnerability helps."

Kinnebrew said that he applied for DCELP and CES to increase his value, increase his awareness and learn the latest concepts.

"I was hoping to find additional blind spots in my leadership style, meet new people and share my experiences and produce a plan for my knowledge transfer to others," he said. "The program helped me develop these plans."

Kinnebrew's knowledge transfer plan would include peer-to-peer mentorship with a discussion board or roundtable discussion to allow lessons learned to be incorporated into current planning, tasks and assignments. He believes a structured, peer-to-peer activity would give everyone an equal voice and a welcome platform for discussion. He'd like to see this plan executed before his retirement.

SIMULATED FLIGHT
Kinnebrew in the cockpit of a CH-47 flight simulator at Army Test and Evaluation Command at Fort Campbell, Kentucky, in April 2024. (Photo courtesy of Archie Kinnebrew)

Above all, for Kinnebrew "it was about the 'gives' and 'gets.' I was able to give my experiences and insight, and I got others' perspectives and learnings," he said. He gained new personal perspective and learned the importance of being inspirational and creative when influencing a new network of professionals. "It has shown me that there is more that I have to offer to my peers and leaders. It has inspired me to push my peers to the levels they are capable of."

"These courses are a must-have for my teammates. We do not know what we do not know if we are not exposed to the unknown," he said. "Knowledge of self and the tools to develop are crucial for personal and professional development and the sharing of knowledge, how to be vulnerable and the value of being a sincere leader."

Kinnebrew's work is his passion. "You have to love what you do in order to accomplish a task; you have to look at it like a work of art. You fill your canvas, pour your heart into it and ensure there are no flaws," he said. "If you do not totally love what you do, then you cannot possibly do your best work."

When you love what you do, it shows. Kinnebrew's enthusiasm for his role is obvious to those within and outside DOD. "When I tell people about military systems they have seen on the news or in the movies, the typical response is 'Wow!', because they can't believe the high probability of my having a hand in the development, testing and fielding of the various warfighting vehicles, munitions, software and tools," he said.

In the past four years, he said he has often found himself to be the most experienced member of his team when it comes to test and evaluation. "I have not only provided support and teamanship, but also became a mentor and coach to junior professionals," Kinnebrew said. "I have also become a confidant and advisor to senior leadership across several testing organizations."

Both in and outside of work, Kinnebrew is known for being highly motivated, in a constant state of learning and extremely competitive. "These are the basics for how I do business in my organization," he said. "To ensure that I give 100 percent, all of these attributes are a must."

—CHERYL MARINO

FIELD ENGAGEMENT

CECOM Integrated Logistics Support Center IT Radio Logistics Assistance Representatives and SEC Software Support Representatives participate in a motor pool terrain walk hosted by 210 Field Artillery Brigade at Camp Casey, Korea. CECOM team members provide on-the-spot guidance in support of the Brigade's Joint Battle Command – Platform Mounted Mission Command – Software readiness event. (Photo by Gaby Waters, CECOM SEC)

ADAPTIVE *EDGE*

CECOM SEC's continuous integration and continuous delivery approach to readiness.

by Kevin Deegan

Software readiness is critical to American warfighting efforts. That's why the Pentagon is laser-focused on enhancing readiness in a cyber-contested battlespace—it is essential for responding effectively to threats, deterring adversarial aggression and protecting American interests and spaces.

Diplomatically, this is far from a new fight.

Rewind to October 2020. At that time, the U.S. Army Communications-Electronics Command (CECOM) Software Engineering Center (SEC) at Aberdeen Proving Ground, Maryland, was forging a path to establish strong and dynamic software readiness, in part via the CECOM Software Repository. This one-stop hub consolidated the software releases for over 70 commands, control, communications, computers, cyber, intelligence, surveillance and reconnaissance (C5ISR) systems. Now, the repository serves as the authoritative, continuous-delivery source of system updates and files for operational units. This end-to-end pipeline repository also holds units accountable for having the latest software, which is critical for Army lethality and preparedness. This was the first effort of many to modernize legacy delivery methods while also shortening the delivery path of critical software to tactical network systems.

The digital domain that can decide the outcome of a war is ever-changing. As Gen. Dwight D. Eisenhower once said, "Plans are worthless, but planning is everything."

In the cyber realm, it's always a new fight.

TACKLING SOLDIER CHALLENGES

Meeting the demand for Soldier readiness means that CECOM SEC can never sleep. Continuous integration and continuous delivery (CI/CD) methodology enables CECOM SEC to rapidly deliver stakeholder requirements while adhering to legacy maintenance policies.

Traditional military policies were designed with hardware in mind—vehicles, equipment or weapon systems—but software can be deployed in mere minutes. Legacy maintenance policies do not neatly accommodate software constantly being tested, updated, fixed or deployed digitally.

Deployment complexity for tactical network systems is also due to the Army's use of various networks with hectic connectivity challenges, different policies and several classification levels. Soldiers who require software patches are often located in austere environments, adding to the disarray.

To meet this challenge, CECOM SEC provides electronic software delivery through the continuously integrated C5ISR Software Repository. And yet ensuring that Soldiers have the most up-to-date software isn't the only obstacle on this fast-track highway: How does the Army effectively train Soldiers on continuously updated software?

CECOM SEC is smoothing this obstacle with another CI/CD tactic: embedded training, which starts with meeting users where they are.

"The training needs to be considered as early as possible in the development life cycle," said John Fry, CECOM SEC's field integration branch chief. "You need to have an understanding of what Soldiers already know and what they can figure out."

Sticking to its Soldier-tailored CI/CD approach, CECOM SEC is now building training directly into some systems. Embedded training allows Soldiers to learn software while actively using it instead of relying on external programs or solutions that can be costly and create downtime. Training occurs during workflow through a strategic user interface that integrates automated prompts, tool tips, pop-ups and interactive walkthroughs.

Encouraging units to learn by doing results in faster readiness, adaptability and operational efficiency.

From beginning to end, CECOM SEC is focused on meeting the needs of Soldiers in the field.

"CI/CD brings the user up front. We understand their environment, what the challenges are—and that gets fed into the development process—so systems become less maintenance-heavy, more user-friendly, with the capability still fully intact," said Fry.

FROM DEVELOPMENT TO DEPLOYMENT

CECOM SEC is the tip of the spear in the field. Fry's team consists of Software Readiness Officers (SROs) embedded with every division and corps in the Army. Whether in a company

MAINTAINING SOLDIER READINESS

Soldiers assigned to 3rd Brigade, 10th Mountain Division monitor footage from an Anduril Ghost-X Medium-Range Reconnaissance drone during exercise Combined Resolve 25-1 at the Joint Multinational Readiness Center, Hohenfels, Germany, on January 15, 2025. Embedded training allows Soldiers to learn by doing, resulting in operational efficiency and enhanced readiness. (Photo by Sgt. Chandler Coats, 5th Mobile Public Affairs Detachment)

or a member of division staff, these readiness officers are in the field daily, providing crucial technical support and ensuring that Soldiers are equipped with the latest patches. As the Army elevates users by integrating them into the development process, SROs stay closely engaged with the user community by supporting the entire software life cycle from development to deployment through ongoing user feedback, maintenance requirements and cyber updates. They support Army users and the software centers by ensuring operational readiness, while integrating digital modernization.

CECOM SEC validates that software capabilities are met before release by performing test runs with units in the field. Testing the software from a configuration and interoperability standpoint is key because of the challenges of the units' extreme environments. Staying informed at the earliest level of development allows CECOM SEC to make the most informed decisions early, resulting in prioritized fixes and improved user experiences.

In today's landscape, the Army views readiness partially through a prism of data-centric comprehensiveness that allows units to rely on real-time information for better decision-making. Data integration allows Fry's team to help units visualize their cyber health. Accessing, aggregating and visualizing it in a way that makes sense to decision-makers is critical for divisions that, for example, need to be prepared to speak to relevant indicators during logistics readiness reviews (LRRs).

CECOM SEC has been working with the United States Army Forces Command (FORSCOM) over the past year to help them create live data for their LRR. Typically chaired by the FORSCOM G-4 and corps and divisional commanders, the LRR is a comprehensive evaluation to assess and improve logistics readiness across units. For example, SROs embedded at Fort Bragg, North Carolina, work closely with FORSCOM headquarters to ensure that all data is uniform across divisions. The focus is on key areas such as equipment maintenance, supply discipline, property accountability and overall logistical support to confirm unit preparedness for deployment and sustained operations.

"Our tools are used at echelon, so FORSCOM commanders are leveraged the same real-time authoritative data for software maintenance accountability as a field maintenance shop," said Fry.

CECOM SEC's Data Analytics Readiness Team, in collaboration with SEC's Technical Services Directorate, recently created a Power BI decision support tool that provides senior Army leaders with real-time visual representations of critical programmatic data. The tool presents budget allocations, acquisition milestones and equipment deployment timelines in a central and assessable environment.

CONCLUSION

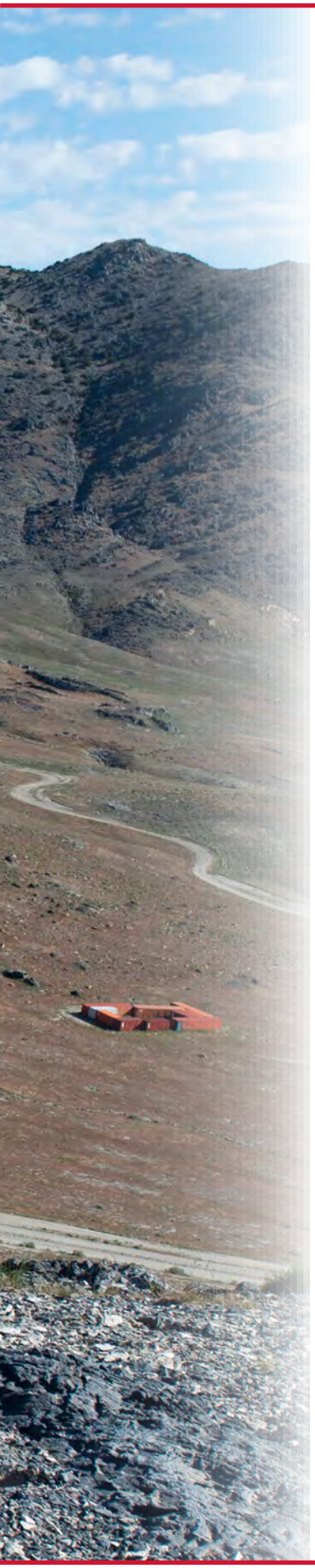
"The data environment in the Army is changing," said Fry. "We want to engage in and be able to leverage data sources from multiple entities, and we have to have a collaborative effort with folks within and external to CECOM to enhance unit readiness."

The battlespace evolves, but CECOM SEC sees it keenly. Adapting to Soldiers' needs—with a strong emphasis on meeting units where they're at—remains a core focus in the foreseeable future.

For more information, contact John Fry at ***john.fry23.civ@army.mil****.*

KEVIN DEEGAN provides contract support to CECOM as a strategic communications specialist at Aberdeen Proving Ground, Maryland. He holds a B.A. in journalism from Temple University and is certified as a Project Management Professional.

BETTER COMMAND OF THE BATTLEFIELD
A service member from the 19th Special Forces Group (Airborne), Utah National Guard, prepares for Exercise Hydra, May 8, 2025, at the Utah Test and Training Range. With the One World Terrain program, AI can automate tactical adjustments and suggest real-time tactical shifts based on evolving battle conditions. (Photo by Jaycee Baker, 151st Wing Air National Guard)



PREPARING FOR THE CYBER BATTLESPACE

The Institute for Creative Technologies is helping the Army make the most of AI in future warfare.

by Keith Brawner, Ph.D.

Just as steam engines and electricity once transformed industry, artificial intelligence (AI) is revolutionizing warfare—reshaping training, decision-making and cyber operations. The challenge, though, isn't just in developing and deploying AI, it's also in preparing our personnel to effectively work alongside it.

The conflict of the future will continue to be fought with weapons, but it will also require data, algorithms and intelligent automation, as well as the people who use them. The Army must prepare for a battlespace where AI-driven cyberattacks, battlefield decision-making and AI-based wargaming tactics are the norm—and they must prepare Soldiers and support staff for its use through immersive, personalized and, yes, AI-enabled training programs and tools.

Founded in 1999, and sponsored by the U.S. Army, the Institute for Creative Technologies (ICT), at the University of Southern California (USC), is a Department of Defense University Affiliated Research Center that is researching new simulations and learning technologies across all branches of service, including AI in all its forms. As the Army program manager for ICT, I have urged our labs to focus on AI almost exclusively over the past year—because it's what the military urgently needs to prepare for the future of warfare. They needed no encouragement, as AI and machine learning are now functionally part of every operational software system and every development environment within the Army. In fact, it was recently reported that roughly 30% of Microsoft's code is AI written and

their largest products are cloud services for AI items. Microsoft expects 95% of all code to be AI generated by 2030.

THE NEED FOR AI EDUCATION IN THE MILITARY

AI literacy is not optional—it's a mission-critical necessity. We're not just competing for technological superiority; we're ensuring our warfighters can wield these tools effectively. Many Soldiers and officers have only a surface-level understanding of AI, yet they will soon depend on it for everything from logistics to battlefield decision-making. Incorporating AI into military education curricula will ensure that future personnel possess the knowledge to effectively utilize their own tools and mitigate AI-enabled threats in both cyber and physical domains.

To that end, through the U.S. Army Research Office, the Artificial Intelligence Research Center of Excellence for Education (AIRCOEE) was established in 2023. AIRCOEE uses a three-pronged approach to address this knowledge gap by providing 1) adaptive AI tutors that can personalize training for each Soldier, 2) AI-accelerated tools that can update training materials as the Army innovates and 3) AI-assisted reasoning tools that can refine critical thinking skills. This work is not theoretical—it's being deployed across the force today through the following tools:

PAL3: An AI Tutor for Warfighters

One of our most impactful tools is Personal Assistant for Life Long Learning (PAL3). Designed for delivering continuous learning, it's an AI-driven tutor that provides interactive dialogues, coding hints and self-regulated learning support. It was previously used to maintain electronics-technician skills for sailors. Unlike traditional training, PAL3 prevents skill decay and keeps Soldiers AI-proficient between formal instruction sessions with interactive training resources that adapt in real-time. During an ongoing pilot program conducted as part of the USC Basics of Artificial Intelligence course in 2024, 200-plus students reported significant learning improvements. PAL3 is available through Google Play and the Apple App Store.

CYBER IS CENTER STAGE

Civilian professionals at Fort Sill, Oklahoma, are learning, in 2025, that leadership in today's Army doesn't just rely on experience and instinct—it also depends on the ability to adapt to rapidly evolving technology. (Photo by Edward Muniz, Fort Sill Public Affairs)

ARC: AI-Assisted Curriculum Updates

Doctrine and best practices evolve rapidly, but updating military curricula is slow and resource intensive. AI-Assisted Revisions for Curricula (ARC) was developed to automatically flag outdated content in training materials. Although it was originally slated for two test sites, there was sufficient demand such that ARC is now in use at seven Army training centers, including the Fires Center of Excellence at Fort Sill, Oklahoma and the U.S. Army Medical Command. Instructors rate ARC's productivity impact at 5.5 out of 6. It is a program that can change training curricula and requirements on demand, and those changes are then uploaded into PAL3 for delivery to students.

AWE: AI for Military Writing and Critical Thinking

Clear communication is as vital as firepower, but being able to clearly communicate is a learned skill. The Army Writing Enhancement (AWE) tool is an AI-powered assistant that guides Soldiers through argument construction and improves their writing. Unlike generative AI tools that do the writing for you, AWE coaches Soldiers before and after they write, enhancing both their thinking and communication skills. The system was initially tested at Fort Leavenworth, and AWE is now set for a 1,000-Soldier study in the fall of 2025, with early users reporting persistent improvements in writing clarity.

A DOUBLE-EDGED SWORD: AI-DRIVEN CYBERSECURITY

Modern warfare is increasingly fought in the digital domain, where cyberattacks can cripple infrastructure, compromise sensitive information and disrupt military operations. AI is playing a dual role in this space—as both a powerful tool for cyber defense and a potential threat when weaponized by adversaries. Cyberattacks today are evolving at machine speed. While traditional cybersecurity systems rely on human analysts to identify and

CRITICAL COMMUNICATIONS

U.S. Army Pfc. Luis Ramos, a signal operations support specialist assigned to Headquarters and Headquarters Battalion, III Armored Corps, verifies digital connectivity during the Headquarters and Headquarters Battalion Command Post Exercise II at Fort Cavazos, Texas, on February 24, 2025. In a battlefield environment, the signal element is crucial for higher echelons of command to communicate with their subordinate units. (Photo by Pfc. Ariana Smith, 7th Mobile Public Affairs Detachment)

mitigate threats, AI enables us to detect, analyze and neutralize threats faster than ever before.

The Social Simulation Lab at ICT, which models and simulates human social and cultural behaviors with AI systems, has achieved an 80% accuracy in our ability to detect AI-assisted decision-making in defensive cyber operations. This capability is vital because many cyberattacks now use AI to evade detection, exploit vulnerabilities and automate large-scale network breaches. AI-driven cybersecurity systems can identify anomalous behavior by scanning massive datasets in real-time to flag unusual activity that may indicate a cyberattack. AI-driven cybersecurity systems can also automate threat mitigation by first detecting threats and then isolating compromised systems, deploying countermeasures and preventing further infiltration before human intervention is required. AI-driven cybersecurity systems can also enhance deception techniques by creating decoy networks and faking data to mislead adversaries, buying valuable time for defenders.

As the Army integrates AI into its cyber defense systems, we must also prepare for adversaries who are leveraging similar technologies so we can use AI to go on the offensive. AI-powered cyberattacks are increasingly sophisticated, with the ability to launch adaptive phishing attacks that analyze human behavior and then craft highly convincing phishing emails that bypass traditional security measures. AI-powered cyberattacks automate zero-day exploits that autonomously discover and exploit software vulnerabilities before they can be patched and also use deepfake technology to manipulate battlefield communications, impersonate leadership and spread disinformation at an unprecedented scale.

AI INTEGRATION
AI is revolutionizing warfare—reshaping everything from training to decision-making to cyber operations. (Photo by googledeepmind, Pexels)

AI IN BATTLEFIELD DECISION-MAKING

Future military operations will rely heavily on AI-assisted command and control systems. These will be able to predict enemy movements, optimize logistics and

The Army must prepare for a battlespace where AI-driven cyberattacks, battlefield decision-making and AI-based wargaming tactics are the norm.

supply chains and enhance reconnaissance and surveillance. AI can analyze battlefield intelligence and historical data to generate real-time threat assessments. ICT directly utilizes this technology area to create digital red forces (representing the enemy) to predict and train against. A project is expected to begin in fiscal year 2026 to combine this capability, while also optimizing logistics and supply needs of the warfighters. AI ensures that troops receive supplies at the right time and place. Essentially, you have to model their movements before you can model the necessary logistics support for your own troops. Lastly, AI-powered drones can provide continuous battlefield intelligence.

ICT has a long history of interpretating satellite imagery and digital three-dimensional (3D) recreation of the battlefield in the form of its contributions that helped start the program of record, One World Terrain, under the Program Executive Office for Simulation, Training and Instrumentation. AI can automate tactical adjustments and suggest real-time tactical shifts based on evolving battle conditions.

WAR GAMES FOR THE DIGITAL AGE

To prepare for AI-driven cyber warfare, ICT has developed three strategic cyber games that enhance cyber defense training and are used by cyber professionals worldwide.

1. CounterNet – A single-player counterterrorism game that teaches Soldiers how to track and disrupt online terrorist networks.
2. Balance of Terror – A two-player strategy game where one side plays as the state and the other as a terrorist organization, teaching players how to balance stability, legitimacy and counterterrorism strategies.
3. Dark Networks – A social network analysis simulation that demonstrates how terrorist organizations structure themselves and how those structures can be disrupted.

A few of ICT's games have also become part of the Naval Postgraduate School Global ECCO (Education Community Collaboration Online) suite of training tools.

CONCLUSION

The AI revolution in military operations is not a distant possibility—it is happening now. From AI-powered training tools to cybersecurity defenses and autonomous combat systems, the Army is embracing AI to enhance readiness, improve decision-making and secure national defense. However, as AI's capabilities expand, so do threats. Our adversaries are investing in AI-driven cyber warfare, autonomous weapons and disinformation campaigns. Staying ahead requires continuous innovation, rigorous AI training for Soldiers and strategic partnerships with industry and academia. By integrating AI into every facet of military operations, the Army is not just responding to modern warfare's challenges, it is shaping the future battlespace. AI is not replacing Soldiers, it is empowering them to fight smarter, faster and more effectively. While AI-enhanced training and cybersecurity tools have already made an impact, there's still much work to be done.

The Army's next priorities should include: 1) scaling PAL3's AI-driven tutoring system for broader use across military training programs, 2) enhancing AI-driven threat detection to anticipate and counteract cyber threats before they materialize, 3) developing AI-powered battlefield simulations to train Soldiers for scenarios where AI plays an active role in enemy decision-making and commander decision recommendation and 4) advancing AI-assisted decision-making tools that can process battlefield intelligence and support rapid tactical adjustments.

AI isn't just a tool—it's a force multiplier that is reshaping warfare. By investing in AI-driven training, cybersecurity and warfighting strategies, the Army will not only defend against future threats but shape the battlefield to our advantage.

For more information, go to the University of Southern California's Institute for Creative Technologies website at ***https://ict.usc.edu****.*

KEITH BRAWNER, PH.D., is the program manager for ICT and senior scientist/engineer at the U.S. Army Combat Capabilities Development Command Soldier Center, where he is also the lead for AI initiatives. He holds a Ph.D. in computer engineering, focused on intelligent systems and machine learning; an M.S. in computer engineering; and a B.S. in electrical engineering, all from the University of Central Florida. He is the recipient of the National Training and Simulation Association Governors Award for Modeling & Simulation.

DANIEL R. SMITH

COMMAND/ORGANIZATION: Joint Program Executive Office for Armaments and Ammunition, Directorate of Integration

TITLE: Alternative sources of positioning, navigation and timing area lead

YEARS OF SERVICE IN WORKFORCE: 14

DAWIA CERTIFICATIONS: Practitioner in engineering

EDUCATION: M.E. in electrical engineering, Stevens Institute of Technology; B.S. in electrical and computer engineering, Lafayette College

AWARDS: Project Manager Combat Ammunition Systems, Engineer of the Year Award (2019)

BUILD ON YOUR SKILLS

Early in his career, Daniel Smith focused on standing out and completing tasks quickly and efficiently, an approach that served him well as he settled into new roles and learned the ropes. Since then, he's learned that, more often than not, achieving and pursuing new goals for the long term requires building a common understanding and skills among team members.

