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PROMPT/:_ Emerging_Technology and Modernizing_the Army

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GUIDE program leverages AI to develop medical countermeasures for warfighters

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FALL 2024

FROM THE AAE

EMERGING TECHNOLOGY AND MODERNIZING THE ARMY

ON THE COVER

The Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)), along with industry partners, is working to streamline processes, remove barriers and accelerate Army modernization by fielding new capabilities and achieving key milestones.

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THEN & NOW

From the Editor-in-Chief

Our theme this issue is Emerging Technology and Modernizing the Army. So, how exactly do you capture useful emerging technology, then fold it into modernization? If you said carefully, you'd be right. The Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) and its approximately 33,000-strong Army Acquisition Workforce, along with our industry partners, have been actively working to streamline processes and remove barriers to quickly field new capabilities. This effort is part of a broader initiative to modernize the U.S. Army and ensure it remains competitive and effective in various operational environments.

One of ASA(ALT)'s key modernization strategies involves leveraging programs such as the xTech Program prize competitions and Small Business Innovation Research (SBIR) programs to find and scale solutions across the Army. The xTech competitions are designed to connect small businesses with the Army and DOD experts to develop innovative solutions for the Army's most pressing challenges including artificial intelligence (AI), Soldier lethality, advanced materials and autonomous systems. These competitions are part of the Army's broader effort to foster innovation and ensure that cutting-edge technologies are rapidly integrated into military operations. Learn about the xTech Scalable AI finalists and AI 2 finalists in the sidebar "XTech Finalists Make Scalable AI An Army Reality" on Page 71.

XTech competition winners find themselves well-positioned to compete for follow-on contracts, such as Army SBIR awards. The SBIR, along with the Small Business Technology Transfer programs collaborate with small businesses and Army customers to align innovative solutions with Army priorities. It awards more than $350 million annually to reinvigorate the Army's technology ecosystem, and is prioritizing and funding cutting-edge AI solutions. Most recently, the SBIR program is requesting small businesses to submit proposals tackling key Army priorities, such as high-energy lasers, better explosives and lighter, stronger armor.

Email Nelson McCouch III
@ armyalt@army.mil

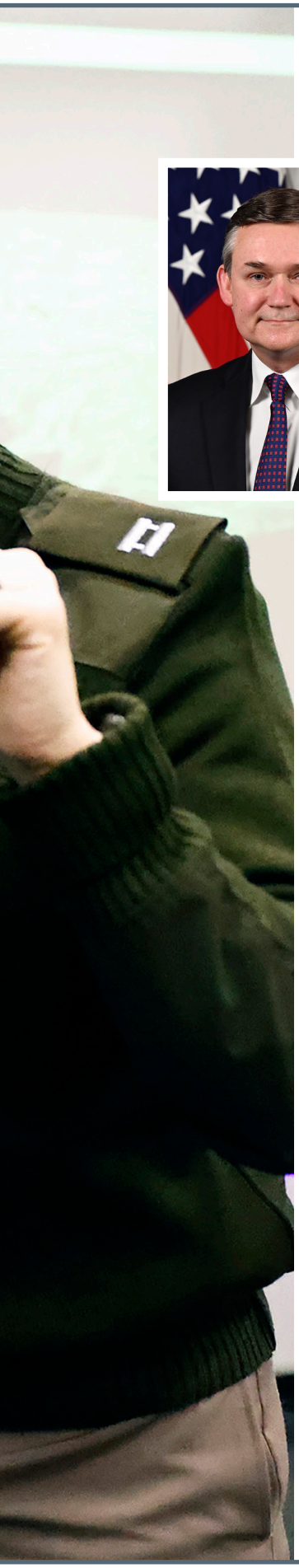
Speaking of SBIR and xTech, in this issue learn how competitions are partnering with Project Linchpin—an operational pipeline of trusted AI solutions that aims to deliver a coherent approach to AI across the Army—to scale AI solutions in "Accelerating the Army's AI Strategy," on Page 66.

Haven't heard enough about AI yet? Find out how the medical community is pacing biological threats and supporting preparedness using artificial intelligence/machine learning (AI/ML) in "The Known Unknowns," on Page 14. But wait, there's more … in "The Calculus of Caution," we're not going to let AI run amuck and become a sequel in the Terminator series. The development of AI capabilities comes with unique risks that require deliberate and appropriately scaled mitigations. Find out what guardrails are being created for AI on Page 8.

By focusing on rapid development and deployment, ASA(ALT) aims to ensure that the Army can quickly adapt to emerging threats and technological advancements. As always, if you have comments, questions or an actual story you would like to work in to a future issue, please contact us at **armyalt@army.mil**. We look forward to hearing from you!

Nelson McCouch III
Editor-in-Chief

EXPERIENCING AUGMENTED REALITY
Cadets and U.S. Military Academy staff took part in a technology demonstration with Magic Leap and EolianVR at the West Point Simulation Center in February 2024. As the technology grows, cadets gain experience on potential applications of AR technology for training and education. (Photo by Eric Bartelt, United States Military Academy at West Point)



SHAPING THE FUTURE OF WARFARE

Advancements across Army acquisition portfolios advance our warfighters on future battlefields.

As the nature of warfare continues to evolve, we are accelerating and intensifying our efforts to develop advanced, long-term modernization programs to ensure our warfighters maintain a decisive advantage, should deterrence fail, on future battlefields. The Army has made significant progress in our most ambitious modernization effort in more than four decades by maintaining continuity across budgets and meeting major milestones for development and fielding.

We've carefully balanced the overall research, development and acquisition portfolio as we transition from enduring systems to new, modernized systems.

In the Aviation portfolio, we strike a balance between prudent investments to maintain the viability of the enduring fleet, while also investing in future aircraft and capabilities designed to provide reach, standoff and overmatch against peer competitors in multidomain operations.

In the Ground Combat Systems portfolio, Armored Brigade Combat Team modernization and combat vehicle protection remain a priority.

The Intelligence and Electronic Warfare (IEW) portfolio enables commanders to see and sense more, at greater distance, and more persistently at every echelon. The IEW portfolio is making key investments in critical multidomain intelligence capabilities to provide better analytics, deep sensing, and indications and warning in support of targeting.

The Air and Missile Defense portfolio invests in integrated command and control, sensors and shooters to provide 360-degree tiered and layered defensive fires to increase force protection capabilities against a wide range of air and missile threats.

The Command and Control portfolio continues to align resources required for networks and command posts to be simpler, more intuitive, lower signature and more flexible.

The Logistics portfolio invests in Army watercraft, a combat multiplier in support of Army operational concepts and the geographical combatant commander in large scale combat operations; it also invests in contested logistics capabilities to reduce demand

and provide point of need production and sustainment, and realigns funding to support critical ammunition program lines and Army training strategies to ensure contractual requirements are met to maintain the industrial base's minimum sustainment rate capacities.

Finally, the Human Machine Integration portfolio consolidates Army efforts to bring autonomous and machine learning advantages to our tactical formations. Integrating virtual training capacities in emerging weapon systems and enduring systems with add on modules and effects ensure continuous training of Soldiers and formations to operate efficiently and effectively as part of the joint force.

Our investments in autonomous and semi-autonomous ground and aerial systems are essential to extend our battlefield effects, maintain an advantage over the enemy and enhance the lethality and survivability of our formations.

The United States Army is constantly evolving to prepare for and meet the demands of today and the challenges of tomorrow.

EMERGENT RESEARCH

In the Army Science and Technology portfolio, basic research investments are the Army's primary drivers to enable leap-ahead technologies that will enhance Soldier capability and increase Soldier protection. These efforts include:

Synthetic biology. Synthetic biology is the creation of new biological systems or the redesign of existing biological systems.