"If you want to go fast, go alone. If you want to go far, go together," Smith said. "I am now trying to make a conscious effort to share knowledge and tasking to build not only my own skills but the skills and capabilities of teammates." For example, he explained, he led a team in developing the Navigation Simulation Tool for Precision Guided Munitions (NavSim-P), an all-digital navigation simulation tool that enables the evaluation of plug and play of sensor simulators (i.e., global positioning system receivers, inertial measurement units, magnetometers, altimeters, etc.) and selectable Kalman Filter architectures (i.e., extended and unscented Kalman filters), enabling trade study evaluation and performance predictions for precision-guided munitions programs. After the first version was up and running, there were only two people (Smith and one other) who knew how to fully use the tool.

At first, he said, there were only a few requests for trade studies and analysis (decision-making activities used to identify the most acceptable technical solution among a set of proposed solutions), which they were able to quickly handle. But once news of the tool's capabilities began to spread, a few requests almost immediately turned into many requests and they became overwhelmed.

"Instead of the two of us working as fast as we could to complete the requests, we spent many hours not only teaching other engineers how to use the toolset but also about the inner workings and code within the toolset. Now that more engineers are involved, we not only keep up with the requests to run the tool but also actively develop more features. If we had just focused on completing tasking, we would have never been able to increase simulation capability."

In his role as the alternative sources of positioning, navigation and timing area lead under the Joint Program Executive Office for Armaments and Ammunition, Directorate of Integration, Smith aids in the maturation, demonstration and transition of Assured Position, Navigation and Timing (PNT) technologies into multiple precision weapon and munition programs of record and their respective firing platforms.

Accurate positioning, navigation and timing is necessary for the functioning of many critical infrastructure sectors. Smith is specifically focused on developing multi-source/multi-mode software-defined PNT receivers for rockets, missiles and cannon-based artillery. This development is aimed at outpacing the increasingly complex electromagnetic warfare threat. "Maintaining unencumbered access to trusted PNT is a crucial enabler for precision-guided munitions that rely on a PNT solution to traverse towards a target," he said. "Its importance provides motivation and satisfaction."

ENGINEER OF THE YEAR
Smith, middle, receiving the 2019 Project Manager Combat Ammunition Systems (PM CAS) "Outstanding Engineer of the Year" award at the PM CAS All Hands Meeting held at the Picatinny Arsenal Lindner Conference Center in December 2019. From left is Pete Burke, PM CAS; Greg Bischer, Precision Fires and Mortars (PdM PFM); Smith, PdM PFM; Lt. Col. Patrick Farrell, PdM PFM; and Col. Will McDonough, PM CAS. (Photo courtesy of Dan Smith)

Smith was hired directly out of college into the U.S. Combat Capabilities Development Command Armaments Center, focusing on guidance, navigation and control. "I was always fascinated by radio frequency navigation, and working in that group exposed me to the development and test of Global Positioning System (GPS) receivers for munitions," he said. Then, he got the opportunity to join the Precision Guidance Kit team as the U.S. Government GPS Responsible Engineering Authority and technically guide a joint contractor and government team to determine root cause identification and corrective action validation for several GPS-related failures. He was also able to experience much of the development and fielding of this item, as well as various product improvement initiatives increasing PNT resilience, such as anti-jam and anti-spoof improvements.

"That experience really fortified my interest in PNT and pointed out how reliant we have become on GPS as our primary and, often, sole source of PNT," he said. "I was then able to join the Joint Program Executive Office [for] Armaments and Ammunition Directorate of Integration, Assured Precision Weapons and Munition team, where we focus on 'pulling' and integrating cutting-edge PNT technology forward into programs of record to diversify and harden PNT capabilities."

Smith said most of his career development occurred through matrixed assignments to other organizations, including Program Executive Office/project management and science and technology organizations. "This has enabled me to gain valuable perspectives on the acquisition life cycle and recognize the criticality of all organizations in getting systems to the warfighter. I highly recommend others pursue similar rotations to better understand the acquisition life cycle and determine where they best see their skillsets thriving."

His advice for junior acquisition personnel typically revolves around being comfortable with "not immediately having the answers."

"Since they have spent roughly the last 20 years operating in the school mindset of 'If you don't immediately know the answer you fail,' junior personnel can often get discouraged and feel overwhelmed," he said. "I try to offer encouragement by reinforcing that engineers are in place to develop answers, construct solutions and fill knowledge gaps with their critical thinking skills."

Outside of work, Smith enjoys playing multiple instruments (trumpet, guitar and bass) and has been in a variety of bands over the years, ranging from high school and college concert bands to open mic events, graduation parties and small community festivals. Now, though, he plays just for fun. "Like work," he said, "bands consist of team members with different roles and the communication among members is crucial to overall group success."

—CHERYL MARINO

OPTIMIZING MILITARY EFFICIENCY

Integrating AI with continuous process improvement in the U.S. Army.

by Charles T. Brandon III, DBA

The U.S. Army is continuously evolving to enhance its operational efficiency, reduce costs and improve decision-making processes across the enterprise. One strategy to achieve this mission is through the integration of artificial intelligence (AI). By automating tasks, analyzing vast datasets and providing predictive insights, AI has the potential to streamline workflows, reduce redundancies and enhance readiness.

However, it is crucial to recognize that AI and automation can only be effective if the underlying processes have been initially optimized through formal process improvement (PI) methodologies. These practices, which seek to reduce costs and processing time, while increasing quality from the perspective of both the organization and its customers, are instrumental in ensuring that strategic objectives are met with greater precision.

In today's AI-era, it is critical to understand that PI methods and tools are no longer limited to yellow, green or black belts working manufacturing or transactional PI projects; anyone in the AI space needs to be acutely aware of the power of its tools and critical touch points in deploying effective AI. PI methods should be used as a way to lower or offset the cost of AI deployment through reduction of waste, process lead time and internal process costs.

The following explores the potential applications of AI and PI within the U.S. Army by examining specific use cases and addressing potential challenges and ethical considerations.

PROCESS IMPROVEMENT TOOLS AND METHODS

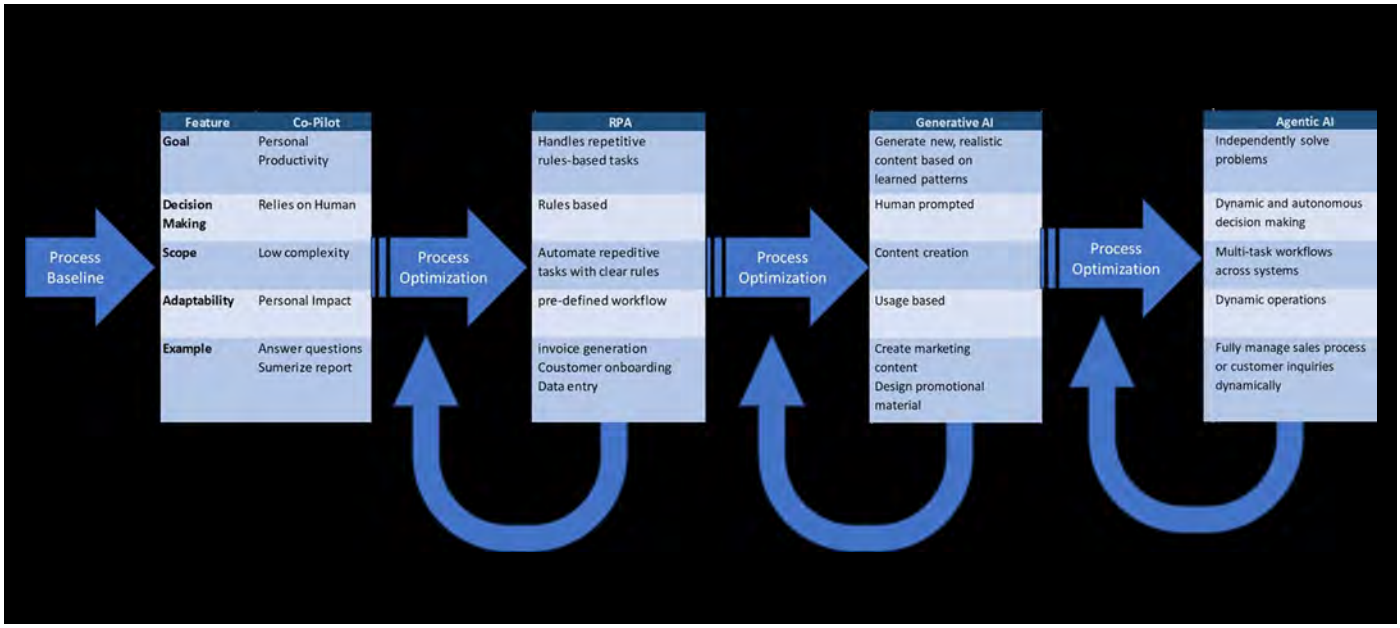
AI holds transformative potential across Army operations—from logistics and maintenance to intelligence and cybersecurity—but its success depends on first establishing strong, efficient processes through continuous process improvement (CPI).

For example, in logistics and warehousing, AI can forecast demand and automate procurement, yet maximum benefits are realized only after streamlining workflows using tools like define, measure, analyze, improve and control, as well as lean tools. These foundational efforts help eliminate waste and ensure efficiency before AI is introduced. Similarly, predictive maintenance and supply chain risk management become more effective when supported by standardized procedures and analyses such as failure modes and effects analysis.

AI could also revolutionize training by creating realistic simulations, providing personalized feedback and automating administrative tasks, leading to more effective training programs at a lower cost. However, maximum potential will be discovered when AI-driven personalization and simulation is paired with programs like Voice of the Customer feedback and Design of Experiments that ensure accurate and useful scenarios. Intelligence and decision-making processes also gain value from AI when data is first organized and standardized, resulting in better data quality and more actionable insights.

COLLABORATION ON INTEGRATION

Soldiers and Army civilians collaborate to integrate AI with continuous process improvement, enhancing operational efficiency and decision-making across the force. (Image by Denise Kovalevich, Office of the Army Chief Information Officer)



CONTINUOUS PROGRESSION

A visual progression of AI integration in Army process improvement—from co-pilot tools enhancing personal productivity to agentic AI enabling autonomous, dynamic operations—demonstrating how continuous process optimization supports increasingly advanced capabilities. (Image by the author)

Meanwhile, AI enhances threat detection, anomaly recognition and report generation only when built on optimized analytic workflows. In personnel management, AI aids recruitment and career development, but success hinges on prior PIs using stakeholder analysis and roadmap tools like swim-lane maps. Predictive analytics can assess readiness across health, training and performance metrics but should be preceded by improvements using tools like Kano analysis to ensure maximum benefit.

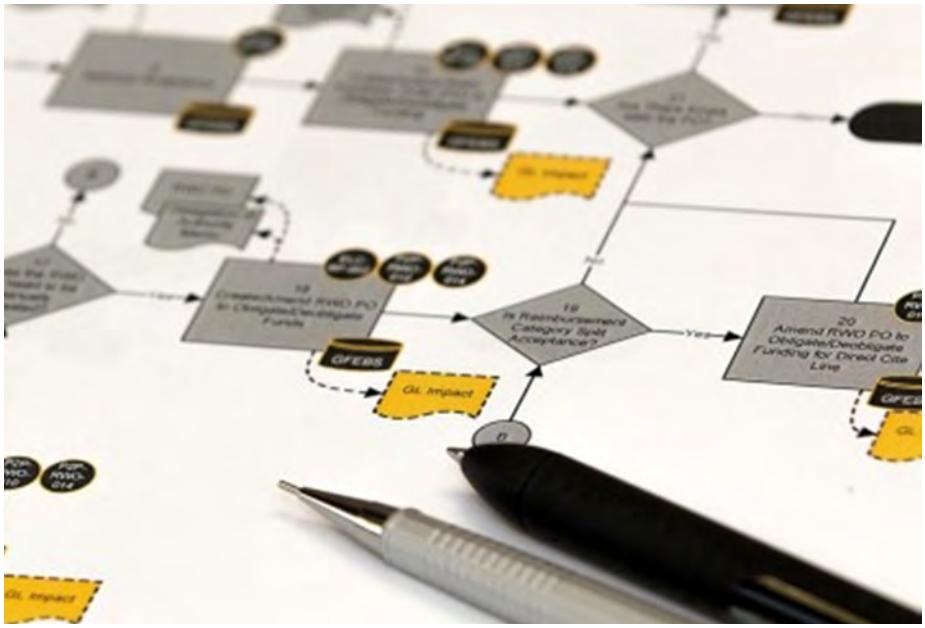
Finally, AI is becoming a crucial tool in strengthening cybersecurity, with capabilities like detecting intrusions, analyzing malware and assessing vulnerabilities. However, its effectiveness relies on prior PIs that establish strong baseline practices in network security and incident response. By integrating AI with PI methods—such as mistake proofing for intrusion detection, statistical control for malware analysis and Design for Six Sigma for vulnerability assessments—the Army can significantly enhance its cybersecurity defenses, ensuring more efficient, accurate and long-lasting protection against threats.

Together, these examples demonstrate how combining AI with CPI could lead to more reliable, cost-effective and sustainable outcomes across defense operations.

CHALLENGES AND ETHICAL CONSIDERATIONS

AI has the capability to revolutionize modern warfare by offering enhanced decision-making, automation and operational efficiency. However, these advancements also introduce significant challenges and ethical concerns if not properly addressed. AI development and deployment in the Army must be grounded in several foundational principles to ensure effectiveness, fairness and accountability. For instance, data quality and availability are critical, as AI algorithms depend on large volumes of high-quality information for training and operation. This requires the implementation of strong data governance frameworks, the definition of clear data quality metrics and ongoing efforts such

Ethical considerations in autonomous systems must be carefully managed.



MAPPING A PLAN

A draft process map sits on a desk in the U.S. Army Financial Management Command headquarters in Indianapolis, Indiana, on May 13, 2019. U.S. Army Financial Management Command's Business Process Management directorate completed a three-year mission of documenting and standardizing all of the Army's business processes impacting financial statements on October 1, 2020. (Photo by Mark R.W. Orders-Woempner, U.S. Army)

as data profiling, cleansing and the use of AI tools for continuous monitoring and validation.

Interpretability and transparency are also essential. Understanding how AI systems reach their conclusions is crucial for building trust and ensuring responsible use. The problem of "black box" AI, where decision-making processes are unclear or opaque, can be especially concerning in high-stakes situations. To address this issue, the use of simpler, more interpretable models—such as decision trees, linear regression and rule-based systems—should be prioritized, along with explainable AI techniques and feature importance analysis to enhance transparency.

Bias and fairness present another major challenge, as AI systems can inherit and amplify biases present in the training data. Addressing this requires careful curation of diverse datasets, implementation of bias detection tools and the establishment of mechanisms for continuous monitoring and human oversight to safeguard against unfair or discriminatory outcomes.

Finally, ethical considerations in autonomous systems must be carefully managed. As AI evolves, the possibility of autonomous weapons systems introduces serious ethical concerns regarding human control and accountability. Ensuring fairness, transparency and human oversight throughout the AI life cycle is essential, along with enforcing robust data protection protocols, security measures and continuous auditing to uphold ethical standards in all applications.

CONCLUSION

AI has the potential to revolutionize the U.S. Army by improving efficiency, enhancing decision-making and strengthening national security. However, it is essential to recognize that AI and automation can only be effective if the underlying processes have been optimized through formal PI methodologies. By addressing the challenges and ethical considerations associated with AI implementation, the Army can harness the full potential of this transformative technology to maintain its competitive edge. Strategic investment in AI research and development, coupled with a focus on responsible AI development and deployment, will be critical for realizing the full benefits of AI-powered PI within the U.S. Army.

For more information, contact the author at ***charles.t.brandon.civ@army.mil****.*

CHARLES T. BRANDON III, DBA, is the Army director for business process improvement and reengineering in the Office of the Chief Information Officer at the Pentagon in Washington, D.C. He holds a DBA in quality systems management from the National Graduate School of Quality Management, an M.S. in information technology from the American InterContinental University and a B.S. in economics from Alabama Agricultural and Mechanical University. The views expressed are his own and do not necessarily represent the opinions of the U.S. Army or DOD.

TEST SUBJECT

In a simulation, Navy Lt. Anh Nguyen, a master's student who is currently evaluating the use of the IVAS augmented reality software, initiates treatment of a wounded warfighter by displaying virtual hands that provide previously recorded guidance in the procedure. (Photo courtesy of Christoph Leuze, Nakamir Inc.)

NEXT-LEVEL REALITY

A new augmented reality tool will soon provide enhanced decision-making and training for medics and corpsmen.

by Gary P. Zientara, Ph.D., and Adam W. Potter, Ph.D.

A 21st century augmented reality visualization tool developed by the U.S. Army Research Institute of Environmental Medicine (USARIEM) will soon give medics and corpsman the ability to "see" 3D anatomy graphics and triage information as they are treating wounded warfighters in the field.

The potential benefits? The ability to assess and treat battlefield casualties more quickly and more effectively with fewer medical personnel, in addition to providing medical units with a 21st century training tool for enhanced training and increased readiness.

Initiated by the Defense Health Agency Small Business Innovation Research program in 2019, the USARIEM then designed augmented reality software for the Army's Integrated Visual Augmentation System (IVAS) as a wearable tool designed to provide enhanced training through high-tech visual capabilities for Army combat medics and Navy hospital corpsman. While wearing the IVAS goggles equipped with the USARIEM software, a medic or corpsman can visualize the internal anatomy of a wounded warfighter by projecting a morphed version of preprogrammed anatomy onto the real-world view of the warfighter.

The tool has already been demonstrated at several Army, National Guard and Navy sites, but is currently being evaluated for transition to the U.S. Marine Corps to help wounded warfighters.

BENEATH THE SURFACE

When the IVAS goggles are activated, the user can see the simulated internal anatomy of the whole warfighter and use brief verbal commands to select the anatomical systems that they wish to have displayed in their field of view overlayed on the view of the warfighter.

For example, if a warfighter sustains a leg injury, the medic or corpsman wearing the goggles can focus on the femur, tibia, fibula or any other bones or tissue affected in their visual scene to assist in decision-making, increasing the efficiency of treatment. Another key aspect of this software is that a user can pull advisory text from the Tactical Combat Casualty Care Quick Reference Guide and then list procedural information on the side of the field of view. This has the dual utility of providing more lengthy guidance during training and providing terse critical information that can be called up in combat as an instant refresh to the medic or corpsman.

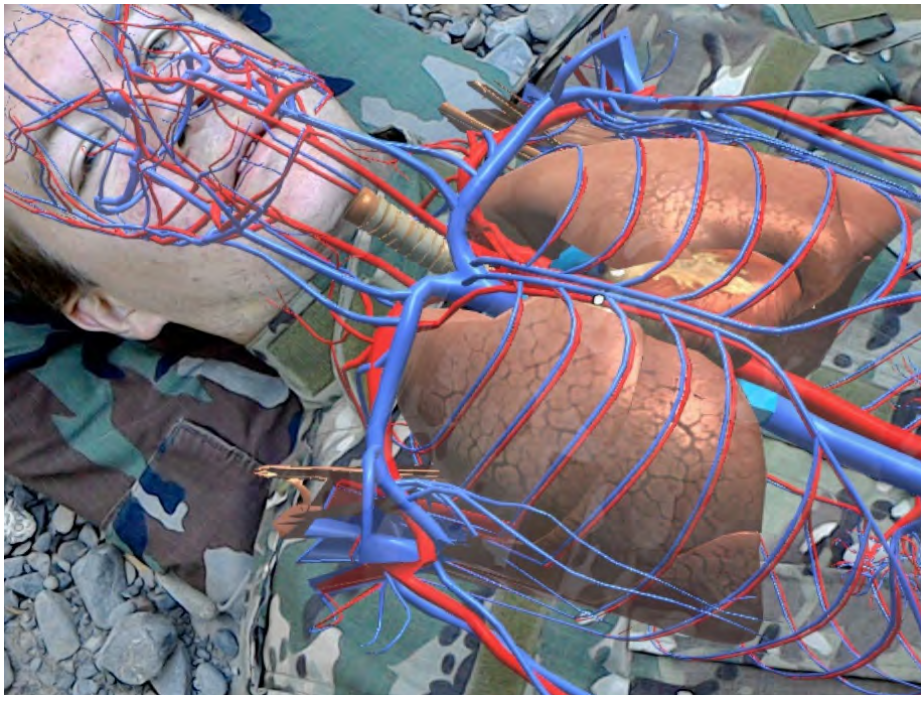
Recently, one of USARIEM's industry collaborators produced graphical guidance in the form of a virtual "expert" that appears in the user's IVAS field of view. The expert's hands are recorded by the user or a senior medical professional in a previous rehearsal session. Visible on IVAS, the hands can facilitate an expert training of the medic or corpsman and provide guidance for battlefield procedures that require prolonged field care.

TECHNOLOGY FOR THE FUTURE OF TRAINING

Navy Lt. Anh Nguyen, a student in the Cyber Systems and Operations Department at the Naval Postgraduate School, is studying the virtual expert software as part of his master's thesis, titled "An Evaluation of Perceptually Enabled Task Guidance to Enhance Training and Operational Effectiveness for the U.S. Marine Corps." Nguyen's ongoing study is quantifying the effectiveness of usage by providing just-in-time perceptual cues through visual and auditory feedback. In addition, he is recording his perceptions during use to explore the psychological and physical side effects of prolonged augmented reality system use.

IN FULL VIEW

In a simulation, a medic initiates treatment of a wounded warfighter with IVAS augmented reality software, overlaying the skeleton and cardiovascular system on the display view of the warfighter. (Photo courtesy of Christoph Leuze, Nakamir, Inc.)



LIKE HAVING X-RAY VISION

A simulation shows the medic's IVAS view of a battlefield casualty using the new augmented reality tool's anatomy display capability. (Photo courtesy of Christoph Leuze, Nakamir Inc.)

When the IVAS goggles are activated, the user can see the simulated internal anatomy of the whole warfighter.

Marine corpsmen, like Army medics, typically operate in unique and diverse environments based on mission requirements. Often serving alongside Marine infantry, corpsmen must complete specialized field medical training, in addition to basic medical training. Corpsmen can be relatively young, from 19 years old to their early 20s, as most enlist right out of high school. They receive their basic medical training at the Medical Education and Training Campus in San Antonio, Texas, where they learn their foundational medical knowledge, terminology, anatomy, physiology and lifesaving skills.

Corpsmen receive their specialized field medical training at the Field Medical Training Battalion (FMTB) at one of two locations—FMTB West at Camp Pendleton, California, or FMTB East at Camp Lejeune, North Carolina. This training qualifies them to become Fleet Marine Force hospital corpsmen. The FMTB schoolhouse teaches corpsmen specialized skills for operating within Marine units, providing combat medicine and tactical combat casualty care training. As corpsmen are often embedded with Marine units, their roles require them to be highly adaptable to meet both the physical and clinical demands of a combat environment.

Corpsmen, like medics, face complex environmental stressors—such as treating wounded warfighters while under fire. Cutting-edge technologies like the IVAS can augment their experience and provide additional aids for timely decision-making, including the virtual expert guidance, which can serve as a valuable source of supplemental training or a refresher. The IVAS does not require network or cloud communications and can function in all domestic and international environments. These technologies are designed to enhance knowledge and skill, but they are also created to not overwhelm or add to the stress of the user.

CONCLUSION

The main advantage of augmented reality software and goggles or glasses is the ability to put graphical and textual information directly into the field of view of the user at the moment it's needed. This approach is a powerful source of information not satisfied by old technology, hard copy manuals, training videos or other traditional training aids. The corpsmen and medic tool is designed to be an application of state-of-the-art technology to provide combat support for medical readiness and to support timely return-to-duty. It is a prime example of bringing information on demand, at any time and in any environment to the user, with the user in control of content and delivery.

For more information, contact Gary Zientara at ***gary.p.zientara.civ@health.mil*** *or 508-206-2416.*

GARY P. ZIENTARA, PH.D., has been serving as a senior research scientist at the USARIEM since 2014. His research includes the human digital twin and the development of photonics-based non-contact medical devices. He previously served as a research scientist at Massachusetts Institute of Technology and as an associate professor of radiology at Harvard Medical School and Brigham and Women's Hospital in Boston, Massachusetts. He holds a Ph.D. in physical chemistry from Cornell University and a B.S. in chemistry from Syracuse University. He did his post-doctoral research at Cornell University.

ADAM W. POTTER, PH.D., has been serving as a research physiologist at the USARIEM since 2010. Previously, he worked in inpatient medical research, managing more than a dozen drug and device clinical trials (Phase II-IV), and was active duty in the U.S. Marine Corps for six years. He holds a Ph.D. in biomedical informatics with a focus on clinical informatics and nanomedicine from Rutgers University-Newark; an MBA and an M.S. in sport and health sciences from American Military University; and a B.A. in psychology from Cambridge College. His research focuses on modeling and measuring human performance, specifically in response to environmental extremes and related to body composition and endocrinology. His scientific findings have resulted in more than 140 open literature publications and government reports.

MAP BREAK

Soldiers at the Tactical Systems Integration Facility at Aberdeen Proving Ground, Maryland, use digital planning platforms to project live geospatial, weather and force structure data onto a map. (Photo by Dan Lafontaine, DEVCOM C5ISR Center)

ALL ACCORDING TO PLAN

The digital planning tools of today prepare us for the battlefields of tomorrow.

by Michael "Reggie" Hammond, Earl Dean and Ryan Delts

At the core of every military operation is a plan, a careful orchestration of the movement of troops and materiel, the coordination of fires and the mitigation of risks—all according to the commander's intent.

The process of creating that plan, however, is not always so elegant. Planners are tasked with both anticipating the conditions of the battlefield and rapidly revising their estimates when unexpected factors arise. Even when a plan is ready for dissemination, the process of transferring it through the chain of command and converting its contents for use in tactical systems is slow and prone to errors.

Since the dawn of strategy, military leaders have sought to make the planning process faster and more flexible. The most recent push to do so in the U.S. Department of Defense, the Adaptive Planning (AP) initiative, has yet to truly take flight. Planning techniques have stalled since the millennium, relying on the same system of disorganized emails and document files, which not only serve as bottlenecks in the planning process but also bring into question how planners can harness emerging technologies like artificial intelligence (AI). The next generation of challenges that planners are facing requires a new set of digital tools—and the Army's Science and Technology (S&T) community is ready to provide them.

ADAPTING THE PLAN

In November 2001, then-Secretary of Defense Donald Rumsfeld and Gen. Tommy Franks conducted a review of Operation Plan (OPLAN) 1003, the contingency plan for the invasion of Iraq. As Robert M. Klein reviews in "Adaptive Planning: Not Your Great Grandfather's Schlieffen Plan," Rumsfeld and Franks discovered that the plan remained largely unchanged from the one used for the 1991 invasion of Kuwait and southern Iraq. Despite having been updated in 1998, the plan's assumptions and strategy were still outdated. Updating the OPLAN for a second time took approximately one year and four months to complete.

Dissatisfied with the lengthy process of updating OPLAN 1003 and responding to the time-constrained need for alternative courses of action (COAs) in Iraq, Rumsfeld issued a mandate to overhaul the existing planning process. The mandate aimed to better account for rapidly changing conditions in the operational environment, leading to the development of the AP initiative. The goals of the AP initiative were set forth in a 2004 study, followed by a series of two AP Roadmaps in 2005 and 2008.

A key aspect of AP is the concept of a "living plan," a plan kept continuously relevant through the periodic validation of its assumptions and data to reflect current conditions. If a plan is not regularly updated, it may become outdated and require extensive revisions, as was the case with OPLAN 1003. The AP Roadmaps identified that better technology, specifically planning software, is essential for creating living plans. At the time, plans were typically a disorganized collection of Microsoft Office and Adobe PDF documents. Transferring information from these files into tactical systems was a time-consuming process and a major reason OPLAN 1003 took 16 months to update and execute.

CONTINGENCY AND CRISIS

Fundamentally, the AP initiative aims to make the planning process flexible and rapid under all circumstances. To better understand this objective, it is essential to comprehend the types of planning that occur in the military. A primary distinction can be made between contingency and crisis planning.

Contingency planning, also known as deliberate planning, is a proactive process that requires planners to define long-term

Since the dawn of strategy, military leaders have sought to make the planning process faster and more flexible.

ON THE MOVE

Participants use analog planning tools to model terrain during Dynamic Front II, a joint artillery exercise at the Grafenwoehr Training Area in Germany. (Photo by Staff Sgt. Kathleen Polanco, 7th Army Training Command)

goals and design COAs to achieve them. It typically follows a highly structured and iterative development procedure, such as the Joint Planning Process or the Army's Military Decision-Making Process. As the Center for Army Lessons Learned discusses in "Military Decision-Making Process," these planning procedures are focused on creating tangible and refined final products. Contingency plans are developed at the combatant command level and support a wide range of operations, with the most complex taking the final form of an OPLAN.

When the conditions for execution described in an OPLAN are met, it is broken down into operations orders, which are disseminated to various echelons, outlining their responsibilities within the overall plan. This practice, known as crisis planning or crisis action planning, is a reactive process that responds rapidly to real-time conditions and challenges. Crisis planning is less structured than contingency planning. It involves the commander quickly determining the most suitable COA to pursue short-term goals or to capitalize on fleeting opportunities, based on current information and the objectives outlined in the contingency plan.

UPFRONT LEADERSHIP
Gen. Tommy Franks, commander in chief of U.S. Central Command, and former Secretary of Defense Donald Rumsfeld at a Pentagon briefing in March 2002. (Photo by Robert D. Ward, via National Archives)

TWO PIECES OF THE PUZZLE

Despite their differences in context, procedure and outcome, contingency and crisis planning are not mutually exclusive processes. In practice, they are complementary solutions to the complex problems planners face, and neither can be neglected for mission success. Contingency plans rely on assumptions to anticipate potential threats, enabling combatant commands to ensure that troops and materiel are prepared for operations. However, no plan can perfectly predict the actual conditions of the battlefield. Crisis planning serves to adapt COAs when goals and circumstances change beyond the assumptions of the OPLAN. It allows for planners to flexibly respond to time-sensitive scenarios where unexpected factors threaten control of the battlefield.

Although both capabilities are essential for protecting American interests, the planning teams' majority of time, resources and attention are currently devoted to crisis planning rather than long-term contingency planning. According to Robert S. Ehlers Jr. and Patrick Blannin in "Integrated Planning and Campaigning for Complex Problems," planning often occurs in rapid, ad hoc sessions conducted by temporary groups, rather than as a continuous procedure undertaken by a dedicated team. As a result, planning teams and their leaders tend to focus on immediate problems rather than long-term goals or unconventional strategies, as Michael J. Mazarr and several co-authors identify in "The U.S. Department of Defense's Planning Process: Components and Challenges."

In contrast to the AP Roadmaps' vision of an overhauled planning pipeline, contingency planning today continues to be a protracted and cumbersome process rather than an essential capability. The size and complexity of today's military operations mean that developing a plan from start to finish still takes around 24 to 36 months. While advances have been made in tools for force management and deployment, a similar tool for planning is yet to be widely used. Since plans continue to reside in Microsoft Office and PDF documents,

the time-consuming and error-prone procedure of transitioning information into tactical systems is still a major obstacle. If we allow our planning proficiencies to deteriorate, we risk ceding the ability to shape the battlefield to our enemies and stifling innovation in the face of new and evolving threats.

THE REVOLUTION WILL BE DIGITALIZED

It doesn't have to be this way. The solution to these challenges lies in digitalization: Reimagining the planning-to-execution pipeline as a unified platform in which data is centrally managed and can be instantly leveraged at every step of the process. As plans exist today, spread across disconnected files, they are computerized but lack integration with other systems. On a digital platform, all aspects of the planning process—mission analysis, mapping, modeling, wargaming, orders dissemination—happen in the same space. Elements of the plan exist as digital objects that can be easily ported between systems rather than static text trapped in document files. Transferring the plan's contents from planning systems to downstream tactical systems suddenly becomes a much smoother, faster task.

Digital planning doesn't bridge only the gap between systems, but also the distance between the war room and the battlefield. On a unified platform, planners, commanders and other stakeholders can seamlessly collaborate from anywhere in the world as if they were seated around the same paper map. Instead of splitting their communications across countless emails, PowerPoint presentations and shared drives, planners can use a single venue to develop, brief and execute a plan.

Digital platforms accelerate the planning process for even the most complex operations by integrating with authoritative data sources. Planners are continually fed with data on terrain, weather, unit readiness, materiel and other critical warfighting factors. These data streams are updated in real-time, removing the guesswork in assessing the conditions of the battlefield. In this way, digital tools finally make the AP initiative's "living plan" concept real, enabling planners to quickly make decisions based on the most up-to-date information possible.

CONCLUSION

The need for robust planning tools is just as important now as it was more than 20 years ago, when Rumsfeld started the AP initiative. The key to delivering on the promises of AP and unlocking the future of planning is digitalization—and the tools to enable it are ready and accessible now. The promise of digital planning isn't just a hypothetical, but a real, capability developed by the Army's S&T community that is ready for deployment today. These tools support the Army's vision for future command and control platforms, including modern warfighting advancements such as AI and edge computing. By embracing the digital planning tools being developed today, the military will be well-prepared for the battlefields of tomorrow.

For more information about a digital planning tool being used today, go to ***https://intellipedia.intelink.gov/wiki/Joint_Planning_Services*** *(CAC required) to learn more about Joint Planning Services, a project of the Geospatial Research Lab (GRL) of the Engineer Research & Development Center (ERDC) of the U.S. Army Corps of Engineers. To learn more about the Spearhead project at GRL and what's coming next in digital planning, go to* ***https://intellipedia.intelink.gov/wiki/Spearhead*** *or contact* ***spearhead@erdc.dren.mil****.*

MICHAEL "REGGIE" HAMMOND is the project manager for the Spearhead project at ERDC GRL at Fort Belvoir, Virginia. He is a retired Naval Officer with almost 20 years' experience in Joint and Army strategic/operational planning, including eight years in the Joint Staff's Joint Operational War Plans Division and six years with the U.S. Army Corps of Engineers. He holds an M.S. in national security strategy from the National War College and a B.S. in mathematics from the U.S. Naval Academy.

EARL DEAN is the deputy project manager for the Spearhead project at ERDC GRL. He brings eight-plus years' experience with Army acquisitions to the team. He holds an M.S. in systems engineering management from the Naval Postgraduate School, a B.S. in business administration from Franklin University and he is DAWIA Certified Advanced in program management.

RYAN DELTS is a computer scientist and configuration manager for the Spearhead project at ERDC GRL. He holds an M.S. in geoinformatics and spatial intelligence from George Mason University and a B.S. in computer science from the University of North Carolina Wilmington.

CONTRIBUTOR: ***George Wright*** *is a technical writer for ERDC GRL.*

A DIME FOR A CAROUSEL RIDE
DEVCOM CBC electrical engineer James Severtsen demonstrates how the DIMES are inserted into the carousel attachment on the FLIR Skyraider quadcopter. The quadcopter can then remotely drop the expendable microsensors to create a larger system of DIMES that work together to alert warfighters of nearby threats. (Photo by Ellie White, DEVCOM CBC)

DEPLOYABLE MICROSENSORS

The best chemical agent protection is knowing where not to go.

by Brian B. Feeney, Ph.D.

The best way to keep warfighters safe from chemical agents on the battlefield is to know whether an agent is present before they enter the area. That requires a new kind of sensor, one that can be placed on the battlefield in quantity ahead of time by drones or unmanned ground vehicles (UGVs) to form a meshed network that communicates back to command and control.

The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) found a new approach to acquisition to get this entirely novel approach to sensing fielded faster than the traditional acquisition cycle allows. To do this, the technology development team at the center changed the acquisition paradigm by shaping the requirements to best take advantage of an emerging technology, rather than develop technology-agnostic requirements and request bids from vendors. They were helped by the recent pace of sensor technological advances within academia and in the microelectronics industry. That, coupled with the Army's need for quickly evolving technology capabilities and developments, aided researchers in rapidly prototyping and experimenting with the new sensors. Thus, the center's Deployable Microsensors System Initiative was launched.

IDENTIFYING THE POSSIBLE

The initial challenge was posed by the Defense Threat Reduction Agency's Joint Science and Technology Office (DTRA JSTO) in 2019: "Was it possible to develop Chemical, Biological, Radiological and Nuclear (CBRN) sensors that could be smaller and expendable?" DEVCOM CBC Senior Research Chemist Alan Samuels, Ph.D., took up the challenge and developed a draft of his Leave In-Place Chemical Sensor (LIPCS) concept. The idea was shared with the chemical biological defense community,

which included a key member, the U.S. Army Maneuver Support Center of Excellence's Capabilities Development and Integration Directorate (MSCoE CDID) at Fort Leonard Wood, Missouri. They saw the value of the concept for warfighter early warning.

DEVCOM CBC Senior Research Scientist Patricia McDaniel, Ph.D., arrived at the center in 2020 from a Navy office that specializes in rapid research and development. She was looking for a technology initiative that would make a real contribution to warfighter protection. She immediately saw the potential of LIPCS but needed a tiger team to take on the challenge of operationalizing the concept.

FINDING ACE-IN-THE-HOLE RESEARCH PARTNERS

In 2021, using center investments, McDaniel devised a strategy to begin maturing the concept of an inexpensive, attritable family of sensors operated on battery power and capable of detecting chemical agents before warfighters enter an area. She reached out to DTRA JSTO, the original initiator of LIPCS, and persuaded them to partner with the center in advancing the effort. McDaniel then assembled a research team composed of scientists and engineers from across the center to tackle the problem using a wide range of technical expertise within a single research center.

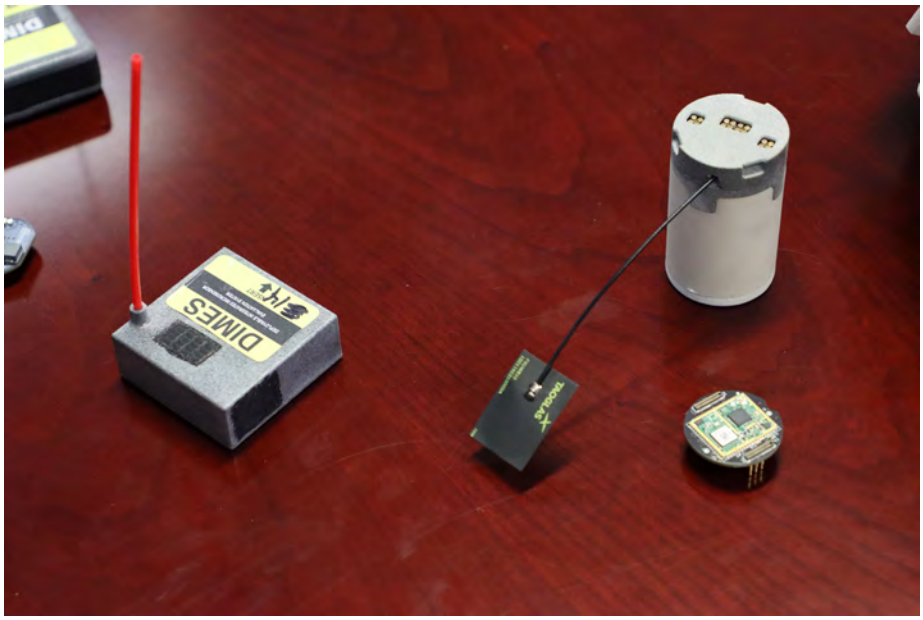
The concept needed to be fleshed out before the team could effectively develop prototypes, so the center assembled an interdisciplinary team of scientists and engineers to conceptualize a miniaturized microsensor and identify what was within the "realm of the possible." This interdisciplinary team followed a methodology for innovation the center created in 2019, called the Warfighter Innovation Leveraging Expertise and Experimentation (WILE-E). In 2022, the WILE-E team began by using the microsensors initiative's problem statements to break the research and development effort into manageable pieces to be addressed over six-month, two-year and ten-year timeframes.

establish an innovation incubator known as the Accelerator for Innovative Minds (AIM). DEVCOM CBC was able to use AIM as a mechanism for fast-track collaborations with vendors for sensor development.

DIMES proved itself as a leap forward in remote and wide area early warning capability.

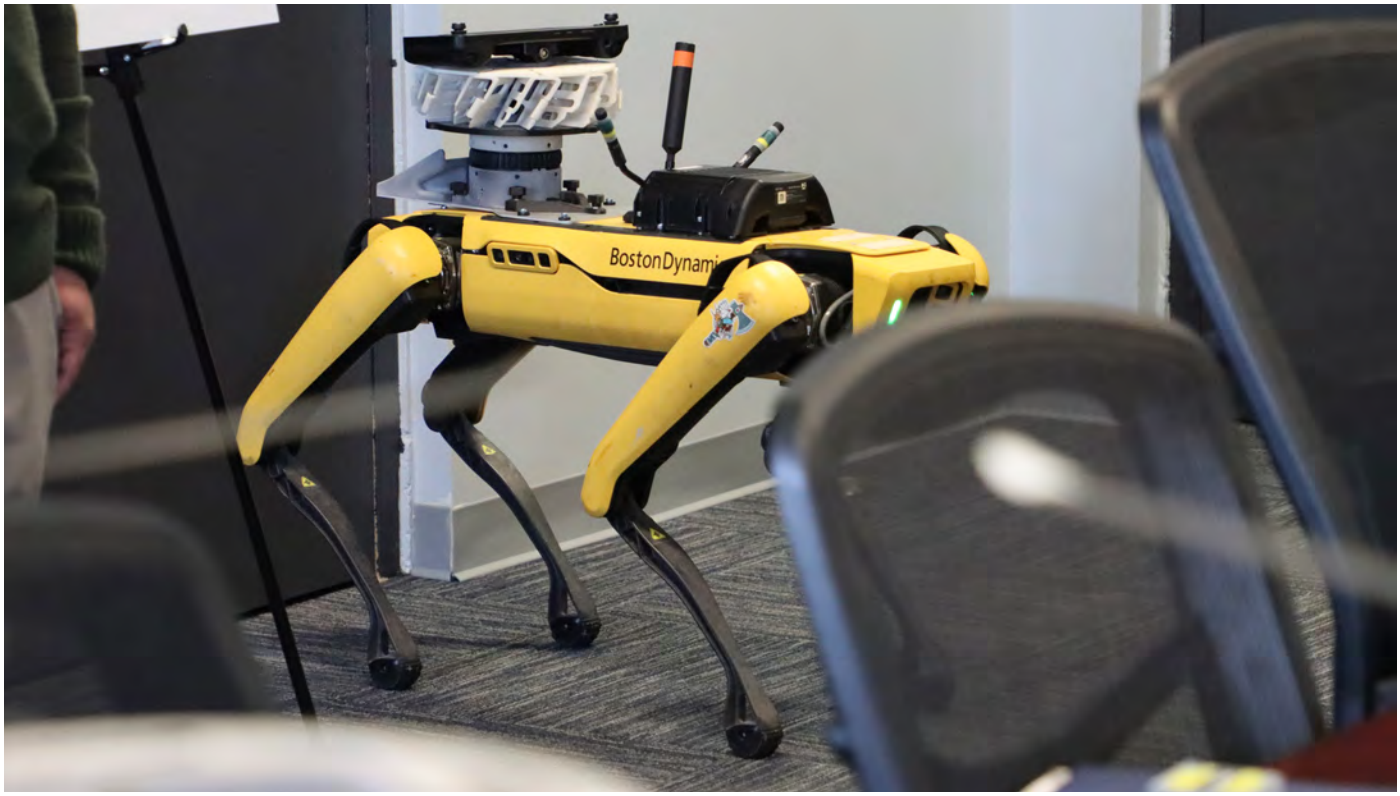
In the fall of 2022, the team turned to another partner, the U.S. Special Operations Command (SOCOM), for help finding technology developers to manufacture the sensor prototype. The center had worked previously with SOCOM to

AIM released a request for technology applications in the form of problem statements to be answered. The problem statements addressed challenge areas in the categories of "sensor," "micro" and "deployable." More than 40 small



SHAPE SHIFTING

DIMES has gone through many iterations. The design shifted from being cylindrical (as shown on the right) to rectangular (as shown on the left) to maximize space efficiency and increase the surface area of the printed circuit board. (Photo by Ellie White, DEVCOM CBC)



SEE SPOT DEPLOY
The UGV, Spot, carries the carousel designed to contain deployable sensors. The carousel attachment is compatible with multiple remotely operated delivery vehicles. (Photo by Ellie White, DEVCOM CBC)

businesses, laboratories and universities responded to this request. After reviewing the responses in early 2023, the team identified three sensor development companies to work on improving sensor technology and three sensor delivery platform developers to work with the sensor companies to build an integrated delivery vehicle.