TRAINED AND READY

A U.S. Army Soldier assigned to 3rd Brigade Combat Team, 1st Armored Division ground guides an M1A2 SEPv2 Abrams Tank to a holding area so it can execute the live-fire portion of the Table VI Gunnery at McGregor Range, New Mexico, Sept. 29, 2023. Modernizing combat vehicles remains a top priority in Army acquisition.(Photo by Spc. David Poleski, 1st Armored Division)

THE HUMAN MACHINE INTEGRATION

Gen. James E. Rainey, commanding general, Army Futures Command, speaks to Soldiers of the Maneuver Center of Excellence Experimental Company, 1st Battalion, 29 Infantry Regiment, 316th Cavalry Brigade and attendees of the Human Machine Integration Summit II following a combined demonstration of Soldier and robotic capabilities at Fort Moore, Georgia in October 2023. (Photo by Josef Cole, Fort Moore Public Affairs Office)

Army basic research in this area focuses on harnessing biology's capacity for custom and responsive materials development to support disruptive capabilities such as self-healing, adaptation and protection.

Disruptive energetics. Achieving the range and lethality necessary for the future battlefield requires new and powerful energetic materials and propulsive concepts. Army basic research in this area focuses on the discovery, synthesis and experimental verification of these disruptive energetic materials and concepts. This research enables overmatching lethality and range of Army ordnance.

Artificial intelligence. Artificial intelligence (AI) is expected to strongly enhance performance of all technological components and Army systems. Army basic research in this area focuses on integration of AI algorithms and approaches to advancing distributive sensing, target recognition and cooperative and distributed navigation and mobility. This research will enable optimal and highly coordinated operation of various Army units.

Quantum effects and quantum information sciences. Quantum science is the study of the behavior of matter and its interactions with energy on the scale of atoms and subatomic particles. Army basic research in this area focuses on generating advances in quantum science by investigating the ultimate performance limits of quantum sensors, clocks, networks and information processing through distributed quantum entanglement. Quantum sensing, quantum navigation, quantum communications and networks, and processing have the potential to revolutionize Army technologies.

CONCLUSION

Another important area to showcase is our continued advancements in training and simulation. Both augmented reality (AR) and virtual reality (VR) are being integrated into military training and operations. VR simulations enable Soldiers to prepare in a safe and effective way for real-world situations, such as combat and disaster relief operations. AR systems enhance situational awareness and enable Soldiers to access critical data, instructions and maps in real time to improve their decision-making ability and operational effectiveness.

The United States Army, like the nation it serves, is constantly evolving to prepare for and meet the demands of today and the challenges of tomorrow. This is an exciting time for those of us in the acquisition community because materiel modernization is an essential part of the Army's broader continuous transformation effort.

RELIABLE DATA NEEDED

Unmanned Aircraft System (UAS) operators assigned to Company D, 82nd Combat Aviation Brigade, 82nd Airborne Division conduct flight operations on April 8, 2024. Reliable data is essential for UAS operations to navigate, identify targets and engage. (Photo by Sgt. Vincent Levelev, 82nd Combat Aviation Brigade)

THE CALCULUS OF CAUTION

| Layered risk mitigation for AI development.

by Jennifer Swanson

A few years ago, I needed to meet with an industry partner whose office I was not familiar with. I typed the address in my GPS and dutifully followed the turn-by-turn instructions; bear right in a quarter mile, make a left at the stop sign, and finally arrive. Unfortunately, the elementary school parking lot it had directed me to was not where I needed to be.

Navigation systems leverage huge data sets that include street maps, topography, business data, traffic information and more, to generate responses to our queries. Unlike my experience that day, they are usually helpful. They use available data to select the best options for us as we find our way.

Today, these systems use machine learning algorithms to analyze data and detect needed updates. For example, algorithms can identify when a business has changed its location or when a new road has been built. We welcome these modern capabilities, as they help us know if there is a road closure, heavy traffic or if there is a new coffee shop on our route.

But as with any piece of technology, there are risks. If the data that the application uses is stale or corrupted in any way, you can end up arriving at a restaurant on the day it's closed or be directed toward the high occupancy lane when traveling solo, or even end up at an elementary school when you are looking for a technology company.

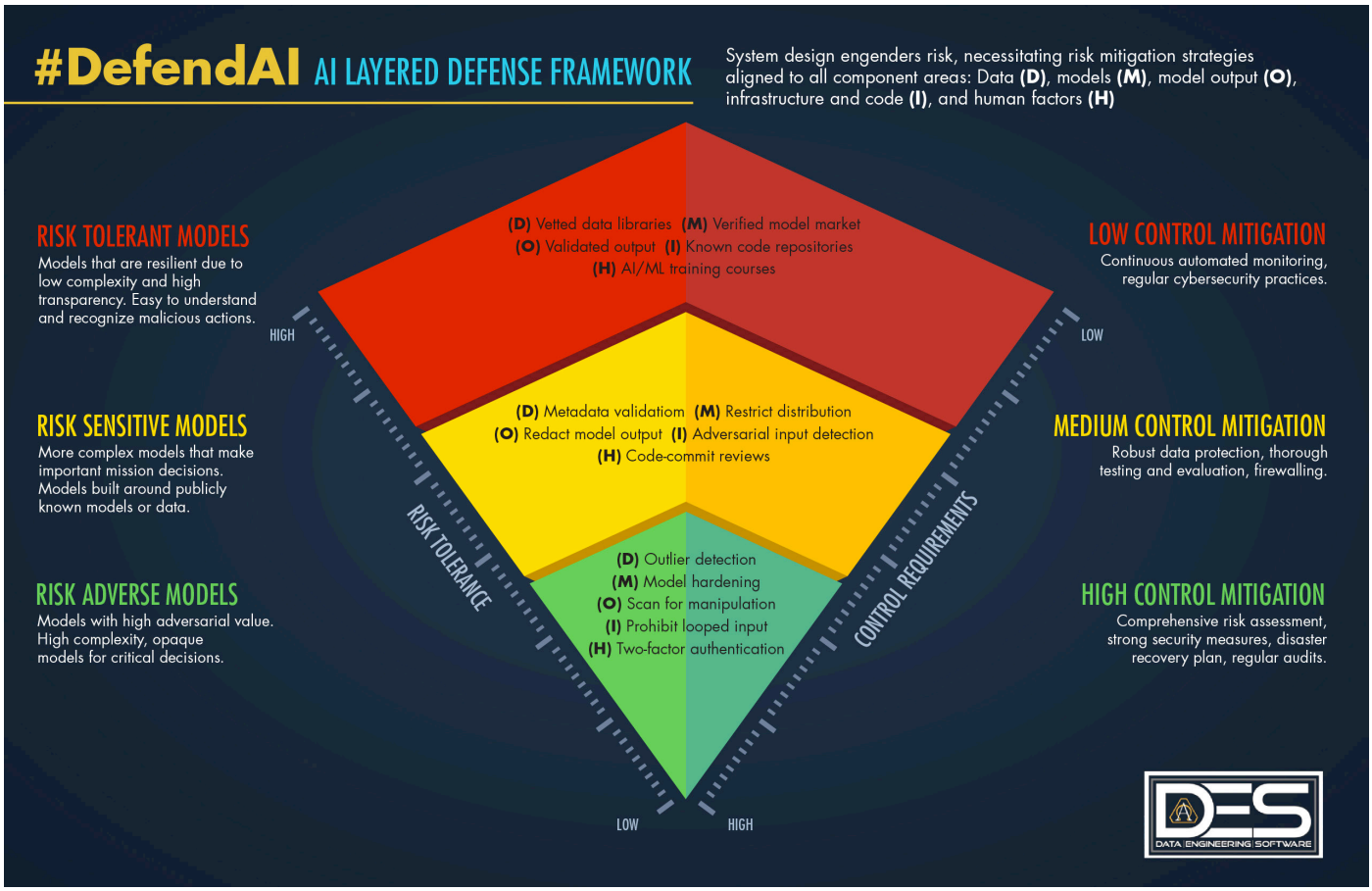
In many cases the risk of a mistake with your navigation system is low enough for us to not worry about it. But what if the stakes were a bit higher? Consider if you were planning to host a VIP for dinner. In this case you might check an alternative data source to confirm hours of operation (e.g., the restaurants website) instead of relying on the data that comes up in the map application. You might even call ahead for a voice confirmation. These are ways of mitigating the risks to the navigation system; ways of implementing some simple safeguards to ensure your plans are successful.