An important partner in the WILE-E initiative was Design West Technologies, Inc. (DWT) of Tustin, California. Members of the WILE-E team knew that DWT had developed the novel "Drop-Puck" system for delivering material and decided that it was a promising platform for experimentation and demonstration with sensors. It can fly over an area and drop hockey puck-shaped sensors onto the ground in a designated pattern. The miniaturized sensors communicate in tandem through a wireless MESH network, enabling the system to communicate in the field by way of their proprietary command-and-control end-user devices. In early 2023, the WILE-E team held a field demonstration at Aberdeen Proving Ground, Maryland, to demonstrate the microsensor concept. The DropPuck system was integrated onto a Forward-Looking Infrared (FLIR) Skyraider quadcopter by the center's Engineering Directorate. Personnel from the MSCoE CDID attended the event and provided practical feedback from the warfighter's point of view.

In March 2023, DEVCOM CBC, again in partnership with DWT, executed a field experiment at Army Expeditionary Warrior Experiment 2023, an event that the MSCoE CDID hosts annually to test tactical concepts and capabilities in support of multidomain operations. The event was attended by a broad range of warfighters and yielded valuable end-user and expert assessor feedback on the concept's current strengths and on areas in need of further development.

BRINGING THE PIECES TOGETHER

To carry out field expeditionary experiments with Soldiers and rapidly adapt the system to address their feedback, DEVCOM CBC's Engineering Directorate designed and fabricated a modular microsensor demonstration prototype called the Deployable

A VIRTUAL VIEW
A MESH network device displays a virtual view of the puck array deposited by a quadcopter at the Army Expeditionary Warrior Experiments annual event at the Maneuver Support Center of Excellence at Fort Leonard Wood, Missouri, in March 2023. (Photo by U.S. Army)

Integrated Microsensor Evaluation System (DIMES). It is a series of playing card-sized packages, each one housing a commercial volatile organic compound sensing element, communications chip and power source. These sensing elements are a placeholder for future chemical agent-specific sensing technologies under development by the joint DEVCOM CBC-JSTO effort. These individual DIMES are then placed inside a circular dispenser called the carousel, so-called because it resembles an old-fashioned slide carousel. The Engineering Directorate designed the carousel to be integrated with either a quadruped robotic system, called Spot, that the technology developer, Boston Dynamics, designed, or on an aerial platform such as the FLIR Skyraider using a standardized DEVCOM CBC-developed interface.

The Deployable Microsensor Initiative initially focused on the technical advances of chemical sensors. However, before the team could take advantage of the low size, decreased weight and reduced power (SWaP) needs of a new generation of sensors, they had to solve the problem of inconsistent methodologies for evaluating sensor performance. That meant they had to continuously scan sensor development progress across academic, government and industry laboratories to find the best candidates to assess for feasibility. It also required them to develop standardized methodology that consistently assessed a variety of sensor technologies as the sensors continued to be improved. The team drew upon expertise within the center to develop sensor evaluation protocols to assess and then compare sensor results and development progress.

That was just the first part of what quickly became a multi-tiered effort. The team not only had to find the best way to identify and validate high-quality, low-SWaP sensor technologies; once the sensors were distributed and engaged in detection, they had to be able to send the detection data through a battlefield communications network so warfighters on the ground and their commanders would be alerted to threats in near real-time.

The DEVCOM CBC Engineering Directorate had the capability to rapidly construct advanced microsensor demonstrator prototypes and integrate them with a variety of delivery vehicles and communication networks. That way, the team could quickly see the strengths and weaknesses of each using warfighter feedback.

TAKING TO THE FIELD

Meanwhile, MSCoE CDID took lessons learned from the demonstrations and experiments to draft an Army Capability Development Document (CDD) that specifies the operational benefit that the technology provides. The CDD progressed from MSCoE CDID through Future Capabilities Command to Army Futures Command, where the validated concept was submitted to the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)). In August 2023, ASA(ALT) sent the Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense a letter designating it as the Office of Primary Responsibility for the maturation and acquisition of this technology. This designation moved the Deployable Microsensor System further down the acquisition cycle to becoming a recognized program of record.

By April 2024, the pace of the Microsensors program quickened further. The concept demonstrator was put through its

The technology development team changed the acquisition paradigm by shaping the requirements to best take advantage of an emerging technology, rather than develop technology-agnostic requirements and request bids from vendors.

paces in a series of field exercises starting with DTRA JSTO's Rio Robotico, a venue that allows technology developers an opportunity to operate autonomous vehicles outdoors in a variety of scenarios. At this event, prototype sensor systems were distributed in a variety of terrains in the West Texas desert, where sensor range, data throughput and overall communication was assessed.

The next stop was DTRA JSTO's Tenacious Dragon 2 (TD2) experimentation at Joint Base San Antonio-Camp Bullis, Texas, in July 2024. DIMES showcased its integrated early warning capability during the event. Participating warfighters concluded that DIMES proved itself as a leap forward in remote and wide-area early warning capability.

TD2 was followed by Beholder's Gaze in fall 2024. This event addresses integrated early warning capability needs in the U.S. Indo-Pacific Command, and the DIMES proved the value of an integrated system of systems for remote monitoring.

The next big test was Project Convergence Capstone 5, the U.S. Army's marquee technology modernization demonstration event, held at the National Training Center at Fort Irwin, California, in March 2025. The system demonstrated its applicability to two of that year's major themes: Data-Driven Decision Making and Expanded Maneuver.

CONCLUSION

The conventional Joint Capability Integration Development System approach to defining and validating requirements simply cannot keep pace with the rapidly changing technology landscape and dynamically evolving threats. A better approach is to design experiments to address prioritized capability gaps using the best available technology solution with the warfighters in their operational setting. This drives the refinement of the technical solutions, and the acquisition process adapts through agile development.

Samuels is very pleased with the results of the Microsensors program. "We showed the acquisition community that a new paradigm for getting an advanced technology into the hands of warfighters far faster is possible," he said. "We were able to demonstrate a technology that keeps the warfighter away from the threat altogether using a system that does not further burden them with more stuff to carry or more operational responsibility."

McDaniel agreed. "We proved the advantage of a new paradigm where requirements are informed by the science and technology communities using experimentation prior to finalizing the capability documents," she said. "This has been a cross-government effort involving several organizations, government agencies and private industry, coming together to make rapid development and fielding of a breakthrough concept happen. It was truly a team effort."

Next steps for the team are to identify the best-of-breed sensing elements and decision analytics for the microsensor and quantify its detection confidence. The team will also continue to investigate and improve the wireless MESH networking architecture and refine and improve the deployment system. Finally, they will work on discovering new concepts for how best to employ this technology.

For more information, go to ***https://www.cbc.devcom.army.mil****.*

BRIAN B. FEENEY, PH.D., is a public affairs specialist at the U.S. Army Combat Capabilities Development Command Chemical Biological Center, where he writes news and feature stories on the science and engineering achievements of the center's researchers. He has written for the center since 2014. He holds a Ph.D. in risk communication from Temple University, an M.A. in communications from Cornell University and a B.A. in history from Colorado College.

TODD TOWNSEND

COMMAND/ORGANIZATION: Joint Program Executive Office for Armaments and Ammunition; Project Manager Maneuver Ammunition Systems; Product Manager Small Caliber Ammunition

TITLE: Ammunition branch chief, 6.8 mm Next Generation Squad Weapons

YEARS OF SERVICE IN WORKFORCE: 22

DAWIA CERTIFICATIONS: Advanced in program management, Practitioner in engineering and technical management

EDUCATION: M.S. in management, Florida Institute of Technology; B.S. in electrical engineering, Rensselaer Polytechnic Institute; B.S. in physics, Roberts Wesleyan College

AWARDS: Certificate of Achievement (2024); Civilian Service Commendation Medal (2023); Superior Civilian Service Award (2014)

BE ADAPTABLE

Being adaptable is crucial in today's rapidly changing world. Whether in professional or personal lives, unexpected challenges and opportunities frequently arise—adaptability allows individuals to adjust their approaches, learn new skills and respond effectively to changes.

Todd Townsend, ammunition branch chief for 6.8 mm Next Generation Squad Weapons (NGSW), within the Joint Program Executive Office for Armaments and Ammunition, Project Manager Maneuver Ammunition Systems, believes this flexibility fosters resilience, innovation and continuous growth, making it a vital trait for success in any endeavor.

"Being adaptable is key," he said. "My job is about risk management and managing resources to meet an ever-fluctuating requirement. While the goal does not change, the path to get there is not a straight line; if I am not flexible or able to navigate the terrain, then it will be increasingly stressful."

Townsend leads a developmental program that is fielding a new caliber of ammunition to the Close Combat Force—the first time a new caliber, 6.8 mm has been introduced to the Army in over 40 years. "This is a part of a much bigger effort involving many stakeholders to successfully field a new rifle, automatic rifle, fire control and advanced ammunition," Townsend said. "This ammunition, common to both weapons employed by the Close Combat Force, will fill a capability gap that requires increased energy on target at range to defeat current and emerging peer and near peer threats."

Prior to his role as the 6.8 mm branch chief, Townsend was the branch chief for the entire Small Caliber Research and Development (R&D) team. As NGSW Ammunition became a larger effort, he said he focused his efforts on 6.8 mm ammunition. Based on his experience with the legacy caliber R&D (5.56 mm, 7.62 mm and .50 cal), he was able to leverage many of the capabilities being developed.

"I enjoy the combination of pushing technical maturation, developing and executing programs to move from development into qualification and production, all with the goal of delivering new capability to the U.S. Soldier," he said. "It's rewarding, working side by side with Soldiers and industry, while leading a team of highly capable teammates."

Townsend said what most people find surprising is the length of time it takes to go from concept to fielding. "Even fast programs can take many years due to the high bar of meeting technical requirements and safety," he said. But he's been lucky to work on multiple programs that have been successfully fielded, including 155 mm Excalibur and M80A1 7.62 mm Enhanced Performance Ammunition.

In 2003, Townsend began his career in Quality Engineering and System Assurance for the 155 mm Excalibur program in a role where he was able to work quality, overall programmatics, requirements, test and evaluation and risk management.

"I enjoyed gaining and developing broad expertise while supporting the Excalibur program and continue to expand my acquisition knowledge in my current role," he said. "There is never a dull moment as each program has its own unique challenges that require new and adaptive ways to overcome and meet the mission—delivering ammunition to the warfighter."

The most important points in his career, Townsend said, have been engagements with industry; much of the work he and his team does is made possible through collaboration and cooperation with industry partners.

"Early in my career, I was able to spend 18 months at the Raytheon facility working on the Excalibur project. Being a part of the daily engineering discussions helped me better understand the challenges that industry faces meeting their contract and program obligations. I was a part of engineering, configuration management, daily staff calls and leadership level discussions," he said. "I wish I had taken an opportunity much earlier to do a rotation at the Pentagon as I imagine it would have provided a breadth of opportunity to participate in efforts at a much different level."

An Insights course, in 2018, provided Townsend and others from his leadership with valuable instruction about different communication styles. The focus, he said, was to understand his own style, but just as importantly, to identify and understand the style of others so he can adapt to communicate with them efficiently and effectively.

"My boss was in the course with me, and I think we both left with a greater sense of how to better communicate with each other," he said. "I learned that I need to approach him with more detail and supporting data for ideas and to expect probing questions to understand a recommendation or path the program is taking."

His advice for junior acquisition personnel is to regularly develop their communication skills, with the right level of detail for the audience based on written and oral communication. "The level of detail you give to the product manager is different than the program manager, which is different than a general officer," he said. "Additionally, learn how to create presentations that clearly provide the message without unnecessary detail. This is something I strive to work on for myself and with my team."

Outside of work, Townsend is an avid DIYer who likes to build, fix and create. In 2022, he and several partners turned their interest in homebrewing into co-owning a commercial brewery called Double Tap Brewing in Whippany, New Jersey. "I think the commonality with work is that big projects are achievable if you have the right team. The partners in the brewery are multidisciplined—engineering and program management, a lawyer, an electrician—and all of us were avid homebrewers," he said. "By taking a team approach across disciplines, we were able to achieve the momentous task of opening a brewery. Similarly to working for the Army, there were many challenges along the way we had to overcome."

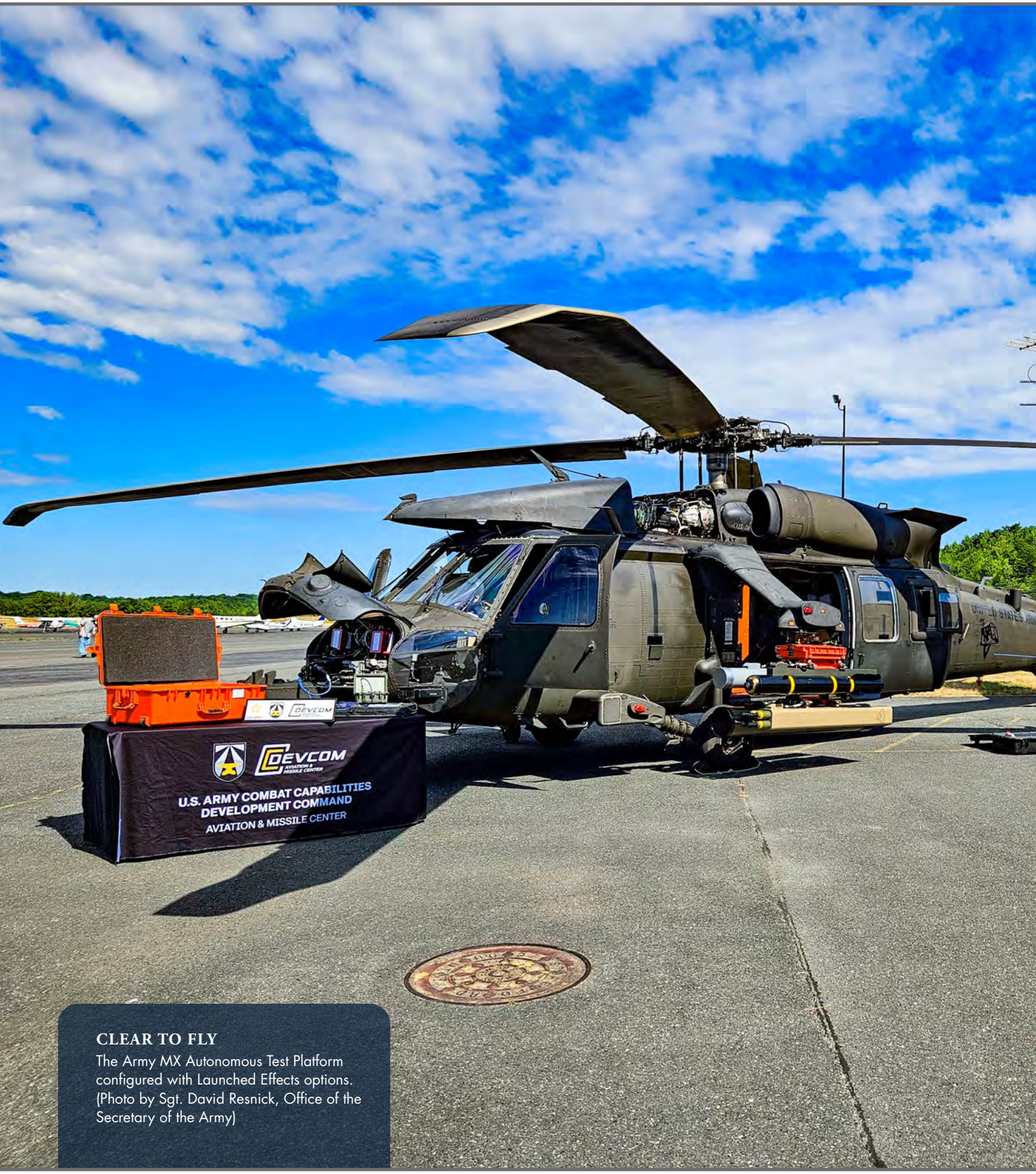
6.8 DAY

Townsend, middle, with Art Fiorellini, left, Project Manager Soldier Lethality, and John Conway, right, DEVCOM AC, at a team picnic celebrating "6.8 Day" in honor of fielding the 6.8 mm NGSW and Ammunition at Picatinny Arsenal. The event scheduled for June 8 was held on June 13, 2024, due to the weekend. (Photo courtesy of Todd Townsend)

He said in addition to being adaptable, "It's all about teamwork."

"At home it's a team effort with my wife and family. At the brewery, it's ensuring my partners and I function as a team. At Picatinny, it's about building a team culture within my office, the users [Soldier Lethality Cross Functional Team] and industry partners to accomplish our mission."

—CHERYL MARINO



CLEAR TO FLY
The Army MX Autonomous Test Platform configured with Launched Effects options. (Photo by Sgt. David Resnick, Office of the Secretary of the Army)

CORRECT BY **CONSTRUCTION** FOR LSCOA

A new take on an old technique is neutralizing cyber threats before they materialize.

by Col. Trent Mills, Maj. Nikesh Kapadia and Robert Price, Lt. Col., USA (Ret.)

Are we willing to accept the risk of adversaries adapting cyberattack tactics, techniques and procedures (TTPs) faster than we can push new software updates? Are we willing to expose the warfighter in comms-sensitive environments to the risk of unverified software updates that may break their system?

In today's dynamic digital environment, these questions demand foolproof solutions. Yet the DOD has been conditioned to accept vulnerable software. We have resigned ourselves to a learned helplessness that defaults to applying patches after discovering software vulnerabilities. In protracted, large-scale combat operations (LSCO), this resignation will translate into catastrophe on the battlefield. However, solutions exist now to secure Army systems. It's just a matter of knowing what they are and how to apply them.

URGENT NEED FOR SOFTWARE FORTIFICATION

The continued success of our Human-Machine Integrated Formation efforts, highlighted at the Project Convergence Capstone 5 demonstration in March 2025, will paradoxically invite our adversaries to strike where we are weakest: Our networked computers on wheels and ubiquitous uncrewed systems. Our creativity and willingness to integrate robots and advanced software into our formations will provide additional attack surfaces for our adversaries to exploit.

In July 2024, the former Army Secretary, Hon. Christine Wormuth, flew on a fully autonomous UH-60A called Aircrew Labor In-Cockpit Automation System (ALIAS),

a program run by the Defense Advanced Research Projects Agency (DARPA) and transitioned to the Program Executive Office for Aviation in December 2024. When the flight ended, she approached the Army's own autonomous UH-60L test vehicle (MX) outfitted with the latest launched effects capabilities. Her first question was how to protect the autonomous systems from being hacked and used against us. The DARPA director at that time, Stefanie Tompkins, told Wormuth about a DARPA program called High-Assurance Cyber Military Systems (HACMS). HACMS proved unequivocally that a Boeing unmanned little bird (H-6U) and a commercial off-the-shelf (COTS) quadcopter circa 2017 could be protected from attacks even when the hackers had full access to the system for months using formal mathematical methods, also called formal methods. Last year, the Army applied formal methods to secure a Polaris MRZR in another DARPA test under the program, Assured Micropatching. These examples of collaboration join several others over the past decade, but their successes are disparate, small-scale and largely unharnessed by the services.

WHY FORMAL METHODS, AND WHY NOW?

For years, industry has used formal methods to verify software, but these capabilities are rarely scaled to DOD challenges. However, early DARPA-Army partnerships have pioneered how formal methods can secure cyber-physical systems: Think military systems that are a complex integration of analog, software and hardware components working together to deliver a warfighting capability. Formal methods are mathematically rigorous techniques that ensure code is free from errors and, thus, cyber vulnerabilities. For those who don't speak in terms of parsers and kernels, formal methods are the checklist and mathematical proofs (i.e., guarantees) that ensure a system does what it is specified and verified to do.

When building a bridge, instead of hoping it will not collapse, the engineer uses strict mathematical calculations to prove it will not. Before DARPA's advancements, such tools for existing software development pipelines were out of reach. Today, they're within reach and when applied to an Army system like the MRZR, formal methods demonstrated that even if a red team hacked the system, the hacker could not make the MRZR do something the blue operator did not approve.

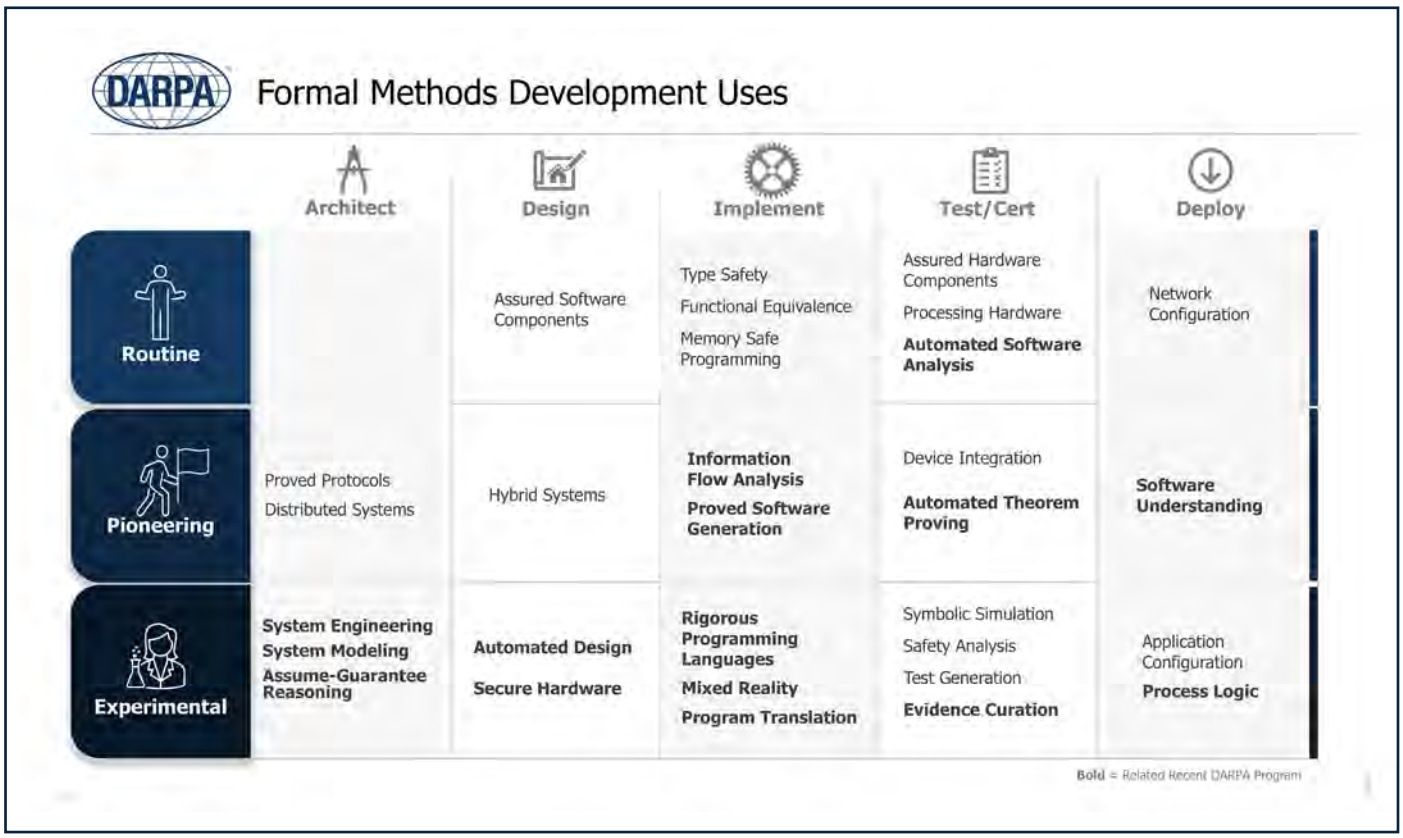
Recent advances in formal methods tools, practices, training and ecosystems, combined with dramatically increasing computing capabilities, make applying formal methods at larger scales more affordable than ever. Today, various U.S. government agencies and industry leaders invest in formal methods due to the growing reliance on software and hardware in critical systems, such as space and aircraft flight control, critical infrastructure, communication security and medical devices.

The Army can leverage investments made by DARPA's Resilient Software Systems portfolio to secure systems:

- **Assured Micropatching (AMP)** tools sustain binary-only embedded software and firmware for which source code is no longer available.
- **Automated Rapid Certification of Software (ARCOS)** automates the evaluation of software assurance evidence to enable certifiers to determine the risk of software deployment is acceptable.
- **Cyber Assured Systems Engineering (CASE)** tools provide necessary design, analysis and verification tools to allow system engineers to design in cyber resiliency.
- **SafeDocs** tools verify data coming in and out of systems and their components.
- **Verified Security and Performance Enhancement of Large Legacy Software (V-SPELLS)** tools enable modernization of large legacy software systems.

The Army can help guide the operational direction of DARPA's new assurance programs:

- **Assured Neuro Symbolic Learning and Reasoning (ANSR)** develops novel algorithms that integrate contextual understanding to build safety and trustworthy military systems.
- **Pipelined Reasoning of Verifiers Enabling Robust Systems (PROVERS)** makes formal methods accessible to the engineers and integrates tools into the design process.
- **Safe and Assured Foundation Robots for Open Environments (SAFRON)** seeks new approaches to ensure Foundation Model-controlled robots perform as directed by warfighters.
- **Securing Artificial Intelligence for Battlefield Effective Robustness (SABER)** seeks to operationalize adversarial-AI techniques and red teams to assess emerging military systems.



PROCESS FOR SUCCESS

DARPA's Resilient Systems Portfolio consists of programs with a shared vision to increase the survivability of our military systems. This chart highlights examples of formal methods techniques based on maturity level (vertical axis) and ways to implement them (horizontal axis). (Graphic courtesy of Matthew Wilding, DARPA)

THE ARMY PREPARES FOR THE NEXT FIGHT

In 2016, the HACMS "edge" case included a malign actor using a USB stick to hijack an Army system. At the beginning of the program, the HACMS red team could hack into the H-6U onboard flight-control computer and take control of the entire system. Then, the HACMS blue team modified the H-6U using formal methods and gave the same red team six weeks of unfettered access to the H-6U. They couldn't hack it. The red team was then given access to a non-essential partition of the helicopter as a way in, but the red team could not expand access or disrupt operations. In other words, the front door of the bank was open, but they did not have the combination to the vault. Perhaps more importantly, the safety pilots of the H-6U did not know the system was hacked as it maintained full functionality. To demonstrate durability of the solution, DARPA offered the same HACMS 2016 quadcopter to hackers at the premier defense hacking conference, DEF CON, for another go. They also failed.

Formal methods can secure DOD systems now. If inclined, the Army could proactively apply formal methods to the Autonomous Resupply Vessel before it rolls off the production line, or the Navy could reinforce the 240-ton DARPA autonomous vessel called USX-1 Defiant (conducting sea trials in 2025). But the scope doesn't have to be limited to just future systems; rather, formal methods can be applied to legacy systems warfighters rely on today.

Formal methods can minimize software updates for network-connected capabilities. Doing so would increase survivability by extending the time Army systems can operate in no-comms environments.

"Formal methods are the best route to shift security from a reactive practice to a proactive guarantee that we can build upon to

gain advantages in the DOD," said Mark A. "Al" Mollenkopf, science advisor to the U.S. Army Cyber Commanding General.

The Army can make protracted LSCO possible—think secure and survivable weapons systems, transport platforms, critical infrastructure and lines of communication that are ready for the next fight.

Rapid action to implement formal methods tools in current and future systems can dramatically reduce the DOD's software vulnerabilities. In fact, DARPA estimates that broad application can eliminate 80 to 90% of our military's cyber vulnerabilities.

"Formal methods application should start at the outset of the formal requirements process to secure our weapons systems and other platforms," said Maj. Gen. Jake S. Kwon, director of Strategic Operations, Headquarters, Department of the Army G-3/5/7. "We can ill afford to retrofit our weapons systems after they're fielded. As formations continue to experiment with COTS solutions and coding at the edge, formal methods provide a clear advantage in securing our innovation efforts."

ASSURANCES IN THE FUTURE OPERATING ENVIRONMENT

Although formal methods offer many benefits, they are not a silver bullet. The adversary has a vote and is already enhancing their cyberattack TTPs.

Future Army systems increasingly rely on artificial intelligence (AI)-based technologies to propel the capabilities of robotics and decision support tools towards the complex military scenarios in the future. However, large neural network architectures and foundational models create new opportunities for adversaries to corrupt data feeds and exploit underlying algorithms. DARPA is exploring how we can secure these emerging AI technologies. Moreover, the Army can help them understand the future operational concepts and lean forward on new requirements to build assurances for our future military systems. These assurances will ensure that military AI-based systems perform as expected in complex and dynamic battlefields.

CONCLUSION

The Army and DARPA are collaborating on a capstone application of formal methods. Instead of a single platform, the Army is considering an entire acquisition line. The Air Force and Navy are also participating. In the aggregate, these capstone efforts will signal that the DOD Enterprise understands the software vulnerabilities underpinning the Interim National Defense Strategy and supporting warfighting concepts, and serves as a leap forward in creating learned resilience across the joint force.

For more information, go to ***https://www.darpa.mil/research/research-topic-spotlights/formal-methods****.*

COL. TRENT MILLS is the Army advisor to the DARPA director. He is an Army strategist with a Ph.D. in rhetoric from Georgia State University, and holds an M.A. in national security and strategy from the Naval War College, an M.A. in English from Washington State University and a B.A. in English from Gonzaga University. He has a deep background in modernization efforts for the land domain (U.K. and U.S.). His previous assignment was with the Director of the Army staff.

MAJ. NIKESH KAPADIA is a DARPA innovation fellow leading fundamental science research towards Army operational challenges. He is an Army FA-49 (Operations Research and Systems Analysis) officer with an M.S. in systems engineering from the University of Virginia and a B.S. in mechanical engineering from the U.S. Military Academy.

ROBERT PRICE, LT. COL., USA (Ret.), is completing his 15th year as a systems engineering and technical advisor supporting the DARPA Director's Office. He holds an M.S. in information technology management from Colorado Technical University; an M.S. in international relations from Troy State University; an M.S. in data analytics and policy from Johns Hopkins University; and a B.A. in psychology from the University of Virginia. Before retiring, he served two tours on the Army staff, contributing to critical digitization efforts in the G-3/5/7 and Program Objective Memorandum development in the G-8.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ALICIA E. CORREA

COMMAND/ORGANIZATION: Joint Program Executive Office for Armaments and Ammunition, Project Manager Close Combat Systems

TITLE: Project management officer

YEARS OF SERVICE IN WORKFORCE: 17

DAWIA CERTIFICATIONS: Practitioner in engineering and technical management

EDUCATION: M.S. in engineering management; B.S. in industrial engineering, both from New Jersey Institute of Technology

TAKING MEASURES

From quality engineer to project management officer, Alicia Correa attributes her career achievements to the invaluable lessons she learned along the way.

The first lesson, she said, is the importance of a team. "You never have to figure things out on your own," she said. "There is a huge network of mentors and people who came before you who are knowledgeable and willing to help you achieve your goals, people who possess different skill sets or experiences who can help you accomplish a task and even influence your career. Building those connections is important not only within your career, but also for your personal growth."

This leads to Correa's second lesson: the importance of constantly pursuing self-growth. "What you think you want today may not be the same in five years. What measures are you taking to evolve? It is important to always strive to improve and avoid remaining stagnant."

Correa noted that so many people grow conformant in their roles but never seek to expand beyond what they already know, so "they stay in the same position for 30 years." Obtaining advanced training and diversifying your knowledge base can add value to your career and to your life, and she recommends "seeking new opportunities in areas that challenge you, such as developmental assignments," which can help broaden your resume and expand your skill set.

"I know that I have so much more to learn, and I lean on my mentors and the wide range of advanced trainings to continue to define my career objectives," she said. "By doing so, I can continue to achieve milestones in my overall success."

As a project management officer, Correa's main responsibility is to manage the schedule, cost and performance of the 66 mm vehicle-launched smoke grenades and the launched electrode stun device programs within Project Manager Close Combat Systems (PM CCS), Joint Program Executive Office for Armaments and Ammunition (JPEO A&A). The 66 mm vehicle-launched smoke grenades offer obscuration screening to protect Soldiers and vehicle platforms from enemy detection and improve their survivability within multidomain operations.

"The performance of these obscuration grenades could be the determinant on whether someone's family member makes it back home from completing their mission," she said. "I have family members serving within the U.S. Army, and other branches of the U.S. military, and I take their safety very personally."

"My aim is to encourage young adults in pursuing careers in engineering."

Serving within this role, Correa also works with sister services (U.S. Marine Corps, U.S. Air Force and U.S. Navy) as the single manager for conventional ammunition, ensuring collaborations with multiple stakeholders from different organizations.

"Collectively, our mission is to ensure that product is ready for fielding, and that we create and maintain a plan to sustain and refresh these products over their life cycle," she said. "My role is critical in providing the best capability possible to the men and women who put their lives on the line every day to serve and defend our Nation. We are not all on the battlefield, but we can all do our best to contribute to their success."

Correa's Army career began with an engineering role at Picatinny Arsenal in New Jersey in 2007. "I was eager to find a promising career in engineering, so when my friend from college mentioned she referred me to her supervisor, it was music to my ears," Correa said. At the time, she was working at a small company as a quality manager with only 75 employees, but knew she wanted more in the long run.

"I tried my luck and sent my resume to the branch chief and within months I started as a quality engineer in the DEVCOM Armament Center Small Caliber Ammunition Branch," she said. "This was a great opportunity for me as it provided me so many development opportunities, taught me about leadership and furthering myself through advanced training."

Correa has taken three courses in leadership development through the University of Pennsylvania Certificate Program, the last being in April 2024 called "Sensemaking and Judgement."

"This course taught me about critical thinking and developing good cognitive habits to enhance problem-solving and decision-making skills," she said. "One of the things that I gleaned from this course was learning about metacognition—my mind's ability to be aware of its own thinking. We often treat problems from our own biases, which can lead to jumping to conclusions. However, learning about how these biases influence our decisions can help us to pause long enough to think and apply sensemaking to reach the best conclusion. This was a great course and I would highly recommend it to anyone seeking increased self-awareness and refining their leadership skills."

An advocate of JPEO A&A's mentorship program, Correa believes that advising junior acquisition personnel is vital. "I was super inquisitive when I started as a project officer, asking questions about all products, processes and even people. I believe that much of the information we know about executing our jobs isn't captured within documents or work procedures, which is why sharing what we know is so important."

For example, Correa said recently a new team member was responsible for preparing and managing a Program Management Review (PMR) and had to coordinate with stakeholders from several different agencies. Constant communication was essential to obtain the latest program updates to be reported for this audience.

This was overwhelming, she said, but in "sharing information from previous years and advising him on prioritizing certain functions, he executed the PMR successfully." Since then, she added, he has enrolled in DAU leadership training courses that she also completed, like "Presenting to Senior Executives," which she believes will help him be more successful within his role at the program management office.

Outside of work, Correa is an avid sports mom. Her son, Mason, plays travel baseball, soccer, basketball and football, and after work she can usually be found at the field cheering on her son from the sidelines—humbly confessing she's his "loudest fan." Correa also volunteers at her church as a teens' ministry leader responsible for facilitating monthly food drives in Newark, New Jersey. "In both capacities, the one thing in common with my work is that I take personal responsibility to serve and be involved in my community," she said.

Correa also serves as a volunteer at the annual "Introduce A Girl To Engineering" at Picatinny Arsenal where students engage with different groups and learn about the different products produced or managed by the Picatinny team. She also participates in public forums at schools, including her alma mater, New Jersey Institute of Technology.

"My aim is to encourage young adults in pursuing careers in engineering," she said. "Growing up, I did not personally know one engineer, let alone a female engineer; therefore, I have made it my personal mission to encourage young girls about the opportunities available for them through STEM [Science, Technology, Engineering and Mathematics]. I'd like to think that one conversation can lead to inspiring them to look in the mirror and see a future in engineering as well."

—CHERYL MARINO

ARMY INTELLIGENCE

Inside the development and adoption of AI chatbots—most notably, the Army's new CamoGPT.

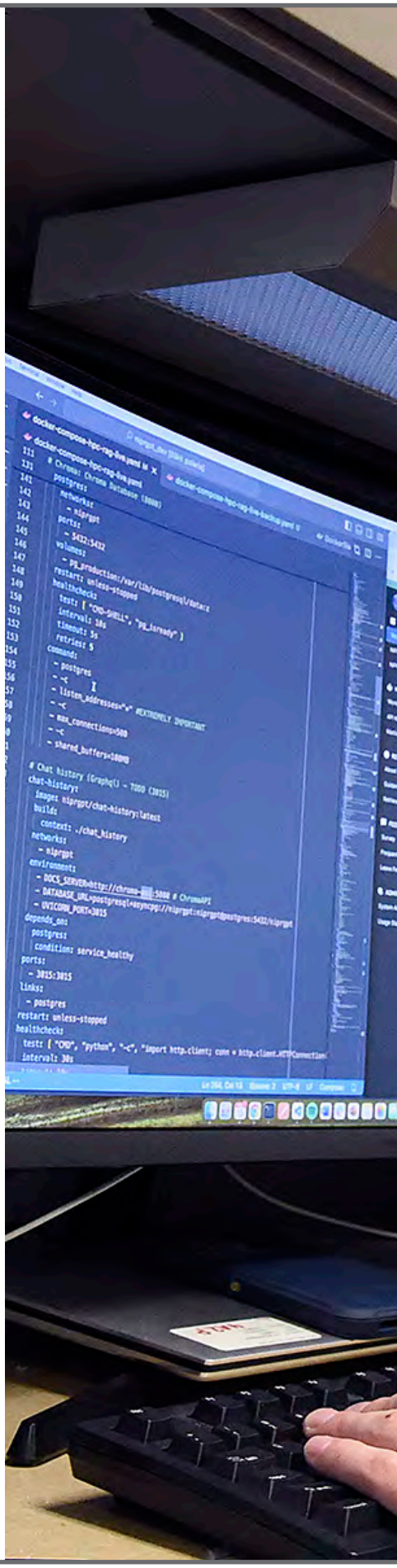
by Holly Comanse

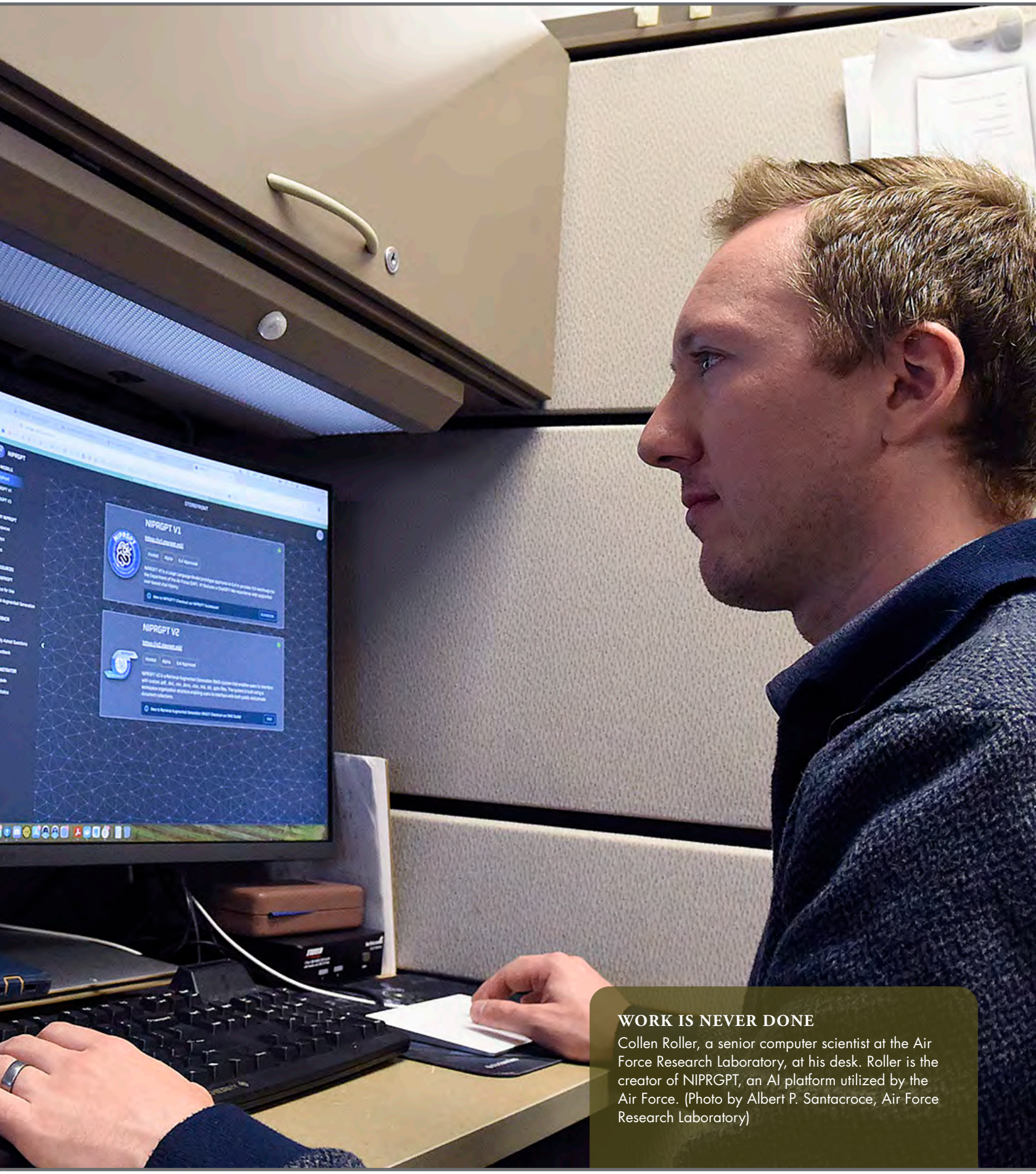
Artificial intelligence (AI) may be trending, but it's nothing new. Alan Turing, an English mathematician said to be the "father of theoretical computer science," conceptualized the term algorithm to solve mathematical problems and test machine intelligence. Not long after, the very first AI chatbot, called ELIZA, was released in 1966. However, it was the generative pre-trained transformer (GPT) model, first introduced in 2018, that provided the foundation for modern AI chatbots.

Both AI and chatbots continue to evolve with many unknown variables related to accuracy and ethical concerns, such as privacy and bias. Job security and the environmental impact of AI are other points of contention. While the unknown may be distressing, it's also an opportunity to adjust and adapt to an evolving era.

The 1962 television cartoon "The Jetsons" presented the concept of a futuristic family in the year 2062, with high-tech characters that included Rosie the Robot, the family's maid, and an intelligent robotic supervisor named Uniblab. Such a prediction isn't much of a stretch anymore. Robotic vacuums, which can autonomously clean floors, and other personal AI assistant devices are now commonplace in the American household. A recent report valued the global smart home market at $84.5 billion in 2024 and predicted it would reach $116.4 billion by 2029.

ChatGPT, released in 2022, is a widely used AI chat-based application with 400 million active users. It independently browses the internet, allowing for more up-to-date and automatic results, but it's used for conversational topics, not industry-specific information. The popularity and limitations of ChatGPT led some organizations to develop their own AI chatbots with the ability to reflect current events, protect sensitive information and deliver search results for company-specific topics.





WORK IS NEVER DONE
Collen Roller, a senior computer scientist at the Air Force Research Laboratory, at his desk. Roller is the creator of NIPRGPT, an AI platform utilized by the Air Force. (Photo by Albert P. Santacroce, Air Force Research Laboratory)

TECH-FOCUSED
Work is increasingly completed using computers and digital apps, as demonstrated by Staff Sgt. Andrew Schede, 105th Communications Squadron cyber systems operations, in the communications building at Stewart Air National Guard Base, New York, on March 6, 2025. (Photo by Senior Airman Sarah Post, 105th Airlift Wing)

One of those organizations is the U.S. Army, which now has an Army-specific chatbot known as CamoGPT. Currently boasting 75,000 users, CamoGPT started development in the fall of 2023 and was first deployed in the spring of 2024. Live data is important for the Army and other companies that choose to implement their own AI chat-based applications. CamoGPT does not currently have access to the internet because it is still in a prototype phase, but connecting to the net is a goal. Another goal for the platform is to accurately respond to questions that involve current statistics and high-stakes information. What's more, CamoGPT can process classified data on SIPRNet and unclassified information on NIPRNet.

THE MORE THE MERRIER

Large language models (LLMs) are a type of AI chatbot that can understand and generate human language based on inputs. LLMs undergo extensive training, require copious amounts of data and can be tedious to create. They can also process and respond to information as a human would. Initially, the information fed to the bot must be input individually and manually by human beings until a pattern is established, at which point the computer can take over. Updating facts can be a daunting task when considering the breadth of data from around the world that AI is expected to process.

Aidan Doyle, a data engineer at the Army Artificial Intelligence Integration Center (AI2C), works on a team of three active-duty service members, including another data engineer and a data analyst, as well as four contracted software developers and one contracted technical team lead. "It's a small team, roles are fluid, [and] everyone contributes code to Camo[GPT]," Doyle said.