AI-SPECIFIC RISKS

When we consider developing or deploying artificial intelligence (AI) capabilities for military, there are risks that can't be mitigated by calling the restaurant. Leveraging AI capabilities in the Army necessarily means that we have some systems that provide sensitive and critical output; output that must be right. Consider an unmanned aerial system that has been developed to operate semi-autonomously to execute an attack. Even when its communications systems are jammed as it approaches enemy lines, it needs to continue operations to complete the mission. A system like this must rely on its internal data sets to navigate, to identify targets and decide when to engage. The risk we considered previously of having a poor quality or corrupted data set could have catastrophic consequences in a scenario like this.

The AI Layered Defense Framework will serve as a thorough theoretical and practical framework for mitigating adversarial risks to our systems and warfighters.

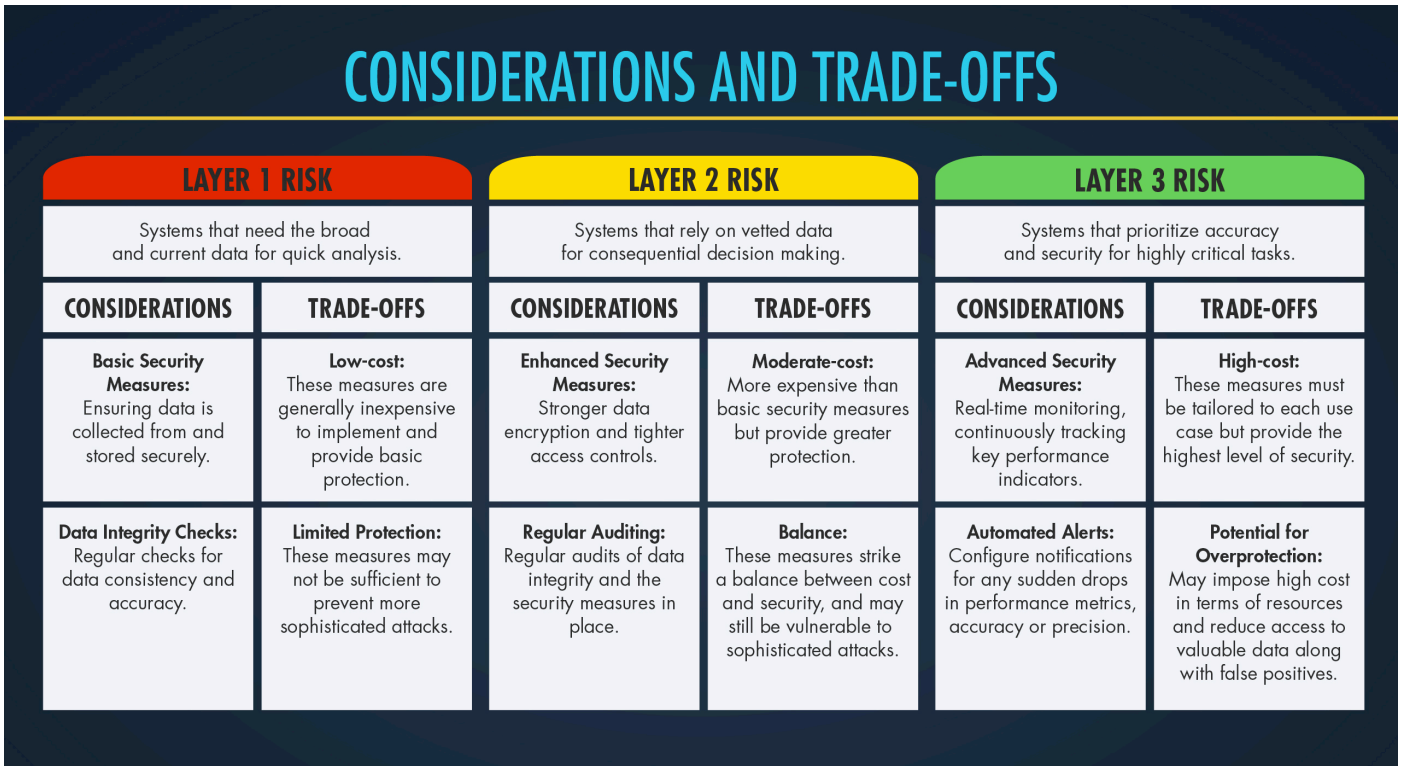
But it's not just the nature of the military scenarios that make AI risks complex. AI capabilities have unique risks all their own. For instance, AI uses massive amounts of data, frequently from disparate sources. This increases the potential vectors for



AI LAYERED DEFENSE FRAMEWORK

The AI Layered Defense Framework will provide program managers with a toolkit to self-assess for AI-specific risks and be informed on relevant mitigations available to them. (Graphic by DASA(DES) and USAASC)

FIGURE 1



CONSIDER THE RISK

There are three layers of risk in which AI capabilities fall and data needs to be secured and safeguarded depending on system need and risk strategies. (Graphic by DASA(DES) and USAASC)

someone to pollute your data. Consider requesting of your GPS to find the closest coffee along your route. It's entirely possible that company A might be closest, but a competitor could poison the data to make it look like company B is closer. Of course, data poisoning by a peer adversary in a military context is even more troublesome.

Another AI-unique risk is related to the black box nature of modern AI systems. Complexity has increased so much that we can't discern the way the AI system is generating its output. The navigation system is relatively easy, as there are a finite number of routes that get chosen from. But the way large language models are operating today obscures much of the operation under the hood, increasing the challenge of addressing risks. Checking enormous, crowd sourced data sets or trying to peel back the layers on highly complex neural network algorithms is extremely difficult and requires a high level of expertise and maybe even new technologies.

MAXIMIZING BENEFIT

Challenges aside, the Army must establish a framework for mitigating AI-related risks. The pace of advance on the battlefield doesn't afford the U.S. to abstain from developing AI enabled overmatch capabilities. Going forward means understanding the risks and employing the appropriate measure of mitigations. Each mitigation adds expense and time so it's about balancing the need to develop with the need to secure.

For instance, a bank has a more secure lock on its vault than a child has on her piggy bank. The bank's vault is vastly more expensive to build, and more time consuming to install and operate, but its protection is appropriate for the value of the contents. If we put the bank's vault lock on the piggy bank, that would be a misuse of resources. Valuable or critical systems require more mitigations.

Every mitigation makes development and deployment more complex. Accessing the Secret Internet Protocol Router Network, or SIPRNet, requires a physical token.

This process is cumbersome but required to maintain control. The key to maximizing value though, is to use the fewest mitigations to get to a reasonable level of risk. That's where an AI-specific risk framework comes into play.

AI LAYERED DEFENSE FRAMEWORK

As part of the AI Implementation Plan for Assistant Secretary of the Army Acquisition, Logistics and Technology (ASA(ALT)), announced in March 2024, Deputy Assistant Secretary of the Army (Data, Engineering and Software) is building the AI Layered Defense Framework. The intent of the framework is to give program managers a toolkit to self-assess for AI-specific risks and be informed on relevant mitigations available to them. All AI capabilities would undergo the most basic mitigations (Layer 1) while more critical systems would get additional layers.

There are three layers of risk in which all AI capabilities fall:

Layer 1—AI tools that have broad value, and if compromised have limited potential for harm or hindrance of Army's objectives. The maximum benefit is achieved with the fewest controls. Using a navigation system to find lunch would fall in this category. We don't need to invest a large amount in mitigations here.

Layer 2—AI software that offers strategic value to a more limited number of users. This layer will have more significant mitigation strategies to balance value and security. Key risks will be mitigated.

Layer 3—AI models that provide high value and cannot be compromised. Layer 3 will employ state-of-the-art defenses for the most valuable or critical capabilities.

The AI Layered Defense Framework aims to incrementally increase security measures from an open, accessible strategy to a highly secure approach with stringent controls, tailored to the unique sensitivity and importance of Army data and systems. The AI Layered Defense framework will serve as a thorough theoretical and practical framework for mitigating adversarial risks to our systems and warfighters. Here, risk is being broadly defined as the possibility that the occurrence of an event, related to AI systems, will adversely affect the achievement of the Army's objectives. It's a general statement which reflects the multitude of challenges the Army faces every day and the idea that many mission objectives must be achieved even if there are dangers. The risk is not the potential of harm or injury, those have to be tolerated at some level; the risk is failing to achieve an objective.

To maintain dominance in the battlefield of tomorrow, the U.S. needs to continue to lead in developing systems on the bleeding edge of technology. This means development and inclusion of AI capabilities.

While AI systems face the traditional cybersecurity risks associated with all computer systems, the AI Layered Defense Framework is concerned with building a comprehensive library of risks and mitigations unique to or inherent in AI systems: risk associated with the data used to train the system, the system itself,

MAKE CHANGE

Scaling and maturing artificial intelligence/machine learning is one of seven focus areas prioritized by ASA(ALT) in an effort to Disrupt the Status Quo through digital transformation. (Image courtesy of DASA(DES))

THE UPPER HAND

Staff Sgt. Tessa Mehler, assigned to 2nd Squadron, 2nd Cavalry Regiment, waits for a UAS to land in her hand during Saber Strike 24 on Bemowo Piskie Training Area, Poland, April 15, 2024. To remain ahead on the battlefield, the Army must remain on the forefront of technological advancement. (Photo by Spc. Austin Robertson, 22nd Mobile Public Affairs Detachment)

the use of the system and the interaction of people and system. The AI Layered Defense Framework is intended to be a flexible, structured and measurable approach to address AI risks prospectively and continuously throughout the AI life cycle. ASA(ALT) is interested in learning more about risks associated with traditional adversarial methods, such as Data Poisoning and Model Stealing, and emerging and future risks broadly associated with all branches of computer science as well as the potential for security disruption from theoretical advances in future technologies such as quantum computing.

Identifying risk is only the first step in developing and implementing industry-leading risk mitigation strategies and technologies. ASA(ALT) is committed to exploring computational methods for, among other things, detecting and removing "Trojaned" data among the vast public and crowdsourced data sets used to train models and detecting the creation of backdoors before deployment.

Figure 1 (Page 11) shows a cursory view of how data can be secured and safeguarded depending on the system need and risks strategies to balance value and security. Each system will have unique requirements and considerations that evolve over time.

CONCLUSION

It's no secret that the character of warfare is changing rapidly. To maintain dominance in the battlefield of tomorrow, the U.S. needs to continue to lead in developing systems on the bleeding edge of technology. This means development and inclusion of AI capabilities.

But development of AI capabilities comes with unique risks that require deliberate and appropriately scaled mitigations. The acquisition community has the responsibility to understand the risks and employ appropriate mitigations to ensure maximum benefit for the warfighter.

For more information about the AI Layered Defense Framework, go to ***https://www.army.mil/dasades*** *or* ***https://armyeitaas.sharepoint-mil.us/sites/ASA-ALT-DASA-DESPlaybooks*** *(CAC-enabled).*

JENNIFER SWANSON is the deputy assistant secretary of the Army for data, engineering and software (DASA(DES)). She leads the implementation of modern software practices, including agile software development, DevSecOps, data centricity and digital engineering across the Office of the ASA(ALT). She holds an M.S. in software engineering from Monmouth University and a B.S. in industrial and systems engineering from the University of Florida. She is a DAWIA Certified Practitioner in engineering and technical management and Advanced in program management.

A LOOK INSIDE

Young Bang, principal deputy assistant secretary for the Army for acquisition, logistics and technology joins Darryl Colvin, joint program executive officer for chemical, biological, radiological and nuclear defense for a walkthrough demonstration of Joint Program Executive Office for CBRND capabilities at Aberdeen Proving Ground, Maryland, in August 2023. (Photo by Matthew Gunther, JPEO-CBRND)

THE KNOWN UNKNOWNS

Pacing biological threats with AI using a capabilities-based defense approach.

by Kelly Burkhalter

The national COVID-19 pandemic response emphasized the importance of speed and agility in combatting a biological threat. The pandemic caused millions of deaths, illness and impacted day-to-day life across the globe, emphasizing that despite the type of threat—natural, manmade or otherwise—biological threats can have significant and lasting consequences. DOD historically managed biological threats from a threats-based perspective, that is, creating solutions for specific types of diseases or poisons. What was magnified during the COVID-19 response is that many threats are unpredictable, and the response to unforeseen threats still needs to be swift. This understanding initiated a new approach to biological defense. One that relies on having the best capabilities available to address any threat, rather than solving for a known handful.

A capabilities-based approach invests in platforms to have the infrastructure, processes and skillsets in place and ready to respond to whatever threat may materialize. A platform, like a monoclonal antibody, could be thought of like a foundational starting point that could be easily and quicky adapted to suit different needs. Think of a truck chassis. While there may be different types of cargo containers on the chassis, a new chassis does not need to be developed when it needs to transport different products. The type of containers put on the chassis can change. Artificial intelligence and machine learning (AI/ML) are platform enablers that can support the derisking, sustainment and preparedness of medical countermeasures (MCM) by modeling the art of the possible before a significant investment is made to further develop an MCM.

The Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense's (JPEO-CBRND) Joint Project Lead for CBRND Enabling Biotechnologies (JPL CBRND EB) has invested in platform technology and is leveraging AI/ML to support this capabilities-based defense approach. The Generative Unconstrained Intelligent Drug Engineering (GUIDE) program is at the forefront of examining how to use AI/ML to computationally design MCM candidates and test these candidates in dedicated labs. Doing so will accelerate the medical discovery phase and meet the joint force's needs faster.

HARNESSING THE POWER OF COMPUTING TO STAY PREPARED

The GUIDE gives the medical community a rapid response tool that can increase preparedness posture by speeding up the discovery phase. Using high performance compute powered by capabilities made available to JPEO-CBRND from partners in the Department of Energy, GUIDE reads and analyzes various types of molecular data from studies conducted over the last 50 years and creates algorithms from this data as a prediction tool. AI/ML works exponentially faster than a human and its computations allow it to "see" things on a molecular level that researchers cannot. GUIDE generates upwards of 300 various drug candidate computations that are then tested in a dedicated laboratory by experts and down selected to the best possible candidate. Using this method, GUIDE will identify potential drug candidates that have a high probability of success as measured by meeting four critical attributes (safety, manufacturability, efficacy, pharmacokinetics and pharmacodynamics). Meeting the four critical attributes de-risks the MCM candidate by the medical community by meeting the attributes more accurately, GUIDE provides an effective solution to de-risk an MCM candidate and fast track it into production.