Doyle's team is working to transition CamoGPT into a program of record and put more focus into developing an Army-specific LLM. "An Army-specific LLM would perform much better at recognizing Army acronyms and providing recommendations founded in Army doctrine," Doyle said. "Our team does not train LLMs; we simply host published, open-source models that have been trained by companies like Meta, Google and Mistral."

The process of training LLMs involves pretraining the model by showing it as many examples of natural language as possible from across the internet. Everything from greetings to colloquialisms must be input so it can mimic human conversation. Sometimes, supervised learning is necessary for specific information during the fine-tuning step. Then the model generates different answers to questions, and humans evaluate and annotate the model responses and flag problems that arise. Once preferred responses are identified, developers adjust the model accordingly. This is a post-training step called reinforcement learning with human feedback, or alignment. Finally, the model generates both the questions and answers itself in the self-play step. When the model is ready, it is deployed.

A LITTLE TOO CREATIVE

The use of AI in creative fields faces significant challenges, such as the potential for plagiarism and inaccuracy. Artists spend a lot of time creating work that can easily be duplicated by AI without giving the artist any credit. AI can also repackage copyrighted material. It can be tough to track down the original source for something when it is generated with AI.

AI can—and sometimes does—introduce inaccuracies. When AI fabricates information unintentionally, it is called a hallucination. AI can make a connection

CHANGE WITH THE TIMES

Civilian professionals learning to adapt to fast-evolving technology, including AI, during their final training session on April 17, 2025, at Fort Sill in Oklahoma. (Photo by Edward Muniz, Fort Sill Public Affairs)

between patterns it recognizes and pass them off as truth for a different set of circumstances. Facts presented by AI should always be verified, and websites such as CamoGPT often come with a disclaimer that hallucinations are possible. Journalists and content creators should be cautious with AI use as they run the risk of spreading misinformation.

Images and videos can also be intentionally manipulated. For example, AI-generated content on social media can be posted for shock value. Sometimes it's easy to spot when something has been created by AI, and you can take it with a grain of salt. In other cases, social media trends can go viral before they are vetted.

For these reasons, the Army decided to implement CamoGPT. Not only does it currently have the ability to process classified information discreetly, but developmental advances will also ensure that CamoGPT provides minimal errors in its responses.

CONCLUSION

It's becoming clear that analog is on the way out. Even older websites like Google and other search engines have started to prioritize AI summary results. Utilizing technology like AI, LLMs and other chatbots can save time and automate tedious tasks, which increases productivity and efficiency. CamoGPT is still evolving, and the team at AI2C is working hard to improve its accuracy and abilities. Other AI systems within the Army are still being developed, but the potential is limitless. While we may not be living in the future that the creator of "The Jetsons" predicted, we're getting closer. In another 37 years, when 2062 rolls around, we may all be using flying cars—and those vehicles just might drive themselves with the help of AI.

For more information, go to ***https://www.camogpt.army.mil/camogpt****.*

HOLLY COMANSE provides contract support to the U.S. Army Acquisition Support Center from Honolulu, Hawaii, as a writer and editor for Army AL&T magazine and TMGL, LLC. She previously served as a content moderator and data specialist training artificial intelligence for a news app. She holds a B.A. in journalism from the University of Nevada, Reno.

TEAM OF RIVALS

Horse cavalry and tanks that made up part of team "Blue" during the Louisiana Maneuvers in September 1941 advance in a heavy downpour of rain that turned the battlefield into "gumbo" mud. (Photo courtesy of National Archives)

FROM HORSES TO TANKS

Lessons from the Army's struggle to mechanize the cavalry.

by Heather B. Hayes

It's hard to believe that in September 1941, more than two years after Nazi Germany unleashed its Panzer tanks and armored vehicles in a surprise attack on Europe, the U.S. Army was still trying to figure out which mobile combat force would be most effective on the battlefield: horses or tanks?

This ideological struggle between mounted cavalry traditionalists and those pushing armored mechanization had been going on since World War I. Then, horse and rider as a combat weapon had been largely sidelined by the stationary Western Front and its trench warfare, machine guns and mustard gas. By contrast, the tank, which made its first ever battlefield appearance in May 1918, seemed to excel under such brutal conditions. Though rudimentary in design and painstakingly slow, the steel-armored and tracked vehicles were able to help break the stalemate by rumbling their way across no-man's land into enemy territory.

The reality was that both horses and tanks could successfully perform the key military tasks of a cavalry unit: ground reconnaissance, security, exploitation, offensive operations and infantry support, including cover for retreat and pursuit. For the next two decades, the question that would dominate conversations at all levels of the Army—from the horse stables at Fort Riley in Kansas to the General Staff at the War Department—was which type of cavalry could do those tasks best under modern conditions.

There were extreme views on both sides of the issue and plenty in the middle. The debate was further challenged by the fact that during its "lean years" in the 1920s and 1930s, the Army had little money and not much inclination to spend the dollars it did have on the tank, a technology that remained relatively slow, guzzled too much gas and broke down too often. Horses and their riders, by contrast, were a known entity that "had stood the acid test of war," as Gen. John K. Herr, the newly appointed chief of cavalry, put it during congressional testimony in 1939.

And yet by the time America finally entered the war in December 1941, the question of horses or tanks had been suddenly and decisively answered. Mechanization had won, and by the end of the decade, the horse cavalry would be relegated to history.

How this happened has been studied for decades by military historians. Why? Because the transformation of the U.S. cavalry from horses to tanks still holds valuable lessons for today's military as it continues to grapple with the challenges of effectively adapting to rapid technological advancement in the face of cultural resistance and the ever-changing nature of war.

BEATING A DEAD HORSE?

The road to mechanizing the cavalry was particularly difficult because change would ultimately require the wholesale replacement of centuries of tradition. The horse cavalry wasn't just a means to achieve certain types of combat functions; it was a culture and a way of life. Riding to battle was both an art form and a lifelong discipline, and it also involved a bond between horse and rider that was fundamental to mission success.

"To be one of the best riders in the American cavalry meant that you were one of the best riders in the world," Elizabeth Letts noted in her book "The Perfect Horse."

Against this backdrop, the struggle to modernize began, and it involved a lot of opinions. Gen. George S. Patton Jr., who had the distinction of being both a cavalryman and a tankman during World War I, famously said, "If everyone is thinking alike, then someone is not thinking."

In the debate over the future of the cavalry, there would be much thinking and very little agreement.

According to Alexander Bielakowski, author of "From Horses to Horsepower: The Mechanization and Demise of the U.S. Cavalry, 1916-1950," there were four clear responses that emerged among cavalry officers dealing with "the evolving intellectual and cultural crisis caused by mechanization."

Probably the most extreme, passionate and intransigent in their views were the traditionalists, led by Herr, who would advocate for the utility of the horse cavalry until his death in 1955.

While the idea of the horse cavalry might conjure images of thousands of horses and their riders recklessly racing across an open field into a barrage of artillery, the U.S. cavalry had developed its own unique style and doctrine based on its experience fighting battles on the plains of North America and in the jungles of Cuba and the Philippines.

BOOTS AND SADDLES

The U.S. cavalry had developed its own distinctive style that ensured "mobility, firepower and shock," and cavalrymen would spend their days honing their riding, shooting and charging skills. (Photo courtesy of Library of Congress)

"American cavalry was, in truth, mounted infantry. They rode into action, dismounted, and fought on foot," military historian and strategist Edward L. Katzenbach Jr. wrote in "Tradition and Technological Change," an American Defense Policy article. "The semiautomatic pistol, not the saber, was the American cavalry's weapon of choice."

Cavalrymen saw the tank as a "deaf and blind" machine that spent more time being pulled out of trenches and shell craters than fighting the enemy—and Army leadership backed them up. In the National Defense Act of 1920 that reorganized the Army, the cavalry was named as a separate combat branch, while the fledgling American Tank Corps was attached to the infantry.

Though tanks still had severe limitations, there were some modernizers—dedicated cavalry officers—who believed those limitations could be overcome. In 1928, Adna Chaffee Jr., while still a major, left the cavalry for a position with the War Department's General Staff where he had an opportunity to help organize a U.S. Army experimental mechanized force demonstration. Though he didn't know much about tanks (he'd never even been inside of one), he was so impressed with what he saw that he wrote a landmark report, "Mechanization in the Army," in which he called for a $4 million, four-year plan to create a "completely mechanized, self-contained, highly mobile regiment," which he (accurately) predicted would be "a great part of the highly mobile combat troops of the next war."

Chaffee would soon find a kindred spirit in new Army Chief of Staff Gen. Douglas MacArthur, who ordered all combat branches to adopt mechanization. For the horse cavalry, that meant taking tanks into their ranks. Chaffee, a future general who would one day be known as the "Father of the Armored Force," managed to work around the Army's regulations on tank funding by requisitioning them as "combat cars." He would later work with another modernizer, Lt. Gen. Daniel Van Voorhis, to mechanize the 7th Cavalry Brigade at Fort Knox, Kentucky. In 1933, the 1st Cavalry became the first horse unit to transition entirely to tanks.

CHANGING HORSES IN MIDSTREAM

Gen. George S. Patton, seen here in 1943, was a notable horse lover and cavalry officer who, nonetheless, became the commander of the First Tank Corps during World War I and would later create the innovative armored tactics that helped the Allies defeat the Nazis in World War II. (Photo courtesy of Library of Congress)

RIDING THE FENCE

In between the traditionalists and the modernizers were the pragmatists, who "either had no opinion or 'played it safe' by not voicing their opinion," according to Bielakowski, who deduced that most of them probably "trusted the Army to provide the correct equipment/weaponry in time for the next war."

Finally, there were the compromisers—or rather, one compromiser: Patton himself. Bielakowski notes that the future master of armored warfare "carved his own unique position" by being "vocally supportive of both sides in the debate between horses and mechanization."

"FATHER OF THE ARMORED FORCE"

Gen. Adna R. Chaffee Jr., a dedicated horseman and gifted cavalry officer, was willing to risk his career advocating for the tank because he recognized that a mechanized cavalry would be the key to winning a future mobile war. (Photo courtesy of Library of Congress)

This stance ensured that Patton would be able to participate in either form of the future cavalry, depending on who won the debate. It also allowed him to encourage other cavalry officers on both sides of the issue to prepare themselves for change—whatever that might look like. For example, in a 1930 Cavalry Journal article co-authored with Maj. Clarence C. Benson, Patton wrote, "To bury our heads, ostrich-like, and ignore [mechanized vehicles] would be foolish," while simultaneously suggesting that the horse cavalry could acclimate to a more modern battlefield: "If the 14th century knight could adapt himself to gunpowder, we should have no fear of oil, grease and motors."

ACQUISITION AND POLICY MOVES

By 1939, as German Panzer tanks rolled into Poland and immediately decimated the Polish horse guard, the Army had no choice but to accelerate its decision on the cavalry question. Newly appointed Army Chief of Staff Gen. George C. Marshall had already begun taking steps to ramp up tank development and manufacturing, along with every other aspect of Army readiness. Herr, who had been appointed to chief of cavalry the year prior, finally began to advocate for a mix of mounted cavalry and tanks, telling the Military Affairs Subcommittee he was convinced that "we can apply automotive machines to the execution of cavalry missions to a very considerable extent." But he also warned that mechanization wasn't a panacea and wanted tanks to be subordinate to the mounted cavalry. "No vehicle can go over the difficult country that a horse can," he insisted. And thus, for a time, the U.S. Army had a Horse-Mechanized Corps Reconnaissance Regiment designed to leverage the strengths of both. A separate armored force, headed by Chaffee, was created shortly thereafter. In 1940, he began his command with a fleet of less than 1,000 light tanks, all of them still technologically inferior to the German tanks dominating in Europe.

SHOW, DON'T TELL

At some point, those advocating for their position needed to "put up or shut up," as the old saying goes. Marshall gave both the horse and mechanized cavalry the opportunity to do just that

in a series of wargame training maneuvers that took place in the fields, small towns and swamplands of Georgia and Louisiana. The exercises would test if either could live up to its own hype and prove its superiority over the other.

Unfortunately, the earliest maneuvers quickly demonstrated that, even in terrain over which they had an advantage, the horses simply could not match the speed of Chaffee's tanks. In response, Patton, then a colonel commanding the horse unit at Fort Myer, Virginia, would reach out to Chaffee about transferring to the new armored force.

Horses would get one more chance to prove their combat worth. In September 1941, the last and largest of the maneuvers took place on 3,400 square miles south of Shreveport and in and around what is now Fort Polk. With 470,000 troops, 50,000 wheeled and tracked vehicles and 32,000 horses participating, two different "armies" were sent out to battle it out in a mock war.

In the first exercise, the horses displayed all the mobility, agility, shock and courage for which they were so famous in their battle against two divisions of tanks.

"Tanks were sliding off roads, getting stuck in Louisiana's famous 'gumbo' mud, running out of gas—subject to all the shortcomings of motorized vehicles of the era. The horse showed none of these deficiencies," Letts described in "The Perfect Horse."

On the second exercise, Patton's armored group, utilizing the innovative tactics of aggression, deception, speed and surprise for which he would later become legendary, managed to encircle the opposing Army, including the horse cavalry, and force their surrender three days before the exercise was scheduled to end.

Although the horse cavalry had performed admirably, the mechanized cavalry prevailed. The maneuvers had convinced Army leadership that tanks could easily outperform horses in providing the strategic and operational speed and mobile firepower needed to succeed in a modern war. Just two months later, the U.S. finally entered the war with mechanized cavalry serving as the heart of mobile combat power. For the cavalry officers who had long advocated for a mounted force, it was a bitter moment. But dutifully, they said goodbye to their horses, hung up their stirrups and transferred to mechanized units.

CONCLUSION

In the end, tanks ultimately won over horses not because they were superior in all aspects of cavalry functions but because they were superior in all the necessary ones. Warfare had changed, and the method by which to achieve the mission had to change with it. As hard as it was to part with the tradition and glory of the mounted cavalry, the Army chose to follow Patton's battlefield doctrine: "Always go forward!"

Although they would no longer again be the "tip of the spear" in combat operations, horses continued to have a few moments of glory advancing our warfighters. For example, in 2001, during Operation Enduring Freedom, a small team of Green Berets with the 5th Special Forces Group's Operational Detachment Alpha 595, led by former cattle rancher Capt. Mark Nutsch, borrowed local horses and used old-style cavalry tactics like stealth and agility to outmaneuver obsolete Soviet tanks and trucks and liberate Afghanistan from the Taliban.

Today, it is the tanks that are being questioned. In the face of 21st century battlefield tactics and technology, many believe that tanks are becoming obsolete and wonder whether they will soon have to cede their role as lead mobile combat power to drones and other unmanned systems.

That debate between traditionalists and modernists and those in the middle will no doubt continue, even as opportunities arise to show which platform is superior. In the end, the answer will, once again, be determined by mission, not method.

May the best technology win.

*For more information on the transition from horses to tanks, go to **https://history.army.mil/Army-Museum-Enterprise/Find-an-Army-Museum/US-Cavalry-Museum** and for the latest information on U.S. Army tank modernization and sustainment, go to **https://www.peogcs.army.mil/Project-Offices/PM-Abrams**.*

HEATHER B. HAYES provides contract support to the U.S. Army Acquisition Support Center as a contributing writer and editor for Army AL&T Magazine and JANSON. She holds a B.A. in journalism from the University of Kentucky and has more than 30 years of experience writing and editing feature articles and books.

Major Army Acquisition Highlights

OVER THE PAST 250 YEARS

MOTORS

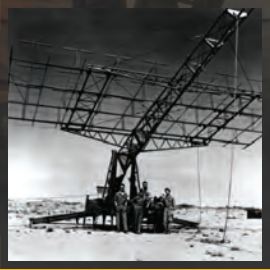
The shift from horse-drawn transport to motorized vehicles dramatically increased the Army's mobility and logistical capabilities, revolutionizing warfare.

EARLY 20TH CENTURY

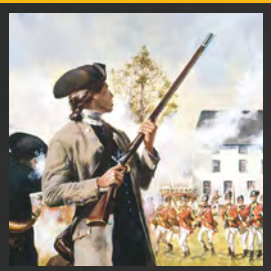
RADAR

Radar provided the Army with the ability to detect approaching aircraft and ships, enabling early warning and improved air defense.

PRE-WORLD WAR II



LATE 18TH/EARLY 19TH CENTURY



STANDARDIZED MUSKETS

In the past, militias used whatever firearms they had. Standardization improved supply, maintenance and training, increasing combat effectiveness.

PRE-WORLD WAR II

M1 GARAND RIFLE

The first semi-automatic rifle to be widely adopted gave American Soldiers a significant firepower advantage over their enemies in World War II.

POST-WORLD WAR II

HELICOPTORS

Revolutionized battlefield mobility, reconnaissance and medical evacuation. Helicopters like the UH-1 Huey became symbols of the Vietnam War and transformed military operations.

EST. 1775

250

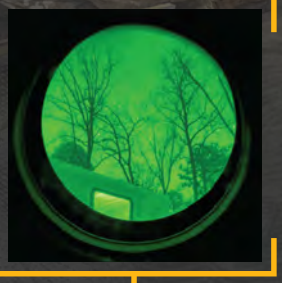
U.S. ARMY

THIS WE'LL DEFEND

NIGHT VISION TECHNOLOGY

Night vision devices enhanced the Army's ability to operate in low-light conditions, giving Soldiers a major advantage in night combat and surveillance.

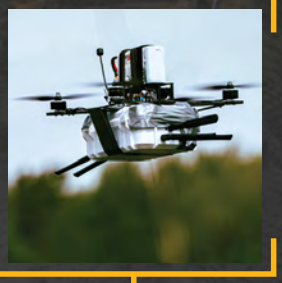
LATE 20TH CENTURY



UNMANNED AERIAL VEHICLES (UAVS)

Evolved from basic reconnaissance tools to versatile, lethal weapons over several decades. Today's drones execute missions with unprecedented accuracy and stealth, while ensuring operational safety in increasingly contested spaces.

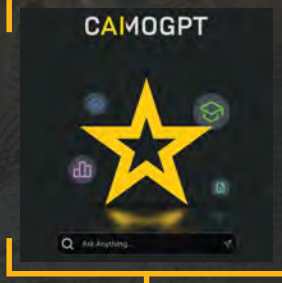
LATE 20TH/EARLY 21ST CENTURY



A.I. CHAT CAPABILITY

Trained AI and machine learning capabilities are transforming the Army's real-time data collection and decision-making capabilities in command and control and in more efficient day-to-day workforce operations.

21ST CENTURY – 2022



LATE 20TH CENTURY

M1 ABRAMS TANK

The heavily armored main battle tank has been a mainstay of the U.S. Army since the 1980s. It provides superior firepower, mobility, and protection on the battlefield.

LATE 20TH/EARLY 21ST CENTURY

DIGITAL NETWORKS AND COMMAND, CONTROL, SURVEILLANCE AND RECONNAISSANCE (C4ISR)

Integration has dramatically improved the Army's situational awareness, command and control, and decision-making capabilities.

FUTURE-PROOFING THE AAW

The workforce is entering a new era of efficiency and effectiveness.

The mission of the Army Acquisition Workforce (AAW) is to cultivate innovation, design the impossible and provide Soldiers with what they need to be successful. While the acquisition community has been called upon to address and evolve with the modernization initiatives across the Department of Defense (DOD), our mission remains the same. The Director of Acquisition Career Management (DACM) Office is committed to achieving efficiency without losing the core, or the heart, of our AAW education and training opportunities.

REIMAGINING AND REENGINEERING

As acquisition professionals advance in their careers, their skills become more tailored and refined to align with their chosen career path. Each AAW professional not only gains core knowledge skills but also becomes specialized in their area of expertise, ensuring the Army has a workforce that can effectively turn requirements into products and services.

Recently, President Donald Trump signed executive orders aimed at modernizing defense acquisitions and spurring innovation in the defense industrial base. To address these executive orders, the acquisition community is actively assessing how we can maximize efficiency and value while maintaining the highest level of quality and professionalism that will help realign the defense acquisition processes with future mission needs. The DACM Office is evaluating how the AAW can efficiently achieve modernization through revitalized resource management to deliver state-of-the-art capabilities to the Soldier.

For example, the Leadership Excellence and Acquisition Development (LEAD) program will move from a 24-month program to a 12-month program, but we guarantee that attendees will still get the training and experience necessary to confidently work toward a future goal of obtaining an acquisition Key Leadership Position. The next cohort of the LEAD program will be the first to move through the adjusted program timeline. By meticulously evaluating where we can maximize efficiency within the program without

IN YOUR ARSENAL

The DAU-SSCF program is offered at Redstone Arsenal, Picatinny Arsenal and virtually. (Photo by Sgt. 1st Class Solomon Navarro, U.S. Army Southern European-Task Force, Africa)

loss in value, we can continue to develop leaders into the program managers they have the potential to become.

Our DACM programs are built to enable excellence within the acquisition community. Following the same methodology that we've applied to the LEAD program, we'll be reengineering our other programs to bolster acquisition and achieve our goals throughout the workforce.

LEVERAGING THE DIGITAL LANDSCAPE

In acknowledgement of the changes across the workforce, we are not only adjusting our programs for efficiency but also accessibility. Acquisition professionals will be able to develop their skills and take on new experiences while minimizing the impact on their organizations in their absence. We are reassessing how to leverage and implement digital opportunities for training and programs that will expand the digital-first culture that is vital to acquisition upskilling.

Our job is to provide pathways to build and support an agile and adaptive acquisition workforce.

Programs such as the Defense Acquisition University Senior Service College Fellowship (DAU-SSCF), an educational senior leadership development opportunity that provides leadership and acquisition training, include travel costs that may be prohibitive for participants. By offering new virtual cohort opportunities for DAU-SSCF and other programs, more applicants can feel confident applying to take part in unique and valuable fellowships that will prepare them for future leadership roles.

CONTINUED EDUCATION

There are many activities that DAU-SSCF includes, such as a program management course and leadership courses. There are plenty of topics to learn with DACM. (Photo by Kevin C. McDevitt, U.S. Army Support Activity, Fort Dix)

Maximizing accessibility alongside efficiency also sets acquisition professionals up for success by giving them access to the tools used to streamline technology and capabilities in support of the warfighter. For example, the Public-Private Talent Experience (PPTE) provides selected DOD acquisition workforce employees with the opportunity to complete a professional assignment with industry by serving six months with a private sector organization. Digital engineering will be a new focus for PPTE to take full advantage of engaging in collaborations across virtual environments. Implementing more modeling and simulations offers a cost-effective opportunity to efficiently test new technology, and beyond, to achieve successful applications in a real-world environment without the fear of failure.