Often, in the MCM development process, most of the cost comes from developing products that cannot be produced or fielded for reasons such as safety, efficacy or manufacturability. By using AI/ML to examine those features early, the MCM that comes out of the discovery phase is more likely to successfully reach

production. This de-risking could potentially save millions of dollars. The data from the non-selected candidates is "learned" by GUIDE and able to be drawn upon for future runs.

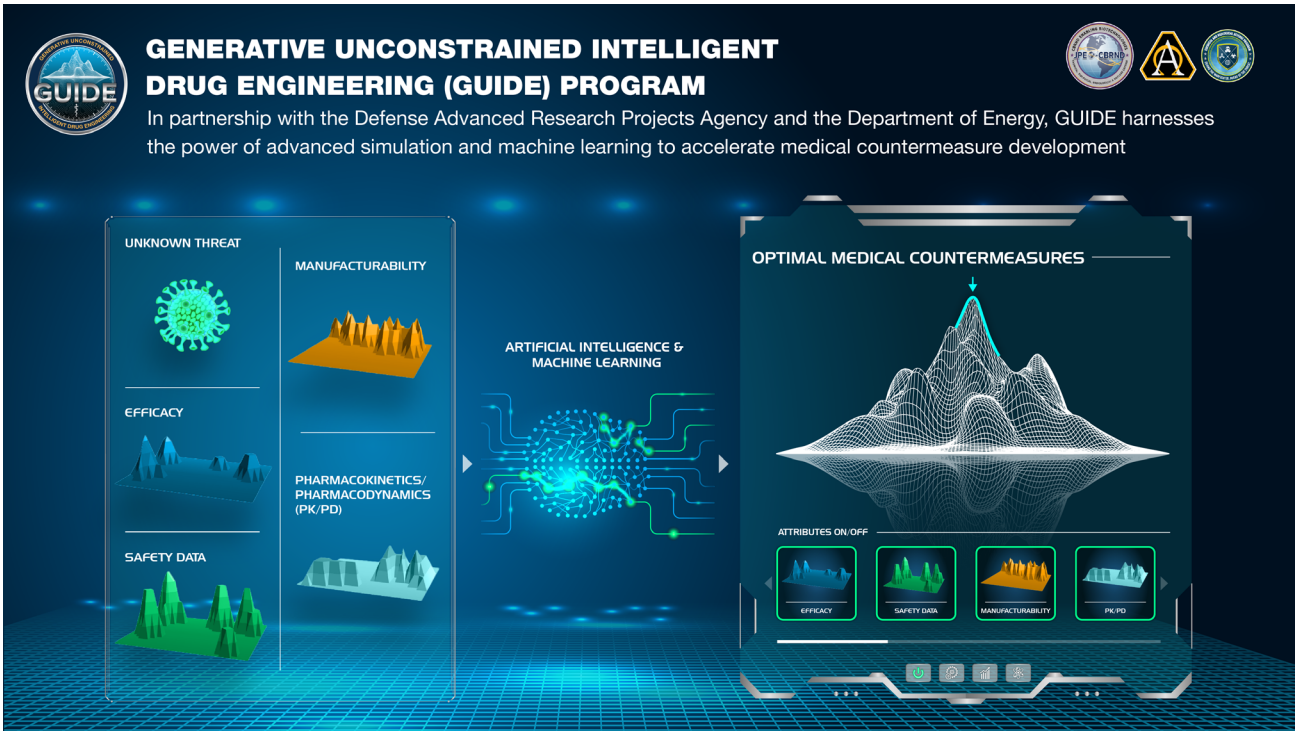
Recently, GUIDE researchers successfully used AI technology to restore the effectiveness of COVID-19 monoclonal antibodies that have lost function due to viral evolution. Restoring the function of antibodies is a game-changing breakthrough to preserve the life and efficacy of medical countermeasures. For example, at the height of the COVID-19 pandemic, researchers struggled to produce MCMs that were effective against the constant new variants of the virus. Using AI to restore antibodies can help keep up with changing viruses by giving the medical community a chance to prolong the lifespan of MCMs.

"It could take decades and millions of dollars to develop a successful MCM. With GUIDE, AI/ML is accelerating the process by helping us see what a viable MCM option could be in a shorter amount of time," said Nicole Dorsey, deputy joint project lead for JPL CBRND EB. While this technology gives the medical community a head start, it does not replace the human researcher. It would, instead, make the human researcher's job more important.

AI/ML AS A TOOL AND PARTNER, NOT A REPLACEMENT

Even if AI/ML can generate a world of possibilities, human researchers are still needed to test and select the best fit, understanding the broader context of the needs and requirements, and applying scrutiny and methods to eliminate the possibility of data bias or other nuances that computers are unable to discern.

Since GUIDE is an agnostic system that analyzes data from a molecular level, there is no potential gender or racial bias to consider. Once the selected computations enter a clinical trial, the medical community can ensure that bias is avoided by enrolling diverse human subjects in the studies to understand the medical impact across populations. Computations can only produce



GUIDE THE WAY

GUIDE is an interagency program between JPL CBRND EB, the Department of Energy and other interagency, academic and industry partners. GUIDE's mission is to use its integrated computational and experimental capabilities to accelerate drug development for the warfighter by harnessing the power of advanced simulation and machine learning. (Graphic by Maya Munk, JPEO-CBRND)

data; humans must set the conditions to ensure the final products minimize and account for any discrepancies across human subjects.

GUIDE uses both historical data and purpose-built datasets which do not have these inherent biases. Rigor in testing should account for diverse populations and circumstances to understand how drug candidates engage and interact with human subjects. Humans still need to have a role in programs that use AI/ML technology to provide that discerning eye and ensure there are safeguards to minimize bias. While a machine can read the data, scientists must interpret the data, apply it and figure out if what the data suggests can be possible.

"AI is great, but it can only see so much, especially when we are looking at molecules," said David Bailey, acting director for advanced technology platforms at JPL CBRND EB. "We can see some 'what-if' molecules, but we need the experts in the medical community and the clinical trial process to show the efficacy and safety is validated across various subject sets."

GETTING TO THE FIELD, FASTER

Response time is critical to defeat any threat. AI/ML can help programs like GUIDE get a head start to finding solutions, but speed and agility must be embraced throughout the entire process, including procedures and collaboration, to prevent stalls in fielding a solution. AI/ML can speed up potential solutions, but the next steps need to move just as quickly to defeat an evolving biological threat.

"GUIDE gives the community best potential starting molecule to fight a threat, but that molecule then needs to be further developed. This rigorous testing and evaluation can only happen from the support of the U.S. government, industry and academic partners to get it over the finish line," said Dorsey.

The DOD must work together to apply and validate findings from AI/ML and use all the resources at its disposal to move a candidate from discovery to Phase I clinical trials and then on to production. Some of those resources could include using opportunities such as Expanded Access Protocol to allow for emergency access to MCMs that are currently under development, working with the whole of government to develop requirements rapidly or investigating how tools like AI/ML could be used in the post-discovery phases of the MCM development process.

"We are using the power of technology to pull data that the Army, U.S. government and industry collected over decades and reuse it," Dorsey said. "Next, we optimize the data and build it into a data model to address real world threats for industry and government partners. This allows us to send the joint force what they need most in the field, providing a defense against whatever threats they may encounter."

CONCLUSION

The best way to react to the unknown is to be prepared. AI/ML is one tool that can support preparedness by accelerating MCM discovery. Tools like these allow DOD to hit the ground running in the face of a threat by saving time and money. To get these MCMs from concept to production requires human coordination and partnership within the community to ensure that the potential candidates generated by AI/ML and experimentation can be operationally relevant and accomplish its mission of saving lives. Realizing the full benefits of technology requires collaboration, responsible use and scientific rigor.

"AI/ML is just one of the tools in our capabilities-focused approach to biodefense," said Bruce Goodwin, joint project lead for CBRND EB. "Technology like this allows us to carry out our mission to enable joint force resiliency, provide rapid response in the face of a threat and provide operationally relevant solutions that can give our joint force the support they need at the time they need it." Fiscal year 2024 marks the second year of GUIDE as a program and, with the support of its partners across the government, it achieves new levels of preparedness and makes the unknown manageable for the joint force.

For more information, contact the JPEO-CBRND Public Affairs Office at ***usarmy.apg.dod-jpeo-cbrnd.mbx.jpeo-cbd-public-affairs-office@army.mil*** *or go to* ***https://www.jpeocbrnd.osd.mil****.*

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BASIC CBRN TRAINING

U.S. Army Spc. James Collins, 10th Army Air and Missile Defense Command, secures his mask during a comprehensive chemical, biological, radiological and nuclear training held by Headquarters and Headquarters Battery, on May 31, 2024, in Landstuhl, Germany. (Photo by Sgt. Yesenia Cadavid, 10th Army Air and Missile Defense Command)

FROM CANARY *TO COMPUTER*

Digital transformation and the modern CBRN battlespace.

by Vashelle Nino

Humankind has long sought innovative ways to circumvent threats to existence, oftentimes modifying established solutions to suit a prevailing need. An exemplar of this innovation can be found in the evolution of chemical, biological, radiological and nuclear (CBRN) defense from modest beginnings to the present digital battlespace.

Perhaps the earliest incarnation of modern day CBRN defense traces back to 19th century coal mines, the setting of a vital but life-threatening industry. The oxidation of coal produced carbon monoxide, a noxious and notoriously undetectable gas. This is how the high-flying, bright-feathered canary came to accompany coal miners deep into the mines. Their sensitivity to (and subsequent death from) poisonous gas alerted their human counterparts to an airborne threat long before they would feel its effects. Though a crude practice by today's standards, miners came to see canaries as sentinels and protectors.

This primitive early-warning system was soon adopted by Soldiers during World War I, becoming one of our warfighters' earliest attempts at CBRN detection and defense. Canaries became a highly valued asset on the battlefield—even appearing in war memoirs—and would go on to be used during the 1990's Gulf War and by Iraqi civilians for potential chemical agent detection as recently as Operation Iraqi Freedom.

Still, canaries as CBRN detection devices had its drawbacks. For one, escape of a canary tipped off opposing forces nearby, compromising defense strategy. Also, many viewed use of these unsuspecting animals as an inhumane practice. But perhaps most crucial, it was a rudimentary solution traversing a landscape advancing toward the digital world and our rapidly changing modern battlespace.

FLYING TOWARD DIGITIZATION

By the 1950s, CBRN detection capabilities had advanced significantly from the canary to more progressive devices. However, challenges such as lack of mobility, susceptibility to the elements and inability to provide warning to nearby warfighters ensured a short shelf-life for most detection prototypes; and while incremental improvements would be made, capabilities evolved into the digital domain at a relatively slow pace. Fortunately, this is not the case today.

The Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense (JPEO-CBRND) is adopting digital technologies to transform processes and improve the development of capabilities that serve the joint force to keep pace with the ever-changing threat environment, which is gaining speed and becoming more dynamic. Joint Program Executive Officer for CBRN Defense Darryl Colvin has emphasized the importance of staying at the forefront of this work for the Army and the DOD's Chemical and Biological Defense Program. Colvin shared his vision for the future of CBRN defense technology: "It is all about the data. We want the warfighter to have as much information as possible at their fingertips so they can understand the environment, make informed decisions and respond faster to the situation. This requires integrated systems communicating and working together to provide situational understanding, getting actionable information to the joint force faster." The JPEO-CBRND is building on this vision and taking steps to integrate today's CBRN defense equipment and its data into digital spaces to inform and improve command decision making.

The absence of information generates blind spots. This puts commanders at a disadvantage and warfighters' lives at risk. The Army is harnessing the power of data, digital engineering, software and workforce development to integrate CBRN defense capabilities into the battlefield common operating picture across all the services.

TRANSFORMATION THROUGH DATA INTEGRATION

Digital transformation in the form of data integration increases readiness, preparedness and lethality on the battlefield, and thorough situational understanding requires systems and capabilities to communicate with each other, faster, in a networked system across the joint force. In short, we cannot afford to think of CBRN environments as separate, isolated battlespaces.

Recently developed technologies—such as the CBRN Support to Command and Control (CSC2)—enable situational awareness and command and control to continue operations in a CBRN-compromised or threatened environment. CSC2 integrates sensor data into a common architecture across the joint force, allowing for a near "plug-and-play" capability while providing automated CBRN hazard warning and reporting, which enables accelerated decision making and reduces false alarm rates. Paul Gietka, joint project lead for CBRN integration said, "CSC2 enables the interoperability and integration of CBRN and non-CBRN sensors to achieve critical situational awareness and understanding, increasing the speed and confidence in which commanders can make informed decisions."

WILL DO CSC2

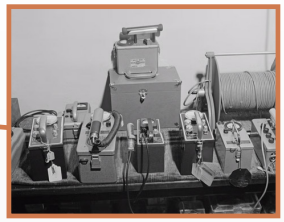
Drew Murphy, joint product lead for CBRN Integrated Early Warning, demonstrates the CBRN support to CSC2 tool to leaders at Focus Falcon 2023 on Aberdeen Proving Ground, Maryland, in August 2023. (Photo by Matthew Gunther, JPEO-CBRND)

EVOLUTION OF A CANARY TO COMPUTER

CBRN gear used to mean a canary and run of the mill personal protective equipment. This timeline shows a few of the historic and modern CBRN protective measures that kept the warfighter safe. JPEO-CBRND is working closely with the joint force to equip warfighters with the CBRN protective tools needed to save lives in our ever-changing threat environment and stay ahead of the Soldier's needs in the future battlespace.

A canary in a cage, Tobruk, Libya. Circa 1941. (Photo courtesy of the Australian War Memorial)

South African women's services on duty in the Middle East: A South African W.A.A.F. sergeant instructor fitting a gas mask to a beginner. Circa 1940. (Photo courtesy of the Library of Congress)



A row of Geiger counters. Circa 1955. (Photo courtesy of Getty Images)

Improved Chemical Agent Monitor (ICAM), fielded and in sustainment as of 2021. (Photo by U.S. Army)

Aerosol Vapor Chemical Agent Detector (AVCAD), 2024. The product is in the Production & Development phase. (Photo by U.S. Army)

Nuclear Biological Chemical Reconnaissance Vehicle Sensor Suite Upgrade (NBCRV SSU), currently in the Engineering and Manufacturing Development Phase. (Photo by U.S. Army)

Wearable sensors technology in testing and assessment during Talisman Sabre exercise in Australia, 2023. (Photo by U.S. Army)

PUTTING IT TO THE TEST

U.S. Army Sgt. 1st Class Carlos Moranbonilla, 10th Army Air and Missile Defense Command, creates tear gas during a comprehensive CBRN training held by Headquarters and Headquarters Battery in Landstuhl, Germany, on May 31, 2024. (Photo by Sgt. Yesenia Cadavid, 10th Army Air and Missile Defense Command)

Unlike the canary method, CSC2 does not stop at merely detecting and warning of the CBRN threat. It provides analysis, reporting and decision support that will help commanders quickly interpret and use available data, increasing confidence on the battlefield while protecting warfighters and keeping them in the fight.