DIGITAL COMMUNICATION
Video conferencing platforms foster collaboration and efficiency by enabling AAW professionals to attend trainings, meetings and interviews from any location, allowing for greater participation in programs without travel costs to support a geographically diverse workforce. (Photo by Diva Plavalaguna, Pexels)

CERTIFICATION COMPLIANCE

Professionals across the AAW are actively working toward their certifications, dedicating their time to continuous learning and laying the necessary groundwork to reach new milestones as their career progresses. By utilizing our resources, we will ensure that every acquisition professional is able to access all the tools, training and assistance needed to reach the standards set across the acquisition community. Appropriately tailoring our offerings will create efficiencies where necessary, balancing educational settings with hands-on experiences while meeting statutory requirements and leaving no acquisition professional behind.

As our programs and learning opportunities evolve, I encourage you to collaborate with your supervisors to be deliberate and meticulous in expanding your individual development plan. Any changes concerning certification requirements and related standards will be communicated in advance to ensure you're able to get the necessary training when you need it. Our job is to provide pathways to build and support an agile and adaptive acquisition workforce, and I believe the workforce will thrive in a leaner, more efficient environment.

CONCLUSION

Whether it's leveraging our digital tools to expand our virtual opportunities or readjusting our programs to shorten the distance between applications to graduations, we're ready to give you the same high quality and high level of training that we've always provided.

I am exceptionally proud of the acquisition workforce and the ability to adapt in the face of transformation. The DACM Office will work to ensure that each of you can accelerate in your career, develop into world-class professionals and reach the goal of supporting the warfighter. As valued members of the acquisition community, we are committed to supporting the current and future workforce and look forward to the efficiencies we can achieve together.

I'd also like to take a moment to acknowledge that this Summer 2025 issue is the last print issue of the Army AL&T magazine. Moving forward, we will shift our focus to providing AL&T news in a condensed online format. I look forward to leveraging our digital footprint to further showcase all things acquisition, logistics and technology across the AAW. As we close the page on our last print issue, I'd like to thank our readers for their support over the years.

IMMERSIVE ACQUISITION FELLOWS
The Defense Innovation Unit recognizes the selection of six contracting officers for the third cohort of the Immersive Commercial Acquisition Program for 2024-2025 during a ceremony at the DAU Campus on Fort Belvoir, Virginia, October 23, 2024. (Photo courtesy of DAU)

PROACTIVE LEARNING

Why DAU credentials are essential for today's acquisition professional.

by Staff Sgt. Summer L. McMahon

The April 9, 2025, Executive Order on Modernizing Defense Acquisitions, with its focus on reforming and training the defense acquisition workforce with innovative methods, highlights the critical importance of continuous learning for all acquisition professionals.

Supervisors and leaders should encourage their teams to leverage resources like Defense Acquisition University (DAU) credentials to enhance their technical competency, leadership skills and functional area knowledge in the field. Noncommissioned officers (NCOs) and officers who hold the Military Occupational Specialty (MOS) 51C or 51A career fields must effectively navigate changing policies and regulations, budget constraints and rapidly advancing technologies to carry out their acquisition duties and responsibilities successfully; a DAU credential can help with this achievement.

While the Army offers significant resources, Soldiers must show initiative to obtain the requisite knowledge and utilize those resources effectively. Continuous learning benefits every Soldier personally and professionally, empowering leaders to make the most of available resources and encourage their teams to grow and develop.

A TAILORED AND TARGETED PROGRAM

To promote continuous learning focusing on specialty competencies, DAU has developed the Defense Acquisition Credential Program, which provides tailored and targeted resources to enhance acquisition processes and knowledge.

Despite their value, DAU credentials often go unnoticed or underutilized. Many Soldiers are unaware of their existence or the significant advantages they can offer by providing additional, just-in-time training. These credentials allow NCOs and officers the opportunity to distinguish themselves by gaining valuable knowledge directly applicable to their current assignments and developing key competencies. DAU credentials are an excellent opportunity for Soldiers seeking to advance their career in the Army. It can also strengthen the resumes of Soldiers preparing to transition out of the military.

A defense acquisition credential verifies that an acquisition professional possesses the knowledge, skills and abilities needed to be successful in a particular DOD acquisition-related field. These credentials help you learn new skills for various roles or strengthen existing skills as you advance in your career. These credentials focus specifically on skills used in defense acquisition and enhance related courses or certifications you may already have earned.

One thing to keep in mind is that several defense acquisition credentials have the same self-paced or virtual course. For example, these four credentials—Contracting for Services, Services Acquisition Team Member: Acquisition Professional, Services Acquisition Team Member: Non-Acquisition Professional and Functional Service Manager—all require one virtual course: ACQ 265. These credentials also have several self-paced courses in common. If you complete all applicable self-paced courses, then you only need to take one virtual course to gain more than one credential. This allows Soldiers to get extra training without hindering unit operations due to extended absences.

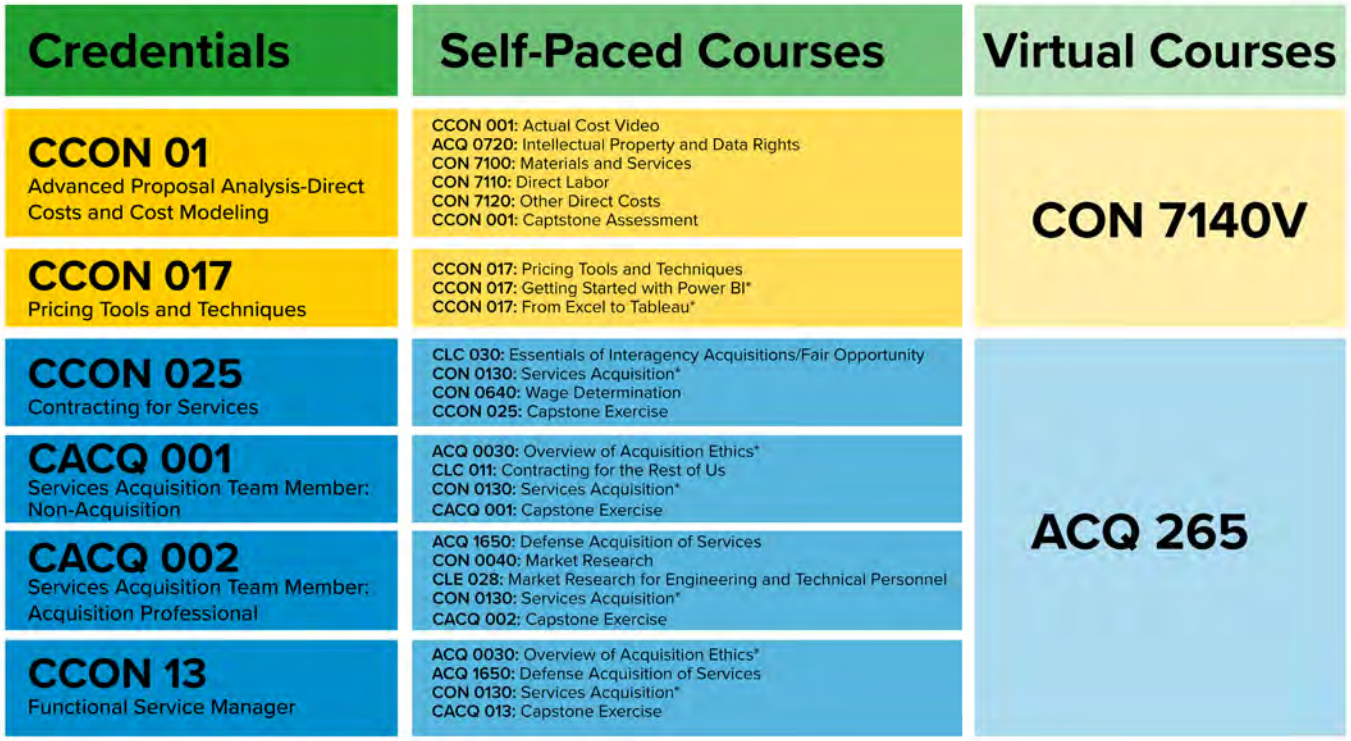
There are also many credentials requiring only self-paced training, which can be completed at the Soldier's convenience. It is important to sit down with your supervisor and identify any DAU credentials that would be beneficial to complete, based on your organization's mission requirements, your professional development goals or other compelling reasons. Once your training needs are determined, you and your supervisor should schedule the courses for the credentials as part of your individual development plan so you can dedicate time and attention to completing them within the designated timeframe.

GETTING DOWN TO DETAILS

Continuous learning is essential for career development and effective leadership, and DAU credentials offer a wide range of opportunities that help build practical skills directly aligned with the demands of the functional area. These credentials give NCOs the knowledge and skills needed to excel in various acquisition roles, from managing complex projects to ensuring a quality product to leading teams, whether conducting service contracts within the continental United States or in a contingency contracting environment outside the continental United States.

Specific DAU credentials, such as Life Cycle Logistics, Acquisition Management, Acquisition Leader Development, Contracting and Small Business Programs, directly address an NCO's daily roles and challenges. These credentials build practical skills and show a strong dedication to professional growth, helping NCOs become more competitive for promotions and leadership roles. DAU courses and programs also develop key skills that can be applied across military environments, strengthening an NCO's ability to lead and succeed. When NCOs dedicate their time to DAU credentials and training, they invest in themselves, the unit and the future of the acquisition workforce.

DAU credentials offer a valuable pathway for officers and NCOs to navigate the complexities of this field and enhance their technical and leadership competencies.



CREDENTIAL OPTIONS AND REQUIRED COURSES

This table shows the necessary courses for each credential and how shared virtual courses can make it easier to earn multiple credentials simultaneously. (Graphic courtesy of the author)

For officers, continuous learning is essential to managing the challenges of defense acquisition and leading successful programs and contracting support. DAU credentials provide a framework for learning and mastering the intricate skills required in program management, strategic planning and policy development. Earning credentials such as Program Management, Engineering and Technical Management and Executive Leadership Development equips officers with broader knowledge across the acquisition spectrum to effectively manage resources, mitigate risks and make informed decisions that impact major defense acquisitions. These credentials enhance an officer's capabilities and contribute to the overall success of DOD programs while ensuring the delivery of critical capabilities to the warfighters. Furthermore, DAU credentials demonstrate a commitment to professional excellence and self-improvement, which are essential attributes for career progression and assuming positions of increased responsibility within the acquisition community. By investing in DAU educational resources, officers invest in their development as leaders and in the future of our nation's warfighters.

DAU credentials are listed in the DAU iCatalog. DAU deploys new credentials throughout the fiscal year, so it is important to routinely check for new knowledge opportunities. Most credentials are available to all DOD and federal government employees. Some credentials require instructor-led training, either in a classroom or virtual environment. To earn a DAU credential, participants must complete all listed requirements, which might include training courses, videos, games, simulations or a capstone assessment. Some credentials utilize outside resources, but they are accessed through the DAU Virtual Campus.

Once the requirement for a credential is completed, it will appear on the DAU transcript. The Army Director for Acquisition Career Management Office receives credential completion data on a weekly basis, and the achievement of credentials will auto-populate on the Acquisition Career Record brief in the Career Acquisition Management Portal (CAMP)/Career Acquisition Personnel and Position Management Information System.

While the Army offers significant resources, Soldiers must show initiative to obtain the requisite knowledge and utilize those resources effectively.

Capstone assessments are graded using the standards in Part VII of the DAU Student Handbook, which requires a score of 80% or higher to pass. Anyone needing help with a capstone assessment can contact the DAU Help Desk for faculty support. Students have 12 months to complete a credential; failure to finish on time will result in disenrollment and require reenrollment. The certified period begins when the credential is earned and appears on the DAU transcript. Disenrollment from the program occurs after one year if credential requirements remain incomplete.

RENEWING A CREDENTIAL

When it comes to keeping credentials current, timing is everything. If the renewal requirements aren't met within the six-month grace period, the credential will expire and all credit towards that credential will be lost. The grace period is based on the credential's original start date.

According to the DAU credentials page, renewal requirements are typically published at least two months before the certification period ends. It is vital to understand how these dates correlate with achieving renewal. For example, if a three-year credential is awarded on March 1, 2022, the credential will expire on September 1, 2025—that's the three-year certification period plus the six-month grace period. However, if the renewal requirements are achieved, the credential remains and the validity will be extended. The new expiration date takes effect at the beginning of the renewal period, allowing the credential to remain valid until March 1, 2028, provided the renewal process is successfully completed with the six-month grace period (e.g., between March 1 and September 1, 2025). Keeping up with renewal requirements ensures the credential stays relevant and allows for continuous refreshment of the knowledge obtained.

CONCLUSION

To remain relevant in defense acquisition, continuous professional development is crucial. DAU credentials offer a valuable pathway for officers and NCOs to navigate the complexities of this field and enhance their technical and leadership competencies. By tapping into DAU's wide range of resources and committing to continuous learning, acquisition professionals can build their careers and strengthen the entire acquisition community.

Given the new administration's goal to modernize the acquisition process, acquisition professionals must proactively do their part. Please take a moment to review the many DAU credentials available, find the ones that match your career goals and start a learning journey that supports both your growth and the mission of supporting the warfighter. But be strategic, as some credentials share common courses, which can help you make the most of your time and effort. This is an excellent opportunity to sharpen your skills, grow as a leader and make a real impact on the future of the defense acquisition system.

For more information, go to ***https://www.dau.edu****.*

STAFF SGT. SUMMER L. MCMAHON is the proponent NCO for the U.S. Army Acquisition Support Center. She holds an M.S. in acquisition and contract management from the Florida Institute of Technology and a B.A. in legal assistant studies from Valdosta State University. She received the professional certification required for MOS 51C, along with six additional credentials in contracting.

FELICIA C. JONES

COMMAND/ORGANIZATION: U.S. Army Contracting Command – Redstone Arsenal

TITLE: Branch chief, Modernization Directorate

YEARS OF SERVICE IN WORKFORCE: 39

DAWIA CERTIFICATIONS: Contracting professional

EDUCATION: MBA and B.S. in marketing, both from Alabama Agricultural and Mechanical University

AWARDS: Team Award, 4th Quarter 2019

PATIENCE MAKES PERFECT

In the world of contracting, one must be adaptable to challenges, focus on objectives and encourage feedback to promote efficiency and teamwork.

In acquisition, as with any field, fostering a collaborative, inclusive environment where all team members feel respected and valued for their individual strengths can be challenging, but according to Felicia Jones, a branch chief of the Modernization Directorate at the Army Contracting Command-Redstone Arsenal (ACC-RSA), it's paramount to overall success. Jones has learned in her nearly four decades as a contracting professional that it takes empathy, understanding and, above all, patience to create and maintain a cohesive, productive team dynamic that will routinely yield positive outcomes.

"The most important lesson I have learned on the job, as well as off the job, is to be patient with people," said Jones, who began her acquisition career in 1985 as an Army Materiel Command (AMC) intern contract specialist at Redstone Arsenal in an area called Repair Parts, where she handled spare components necessary for maintaining and sustaining military equipment and systems. "In the contracting area, we deal with so many individuals that I have found it's best for me to think first before I react."

Jones believes taking that extra step allows her to respond intentionally, rather than impulsively, reducing the risk of escalating conflicts or making hasty decisions that could be regretted later. It also provides an opportunity to assess the situation, consider the consequences of her words or actions and empathize with others' perspectives. This deliberate approach, which Jones applies to any critical decision, both personally and professionally, helps to ensure that her reactions align with values and goals, fostering better communication and stronger relationships.

As a branch chief for the Modernization Directorate at ACC-RSA, Jones oversees a team of contract specialists and officers providing support to the Combat Capabilities Development Command Aviation and Missile Center. Since specialists often bring diverse perspectives and expertise, her focus on being patient, she said, has allowed her to listen actively, address challenges constructively and foster a supportive environment.

The role she and her team play is critical to the Army's mission because they provide Soldiers with what they need, when they need it. "The reason my position is important to the Army is that we provide research and development services that create new technologies that give the military an edge over other forces," she said. "It also helps the

"The most important lesson I have learned on the job, as well as off the job, is to be patient with people."

A GRAND OL' TIME
Jones vacationing at the Grand Canyon in November 2024. (Photo courtesy of Felicia Jones)

military to maintain national security by providing the technology and weaponry needed to do so."

In addition, she explained, her team is responsible for the procurement of information technology (IT) requirements in the form of computer hardware and software, desktop and laptop computers, printers, software renewal licenses and other IT requirements.

To sum it all up, Jones and her team contribute to the Army's success by ensuring troops are equipped, supported and prepared for their missions, but Jones stated that her greatest satisfaction "is being a part of the Army that protects the United States."

Jones has come a long way since her AMC internship making small purchases in Repair Parts. For several years, she continued in that role before working in Major Weapon Systems, where she supported Close Combat Weapon Systems (now Tactical Aviation and Ground Munitions) for the majority of her career. "I became a contracting officer and then became a supervisor," she said. "I later moved to EXPRESS [Expedited Professional and Engineering Support Services] and now work in the Modernization Directorate—all in acquisition."

The most important points in her career, Jones said, were being chosen for a developmental assignment on a Major Weapon System team early on in her career and, later, becoming an unlimited warranted contracting officer. "I thought it would be interesting to work in contracts," she said of the latter position. Empowered with delegation authority to enter, administer or terminate contracts, she's handled various types of contracts, including firm-fixed-price, cost-plus-fixed-fee and cost-plus-award-fee contracts. Most contracts she has dealt with during her career, Jones noted, have been with major defense contractors.

Looking to external sources for professional development and leadership growth has also been important to her career progression, Jones said, noting that she especially enjoyed taking Darden Executive Education classes at the University of Virginia and attending National Contract Management Association World Congress conferences, with the latter uniting the contract management community each year for a training event on the impact of collaborative problem solving.

"The career points mentioned helped me to consider seeking a supervisory position," said Jones, adding that in addition to classes and conferences, working in a program office to "understand the other side of contracts" is something she wishes she pursued that might have also been of benefit to her. "I would have liked to better understand the perspective of the team that put the requirement together," Jones said.

Learning all there is to know about contracts doesn't happen overnight. It takes years of experience and training to build upon your skills, and according to Jones, mentoring doesn't hurt either. "I have told many acquisition personnel to learn your craft and not to be in a big rush to get the next promotion," Jones said. "It takes time to learn contracting, and you want to be fully prepared for the next position. Get with an experienced person and let them mentor you."

Outside of work, Jones is active with her sorority, Alpha Kappa Alpha Sorority, Inc., and its foundation, The Ivy Center of Huntsville Madison County, as well as The Links, Incorporated, a volunteer service organization. She also enjoys decorating and making live flower arrangements for various events for family, friends and her church, where she is co-chair of the ladies ministry. Though it may seem to have nothing to do with her day job, putting together flower arrangements, like contracting, requires creativity, attention to detail and strategic planning. Both also emphasize problem solving, resourcefulness and delivering results that meet specific requirements. Jones explained, "With the contracting field, you often must become creative and work with various individuals outside of your team—as I have done with my outside activities."

—CHERYL MARINO

CAREER NAVIGATOR

ROAD TO RETIREMENT

by Rebecca Wright

Navigating processes and steps for federal civilian retirement.

The joy of retirement. When soon-to-be retirees look forward to having more free time to spend with family and friends, or the freedom to explore new hobbies and pursue other passions after decades of daily grind.

While many look forward to the additional free time in their day, getting through the retirement process can also be challenging and overwhelming. For civilians retiring from the federal government, it can be daunting due to its complexity and often takes a long time to complete.

In fiscal year 2023, 108,387 federal civilians retired from the government. So far in 2025, more than 33,500 federal employees have retired—approximately 3,800 more than the number who left in the first three months of 2024. Due to the changing political climate and the impact on the federal workforce, the average number of federal employees retiring in 2025 is uncertain. Being prepared for retirement sooner rather than later can offer more flexibility and greater peace of mind, especially during uncertain times.

WHAT'S YOUR PLAN?

There are two main retirement plans that cover federal employees: the Civil Service Retirement System (CSRS) and the Federal Employee Retirement System (FERS). The CSRS—a legacy program—is a standard pension plan that covers federal employees who were hired before 1987. Employees covered by CSRS were offered a one-time opportunity in 1987 to switch to FERS, which offers multiple income sources, employer contributions and flexible savings options.

NEXT STOP, RETIREMENT
The retirement process can be overwhelming. Being prepared and remaining well-informed about proper retirement planning can ease anxiety and help retirees adjust and enjoy their new lifestyle. (Photo by ESB Professional, Shutterstock)

The CSRS program is a defined benefit that guarantees an income to an employee throughout their retirement years through designated annuity payments. Employees covered by CSRS contribute 7, 7.5 or 8% of their pay with the employee's agency matching those contributions. Annuities are determined by an employee's age, length of service and an average of the highest three years of base salary, commonly referred to as the "high-3." Once the average high-3 salary is determined, a formula is applied using different percentages based on years of service to calculate the annuity amount: 1.5% of the average high-3 for the first five years; 1.75% for the next five years; then 2% for all years greater than 10, with the maximum benefit received being 80% of the high-3 salary. For those covered by CSRS, the minimum retirement age (MRA) is 55 with at least 30 years of civil service, age 60 with at least 20 years of service or age 62 with at least five years of service. If you retire before the age of 55, the annuity is reduced by 1/6 of a percent for each month under age 55.

Employees covered by this plan generally do not contribute to Social Security and, therefore, are not eligible for Social Security retirement benefits. However, an employee may be eligible for Social Security benefits if they previously held other jobs that required a Social Security tax contribution.

FERS was enacted in 1987 as a replacement to CSRS. All federal civilian employees hired after this date are covered by FERS, which is both a defined benefit and a contributory retirement plan. It is designed as a three-part retirement system that includes a basic pension plan, Social Security benefits and the Thrift Savings Plan (TSP). FERS employees have Social Security deducted from their pay, which entitles them to Social Security benefits upon retirement. They also contribute a portion of their salary towards their FERS pension plan. The amount withheld depends on when the employee was hired: Employees hired prior to 2013 contribute 0.8% of their salary, employees hired in 2013 contribute 3.1% and those who were hired in 2014 or later contribute 4.4%. Agencies also contribute a percentage towards their employees' FERS.

Similar to CSRS, the FERS plan has a calculated annuity based on length of service and an employee's average high-3 salary; however, the annuity is calculated using a different formula. Employees under the age of 62, or employees who are 62 or older with less than 20 years of service, are entitled to 1% of their high-3 salary for each year of service. If an employee retires at age 62 or older with more than 20 years of service, they are entitled to 1.1% of their average high-3 for each year of service. In addition, those covered by FERS must meet an MRA, which is determined by birth year. If you decide to retire at your MRA with at least 10 years of service, but less than 30, your annuity will be reduced.