CHAMPIONING DIGITAL LITERACY

To keep capabilities such as CSC2 relevant and effective, it is crucial for the CBRN defense community to stay abreast of developing technologies. To that end, JPEO-CBRND is leading the charge through a Digital Literacy Campaign, providing learning opportunities to its workforce so that practitioners can remain adaptable and capable of using and acquiring digital technologies within their capabilities development pipeline. In turn, the workforce will benefit from increased accessibility to digital products; enhanced virtual collaboration for continuity of operations; faster adoption and use of new digital technologies, processes and tools; and improved information sharing. This not only enables incremental—and thus, current—delivery of capabilities, but the capacity for those capabilities to be improved over time in the pursuit of agile design, development and delivery.

IT TAKES A VILLAGE

While JPEO-CBRND is making strides to ensure the digital competency of its workforce, it is impossible for the organization to cover the depth and breadth of CBRN defense modernization digital transformation alone. JPEO-CBRND actively seeks industry and academic support in the areas of data integration and digital transformation. One main avenue JPEO-CBRND employs to connect with potential partners is through its Joint Enterprise Technology Tool, or JETT.

JETT is a web-based engagement tool designed for industry, academia and laboratories to introduce their ideas and capabilities to JPEO-CBRND so they can accurately and effectively connect them with the appropriate decision-makers within the organization. This might be an engineer with a product that could support portfolio integration, an artificial intelligence company with operational data science to support CBRN decision-making or a pharmaceutical developer who has a platform technology the JPEO-CBRND should know about no matter where they are in the development process. “We want to know what industry is pursuing and discover new ideas and technologies that could potentially help shape future capabilities for the joint force,” said Josh Israel, chief engineer and manager of the JETT program. “We are always looking to partner with those who want to make a difference and solve problems together.”

CONCLUSION

CBRN defense has evolved vastly from a lone canary in a coal mine. Thanks to modernization and digital transformation, our warfighters are better informed, prepared and protected from CBRN threats more than ever. But the quest to protect our service members using an effective integrated layered CBRN defense is far from over. Just as canaries came to be seen as esteemed protectors during their time, digital transformation and CBRN defense modernization efforts ensure that our valued protectors—our nation’s warfighters—have the capabilities they need to fight and win in CBRN contested environments on a rapidly evolving battlefield.

For more information, refer to the JPEO-CBRND’s ***Digital Transformation Smart Book****.*

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TAKING NO RISKS

U.S. Marines from the Chemical & Biological Incident Response Force (CBIRF) participate in a Product Manager Risk Reduction activity at Aberdeen Proving Ground, Maryland in October 2023. (Photos courtesy of JPEO-CBRND)

ON YOUR MARK, GET SET, DETECT!

The Joint Biological Tactical Detection System is ready to go into production.

by Jack Wilson and Alexandra Hillman

It's been 20 years in the making, but the Army is about to get its first lightweight, low-cost, man-portable defense surveillance system for detecting, collecting and identifying biological warfare agent aerosols.

First conceived in 2003, the Joint Biological Tactical Defense System (JBTDS), a project developed under the Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense (JPEO-CBRND), has finally achieved Milestone C, passing a critical point in the acquisition process and moving the capability forward into production and deployment.

The JBTDS will provide the CBRN community with real-time awareness of potential hazards in various operational environments without the logistical burden of being mounted on a vehicle or trailer.

Biological detection and identification is complex and presents significant challenges. Why? Because the diverse range of biological threats out there including bacteria, viruses and toxins, makes it difficult to develop universal detection methods. Each biological agent requires specific detection protocols, and the constantly evolving nature of biological warfare necessitates continuous adaptation and innovation. As these novel agents are realized, continuous evolution and improvement of assay panels will keep pace with the threat and respond with medical countermeasures, as needed.

FILLING A SIMPLE BUT AMBITIOUS NEED

The JBTDS first emerged from the pressing need to enhance the U.S. military's capabilities for the detection, identification and characterization of biological threats during Operation Iraqi Freedom and Operation Enduring Freedom. The idea was simple yet ambitious: create a man-portable integrated system, no heavier than 45 pounds, capable of rapidly identifying and responding to biological agents in operational environments across the globe. The result would be a system powerful enough to detect biological hazards but also small and light enough that the warfighter could still freely maneuver.

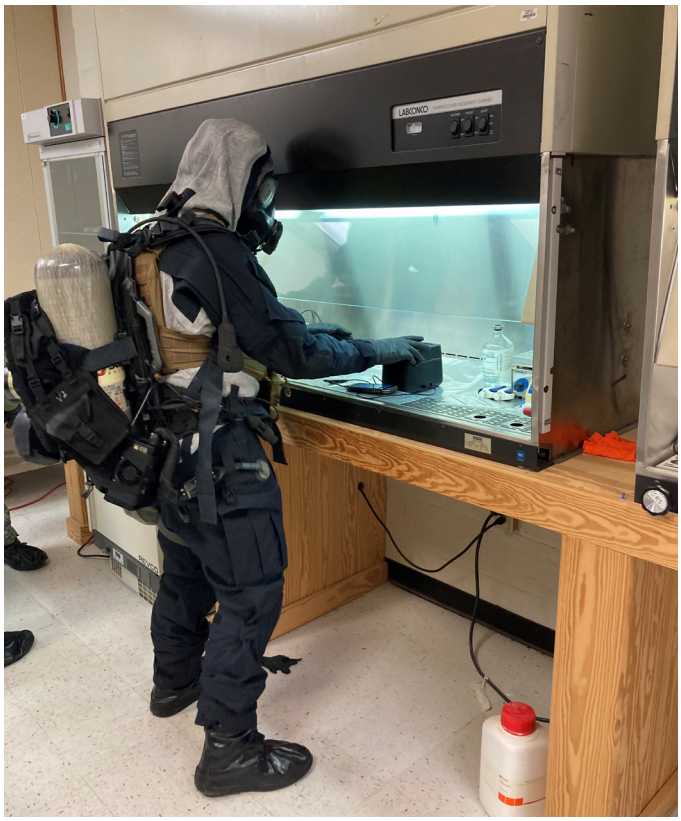
Developing a sophisticated tactical biological detection and identification system from scratch presented numerous challenges. Developers underwent many operational demonstrations and experiments with multiple prototypes to inform the Joint Requirements Office (JRO) and help determine what capability might be possible—and with what features. This technology had not yet been explored on the commercial side, making it a true need for DOD to spearhead its development.

Recognizing the importance of this effort and the clear requirement to protect the joint force from emerging threats, JBTDS stakeholders went to work.

Although it would take 20 years to fully develop the system, there were many technical and programmatic delays that the team had to address and overcome during this period. For starters, team members needed to refine the technology by developing a new detection modality that operated with a battery able to withstand temperature extremes. Then, the team's work was delayed by a two-year moratorium on biological work, starting in 2015. Finally, the team had to overcome technical challenges with the detector, which led to the assessment of multiple solutions during the Biological Point System Assessment in 2018-2019. It was no small feat and took considerable time to overcome these challenges; however, the JBTDS is stronger and more precise because of navigating the ups and downs of advanced development.