To supplement Social Security and the FERS basic pension plan, employees may also contribute to the TSP—the federal government's version of a 401(k) plan,

MAP OUT YOUR PLANS

It is never too early to begin your retirement plan. Determine how much you will need to be financially secure and ensure that you properly carry over your health and life insurance. Don't forget to designate beneficiaries for all your accounts. (Photo by Rawpixel.com, Shutterstock)

FROM WORK TO LEISURE
Spending time with family and friends, engaging in hobbies and maintaining a healthy lifestyle are just a few support mechanisms that can help avoid anxiety, depression or social isolation after retirement. (Photo by Alessandro Biascioli, Shutterstock)

similar to those offered by the private sector. Employees may opt to contribute up to the maximum pretax amount allowed by the Internal Revenue Service (IRS) each year, and those age 50 and older may also make catch-up contributions. Agencies automatically contribute 1% of an employee's salary to their TSP, whether or not the employee opts to contribute. Agencies also match up to 5% of an employee's contribution.

There are also different types of retirement other than voluntary, which is the most common. Some employees may be eligible for early retirement, disability, deferred retirement or a phased retirement.

ALWAYS AN EXCEPTION TO THE RULE

There are circumstances where annuities for certain federal employees will be calculated differently. Law enforcement officers and firefighters have a higher contribution rate into FERS, so their basic annuities are calculated at a higher rate. Law enforcement officers and firefighters that have 20 years of service will receive 1.7% of their average high-3 salary for each of those 20 years, plus an additional 1% of their average high-3 salary for each year served over 20 years. Employees hired prior to 2013 contribute 1.3% of their salary, employees hired in 2013 contribute 3.6% and those who were hired in 2014 or later contribute 4.9%. Those covered under CSRS will receive 50% of their average high-3 salary plus an additional 2% of their average high-3 for every year over 20 years.

Law enforcement officers and firefighters have earlier MRAs along with mandatory retirement ages, as do air traffic controllers. Whether covered under CSRS or FERS, law enforcement officers and firefighters have an MRA of 50 and a mandatory retirement age of 57, or as soon as 20 years of service has been completed after the age of 57. Those covered by FERS have the option to retire at any age if they have 25 years of service. Air traffic controllers are required to retire by the age of 56.

All employees who retire under CSRS or FERS will have their unused sick leave converted into creditable service. Unused sick leave is converted into additional months of service, which is then

applied to your creditable service; this can result in a higher annuity calculation. It is important to note that sick leave is added to creditable service for annuity purposes only and not used towards years in service for eligibility to retire.

Those who served in the military may be able to have their military service count towards their civilian retirement. To do this, the employee typically pays a deposit—usually around 3% of their basic military pay. This is referred to as a military service buy-back.

NEVER TOO EARLY TO PLAN

As with any big decision-making task, many people may ask themselves where to begin. However, when planning retirement from the federal government, the question is not just where to begin but also when to begin. The retirement system in which you are covered will help determine the ideal age to start your retirement planning.

While many look forward to the additional free time in their day, getting through the retirement process can also be challenging and overwhelming.

Retirement planning and saving is something that should be done throughout your career. The Office of Personnel Management (OPM) recommends that serious planning should begin approximately five years prior to your targeted retirement date.

CELEBRATING A CAREER

Joseph Long, Ph.D., retired supervisory research physiologist, Walter Reed Army Institute of Research, stands with his colleagues as they present him with gifts during his surprise retirement celebration in Silver Spring, Maryland, on January 30, 2025. Long served both in the military and as a civilian, spending over 35 years as a scientist. His retirement celebration was attended by coworkers, mentees and friends, as well as his wife, son and daughter. (Photo by Hannah Covington, Walter Reed Army Institute of Research)

This recommendation stems from several factors, such as providing the opportunity to maximize TSP contributions (if covered by FERS), including catch-up contributions for those over the age of 50, ample time for financial planning to determine if you can afford to retire and to verify if all personnel files are accurate and available (including both civilian service and military service, if applicable). This can be reviewed and verified through the Electronic Official Personnel Folder (eOPF).

The most significant reason for the five-year recommendation concerns health insurance coverage. To continue health insurance after retirement, you must be covered at the time of your retirement and have maintained coverage for five consecutive years beforehand without any gaps and begin your annuity payments within 30 days of retirement. Health insurance premiums are deducted from your annuity payments.

Planning this far ahead also provides the opportunity for the retiring employee to begin transferring job responsibilities to others and to offer training and mentoring to junior employees.

TAKE IT ONE STEP AT A TIME

As you approach your retirement eligibility date (within one year), it is important to verify the date you will begin receiving your retirement benefits. At the same time, you should determine your desired retirement timeframe and inform your supervisor of your plans.

According to OPM, the entire process typically takes three to five months. Begin by requesting your estimated annuity statement and your SF-50. You can download both documents from the Government Retirement & Benefits platform or from eOPF. Alternatively, you can request them directly from your human resources (HR) department. Once you have chosen your exact retirement date, you should complete the retirement application—either SF-2801 for CSRS or SF-3107 for FERS—and submit it to your HR department. You will also need to fill out an SF-2818, which is the Federal Employee Group Life Insurance retirement form. This form allows you to continue your employee life insurance and elect a beneficiary.

If you are planning to withdraw from your TSP upon retirement, keep in mind that it may take up to eight weeks to receive your first payment. You are not required to withdraw your TSP funds immediately and can choose to do so at any time. FERS employees should contact the Social Security Administration approximately three months prior to becoming eligible to apply for benefits.

CONCLUSION

Everyone's experience with the retirement process—before, during and after—will be different. The important thing to keep in mind is there is always help available to navigate the process, either from your agency's HR representatives or from OPM. The OPM website has several resources including application tips, quick guides, FAQs and retirement calculators. OPM has also digitized the CSRS and FERS retirement handbook. Many agencies offer pre-retirement seminars that can be helpful with planning for those who are still mid-career and for those much closer to retirement age.

Once retired, many will need to adjust to their new lifestyle. Financial insecurity, a changing routine and social isolation are a few factors that may lead to potential mental and emotional stress among retirees. Having support systems in place can be helpful during this life-changing transition. Working with a financial planner and sticking to a budget will help keep you on track to ensure your retirement savings lasts. Establishing a new routine can bring comfort after your previous one is disrupted. Feelings of social isolation can be avoided by spending time with family and friends and engaging in hobbies. You may also enjoy volunteering within your community or pursuing jobs that align with your passion.

Additionally, never underestimate a healthy diet and exercise. Maintaining a well-balanced diet and a daily workout not only provides a positive impact on your physical health, but your mental and emotional health as well. Staying healthy, both physically and mentally, can help you enjoy every day like it's Saturday.

*For more information, go to **www.opm.gov** or contact your agency's HR department.*

REBECCA WRIGHT is a writer and editor with Army AL&T and the U.S. Army Acquisition Support Center at Fort Belvoir, Virginia. She has more than 15 years of experience writing and editing for DOD and the U.S. Department of Justice.

CREATING WITH CAD

PPTE participants gain digital engineering experience by integrating various tools and processes, including CAD software, enabling engineers to explore how products operate in real-world conditions. (Photo by ThisIsEngineering, Pexels)

A DIGITAL DIVE

The PPTE digital engineering cohort aims to develop the acquisition workforce through hands-on learning with private sector organizations.

by Rachel Berry

The Department of Defense (DOD) Public Private Talent Experience (PPTE) program provides DOD acquisition workforce employees with the opportunity to complete a professional assignment by serving for six months with a private sector organization. PPTE promotes increased communication between government and industry, enables participants to gain a better understanding of industry's business operations and challenges and facilitates the sharing of innovative best practices.

DIGITAL ENGINEERING COHORT

In support of the Army's Digital Transformation Strategy, a number of key stakeholders partnered to leverage PPTE's fiscal year 2024 program. An opportunity to utilize PPTE as a supportive activity that could increase the digital acumen across the acquisition workforce was first identified by David Gorsich, Ph.D., chief scientist, U.S. Army Combat Capabilities Development Command (DEVCOM), along with the Office of the Deputy Assistant Secretary of the Army for Data, Engineering and Software (DASA(DES)) and the Army Director of Acquisition Career Management Office. Leveraging relationships with industry partners within the Army Science Board, the team created an Army PPTE digital engineering cohort with the goal of developing the workforce by learning with hands-on experience. Organizations like Bell Textron, Ford, The MITRE Corporation and Siemens created digital engineering-specific assignments and hosted an Army digital engineering practitioner for a six-month, immersive digital engineering experience.

OUTSIDE-THE-BOX THINKING

David Gorsich, Ph.D., chief scientist at U.S. Army DEVCOM Ground Vehicle Systems Center (seen here speaking before the Automotive Research Center's annual review at the University of Michigan in Ann Arbor), was instrumental in identifying and establishing the PPTE program as a supportive activity that could increase the acquisition workforce's digital acumen. (Photo by Christopher Estrada, DEVCOM GVSC)

Gorsich reflected, "The first cohort from the program had a wonderful experience with companies that do digital engineering well. Our employees who returned come back with industry best practices and lessons learned to inform our work processes." He further commented that this program "is a tremendous opportunity to work directly with commercial industry and see how to do digital engineering. The opportunity with Ford was to work with them on engineering and development of the F-150 pick-up truck. Who would not want to work on the development of that? And it is of great value to the Army to bring back that experience and look at how we do things in comparison. It provides a great perspective to the employee."

In fiscal year 2024, four participants in the PPTE digital engineering cohort were placed within Bell Textron, Ford, The MITRE Corporation and Siemens.

A VALUABLE LEARNING EXPERIENCE

Ivan Couvillon, a PPTE participant assigned to Bell Textron, shared his experience as it relates to his current Army work, where he focuses on new technologies and processes to improve the technical exchange of information from various functional groups, including engineering, procurement, manufacturing, project management and logistics. His PPTE assignment at Bell Textron "directly related to the interoperability of various commercial technologies [primarily software systems] and some of the challenges related to the exchange of technical information and data sets encountered during the product development cycle."

Through this experience, Couvillon learned new approaches for investigating and testing software solutions that can minimize the loss in fidelity of technical data as it is exchanged between various software systems used by various user groups.

"My PPTE experience has allowed me insight on how to approach problems associated with using common data sets across unique user groups and functions." Couvillon was also impressed by industry's "flexibility to acquire and deploy new

toolsets" and "anticipate challenges and target solutions to these challenges prior to them being encountered by their customers."

In fiscal year 2024, four participants in the PPTE digital engineering cohort were placed within Bell Textron, Ford, The MITRE Corporation and Siemens.

Svetislav "Steve" Petrusevic spent his digital engineering PPTE with Siemens and is applying his experience to his program, Project Manager (PM) XM30, which "is at the tip of the spear defining and changing the culture going away from a traditional methodology to a digital methodology." Petrusevic said that "by participating in the PPTE program, the skillset and knowledge has been brought back to PM XM30." Throughout his program, he learned how Siemens utilized system thinking, or integrating different digital engineering tools and processes to create complex systems specific to healthcare. He also gained experience with a digital engineering tool called Star-CCM+, which provides the capability of computer-assisted design (CAD) handling and geometry preparation and enables computational fluid dynamic engineers to model the complexity and explore the possibilities of products operating under real-world conditions. "This allows the simulation to stay true to the design based on the CAD, allowing quicker simulation," Petrusevic said.

To anyone interested in the PPTE digital engineering program, Petrusevic encourages them to "go for it! Place your name in the 'hat' and, if selected, participate in the PPTE digital engineering program. There is so much to learn in private industry, specifically [with] digital engineering tools."

CONCLUSION

In fiscal year 2025 there are seven PPTE digital engineering participants at The Aerospace Corporation, Amazon, Applied Intuition, Bell Textron, Invariant, MORSE Corp. and Siemens. For the future of the PPTE digital engineering program, Gorsich commented "We hope more companies join the program and more associates take advantage of it. In the FY25 PPTE program, there is the addition of a Silicon Valley company called Applied Intuition. They develop and assess autonomous systems. Talk about an opportunity for the employees and the Army to learn how things are done in this exciting area, and a key area for the Army's future."

For more information about the PPTE program, go to ***https://asc.army.mil/web/career-development/programs/dod-ppte****.*

RACHEL BERRY is an acquisition training and education manager at the U.S. Army Acquisition Support Center, Office of the Director of Acquisition Career Management. She holds a Master of Professional Studies in industrial organizational psychology from the University of Maryland, Baltimore County, and a B.S. in hospitality management from James Madison University.

ON THE MOVE

JOINT PROGRAM EXECUTIVE OFFICE FOR CHEMICAL, BIOLOGICAL RADIOLOGICAL AND NUCLEAR DEFENSE

CHANGE OF CHARTER

Elissa E. Zadrozny, right, accepts the charter for Joint Product Director for Biological Detection Systems from outgoing Product Director **Raymond "Mike" Hartley**, left, during a change of charter ceremony held on May 6, 2025, at Aberdeen Proving Ground, Maryland. The ceremony was hosted by **Timothy G. Tharp**, center, joint project manager for Chemical, Biological, Radiological and Nuclear Sensors. (Photo by Matt Gunther, JPEO-CBRND)

JOINT PROJECT MANAGER FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR MEDICAL

ASSUMPTION OF CHARTER

Michael Levandusky, left, was promoted to the role of joint product manager on February 19, 2025, at Fort Detrick, Maryland. **Col. Matthew Clark,** joint project manager for Chemical, Biological, Radiological and Nuclear Medical presented the award to Levandusky during the assumption of charter ceremony. (Photo by Lisa Calloway, JPM CBRN Medical Graphics Team)

PROGRAM EXECUTIVE OFFICE FOR COMMAND, CONTROL, COMMUNICATIONS AND NETWORK

ASSUMPTION OF CHARTER AT PM NEXT GENERATION COMMAND AND CONTROL

Col. Christopher Anderson, left, accepts the charter for Program Manager for Next Generation Command and Control from **Mark Kitz,** program executive officer for Command, Control, Communications and Network (PEO C3N) during an assumption of charter ceremony held on April 11, 2025, at Aberdeen Proving Ground, Maryland. The ceremony was hosted by Kitz and established PM Next Generation Command and Control as the newest program office within PEO C3N. (Photo by Ryan Myers, PEO C3N)

CHANGE OF CHARTER AT PDL ALLIED INFORMATION TECHNOLOGY

James Christophersen, right, accepts the charter for Product Lead for Allied Information Technology from **Col. Stuart McMillan**, project manager for Tactical Network, during a change of charter ceremony held on October 3, 2024, at Fort Belvoir, Virginia. (Photo by Amy Walker, PEO C3N)

PROGRAM EXECUTIVE OFFICE FOR SOLDIER

PM SOLDIER WARRIOR CHANGE OF CHARTER

Col. Toby Birdsell, left, assumed leadership as the new project manager for Soldier Warrior at a change of charter ceremony held on April 11, 2025, at the Army Museum on Fort Belvoir, Virginia. **Maj. Gen. Christopher Schneider**, program executive officer for Soldier, presented the charter to Birdsell and awarded the Legion of Merit to the outgoing Project Manager **Col. Anthony Gibbs,** not pictured, in recognition of his years of dedication and strong leadership. (Photo by Zach Montanaro, PEO Soldier)

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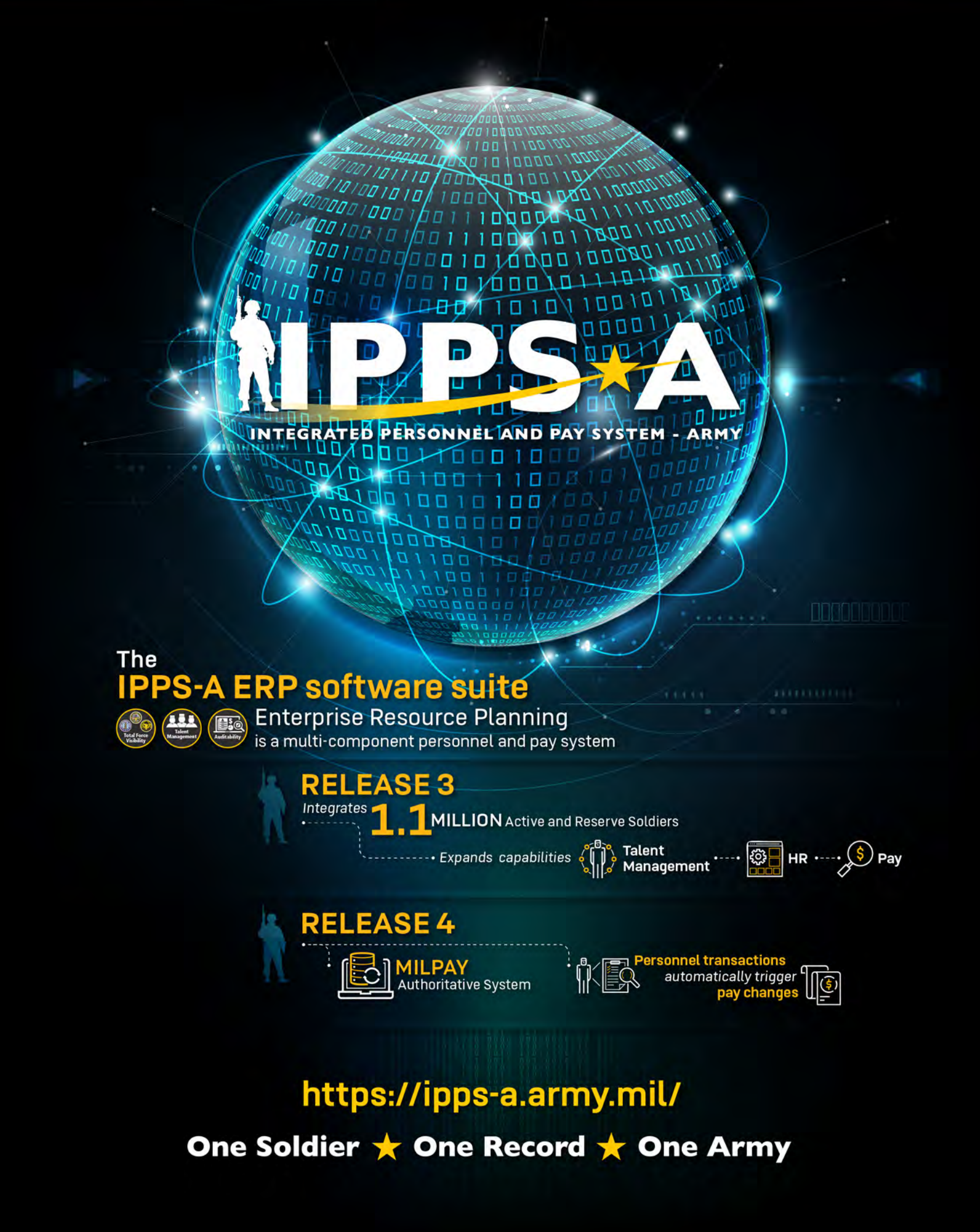
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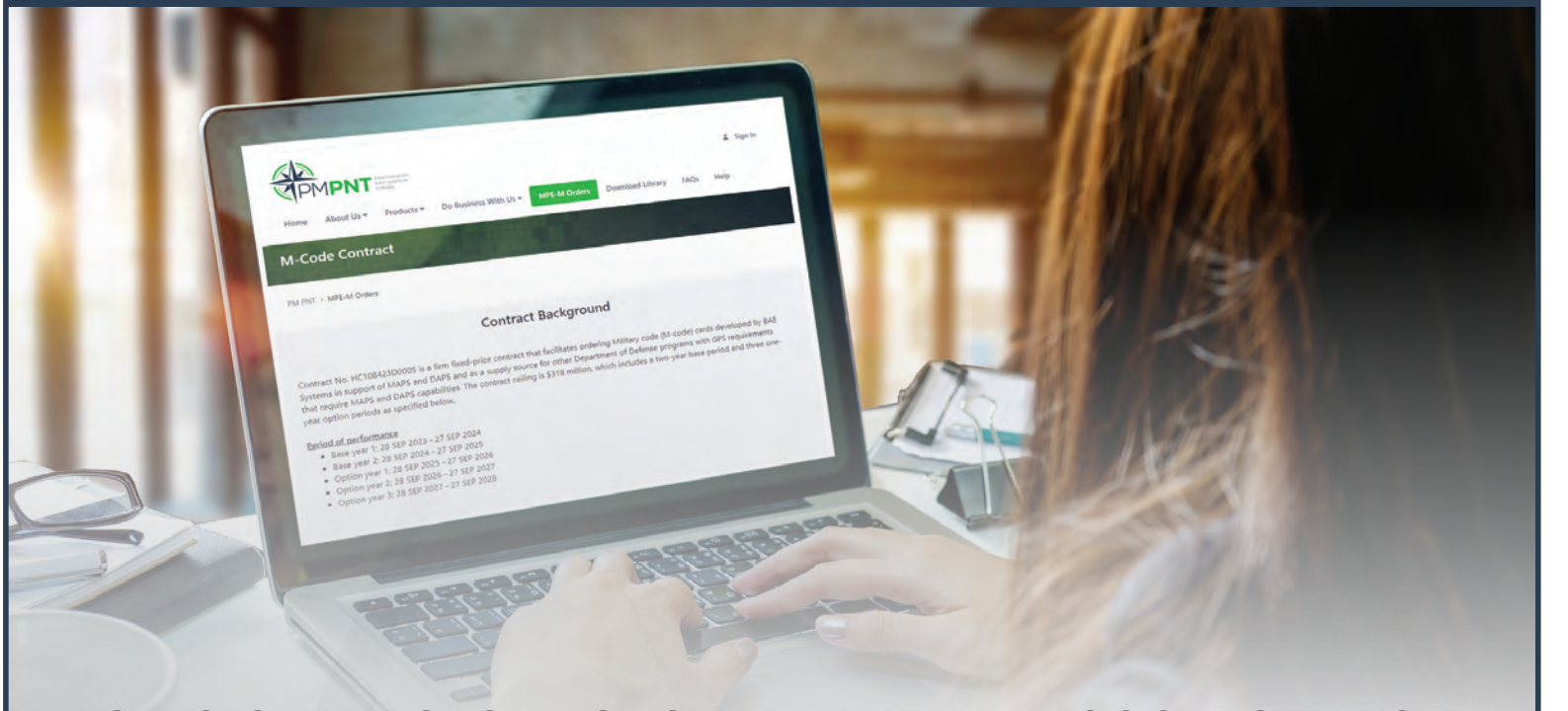

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—Mr. Ronald R. Richardson, Jr.
Director, U.S. Army Acquisition Support Center, (USAASC) /
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