It led to greater interoperability with and communication between CBRN sensor instruments in austere environments, for example. The JPEO-CBRND's Joint Project Manager (JPM) for CBRN Sensors team was also able to forge partnerships with other Program Executive Offices and project managers to ensure that cyber compliance and security was not compromised; among their accomplishments was a comprehensive Cyber Security Strategy, a first for a biological sensor within the JPEO-CBRND portfolio. Additionally, the team coordinated numerous requirements across

The JBTDS will provide the CBRN community with real-time awareness of potential hazards in various operational environments without the logistical burden of being mounted on a vehicle or trailer.



NECESSARY PREPARATIONS

U.S. Marines from the CBIRF participated in a Product Manager Risk Reduction activity at Aberdeen Proving Ground, Maryland in October 2023. Product managers often conduct excursions with operational units to identify potential risks to performance as well as document warfighter experiences using the equipment prior to undergoing further testing.

the services to verify that all branches had their CBRN detection and identification needs met.

Upon completion of the technology's experimentation and demonstration, a validated Capability Development Document was endorsed by the JRO Counsel in 2014, indicating that the capability met the requirements set forth by DOD to protect and defend warfighters downrange.

A defining aspect of the JBTDS project has been the collaboration among various U.S. government agencies. JPEO-CBRND played a pivotal role in bringing together experts from different domains to foster the development of this much-needed detection capability. For example, the U.S. Army Combat Capabilities Development Command's (DEVCOM) Chemical Biological Center (CBC) provided crucial technological advancements using its cutting-edge research capabilities and ingenuity to design a biological warfare agent trigger and detector that could be integrated with the JBTDS.

DEVCOM CBC contributed its vast biological detection experience, while the Defense Threat Reduction Agency's Joint Science and Technology Office, which, along with the JPEO-CBRND and JRO is part of the larger Chemical and Biological Defense Program (CBDP) and a science and technology development partner of the JPEO-CBRND, lent expertise in emerging and novel threats. Meanwhile, the CBDP's JRO assisted in navigating the joint capabilities integration and development system process, which defines DOD acquisition requirements and evaluation criteria, even as other stakeholders worked to qualify the system.

The JBTDS' journey is far from over.

A GAME CHANGER

The JBTDS offers several advantages that make it a game changer in the field of biological threat detection. First, the system provides real-time detection and identification of biological agents, allowing for swift and informed responses to potential threats. The system is also versatile, so it can be used on a wide range of operational environments, from military

FIRST OF ITS KIND

U.S. Special Operations Command Soldiers conducted simulation testing on the Biomeme 3/9 Integrated Sample Prep JBTDS Identifier at Joint Expeditionary Base Little Creek-Fort Story, Virginia in October 2022. This device is the first of its kind to provide polymerase chain reaction identification, where warfighters can identify a pathogen at the point of collection rather than transporting samples to laboratories.

JBTDS SAMPLING
During a Product Manager Risk Reduction event at Aberdeen Proving Ground in October 2023, a Marine from CBIRF prepares a sample obtained from the JBTDS Detector/Collector for PCR identification using the Biomeme 3/9 ISP identifier.

deployments to homeland security and disaster response scenarios.

The product's reliability, availability and maintainability (RAM) sets it apart as well. Extensive testing and end-user feedback has been used to enhance the system's performance to ensure its RAM will meet mission requirements, making it a more sustainable tool. Additionally, the system's reliability supplies the warfighter with confidence in the results. Finally, the CBDP will continue to collaborate with interested stakeholders to ensure that the JBTDS remains at the forefront of technology, through ongoing improvements and updates.

FINALLY—THE MILESTONE C ACCOMPLISHMENT

The project finally achieved Milestone C status in August 2023—a pinnacle accomplishment for the JPEO–CBRND and its JPM CBRN Sensors team. It represents a critical decision point, signifying that the system has undergone rigorous testing and evaluation, proving its readiness for production and deployment, and officially recognizing that it is prepared for the rigors of a multi-service operational test and evaluation. The milestone marked the culmination of 20 years of hard work and cooperation from countless stakeholders throughout the department, ultimately equipping the joint force with a key bio-detection capability to ensure warfighters are safer in CBRN-contested environments.

"The JBTDS achieving Milestone C is a testament to the dedication and unwavering commitment of many stakeholders over the years and stands as an example of overcoming acquisition challenges," said Col. Robert Carter, the previous joint project manager for CBRN Sensors. "Although we have come this far, the innovation required to stay the course and deploy this capability is still very much at the forefront."

MOVING FORWARD

With Milestone C achieved, the JBTDS is now positioned for Full Rate Production within the next 24 to 30 months. However, the JBTDS' journey is far from over. JPM CBRN Sensors will continue to improve the system's identification capability over the next 18 months.

Since entering Milestone C, the JBTDS has shown improvement in identifying biological warfare agents at both low and high concentrations while undergoing testing at Dugway Proving Ground, Utah. Based on preliminary data, it is projected that the identifier will meet the full threshold requirement in fiscal year 2026. The capability deployed to the force will be operationally effective and provide commanders confidence to make informed decisions to prevent or mitigate biological threats that may affect their troops.

In parallel, the JBTDS will continue to adapt to emerging threats and changing operational environments using an incremental approach to provide operationally

relevant capability as threats and technologies evolve. JBTDS is poised to integrate into CBRN Support to Command and Control (CSC2), the JPEO–CBRND's first approved DOD Software Acquisition Pathway program. This will allow commanders to maintain battlefield situational awareness at all echelons of command, while also helping to enable a full CBRN Integrated Layered Defense.

Warfighters using the JBTDS need confidence in the system's ability to provide early warning in the event of an alarm. However, JBTDS users must also be aware of the concealment tactics used by adversaries that have the potential to further complicate their detection.

Developing a sophisticated tactical biological detection and identification system from scratch presented numerous challenges.

Biological agents can be dispersed covertly, making their detection and identification challenging, especially in large open environments such as rural battlefields and urban areas. The onset of symptoms in biological warfare victims often delays detection until after exposure has occurred, heightening the urgency of accurate and timely identification.

As a result, the CBDP must balance the need for effective detection and identification while managing the risk of false alarms. Balancing specificity versus sensitivity can be a true challenge. Both are critical to gaining an accurate result, but finding the balance is what matters most.

CONCLUSION

The development journey of the JBTDS is a testament to the power of collaboration, dedication and innovation in the pursuit of successful CBRN sensor development. The combined efforts of the entire CBRN defense community have resulted in a cutting-edge system that will enhance our nation's capabilities to detect and respond to biological threats. As the JBTDS moves closer to full deployment and as warfighters incorporate this capability into their CBRN defense toolbox, it stands as a symbol of what can be achieved when organizations come together with a shared vision of protecting our nation against "the invisible threat."

For more information about the JPEO-CBRND, go to ***https://www.jpeocbrnd.osd.mil*** *or follow JPEO-CBRND on social media @JPEOCBRND. Questions about the article can be directed to* ***usarmy.apg.dod-jpeo-cbrnd.mbx.public-affairs@army.mil****.*

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ALEXANDRA HILLMAN is the public affairs officer for JPEO-CBRND at Aberdeen Proving Ground – Edgewood, Maryland. She holds a Master of Public Health in health policy and management and a Master of Public Policy and Administration from the University of Massachusetts, Amherst and a Bachelor of Fine Arts in dance from Ohio University.

SAPNA "SONA" PATIL

COMMAND/ORGANIZATION: Program Executive Office for Combat Support and Combat Service Support, Project Manager Force Projection

TITLE: Information technology specialist – SharePoint/Microsoft developer

YEARS OF SERVICE IN WORKFORCE: 2

DAWIA CERTIFICATIONS: Practitioner in engineering and technical management

EDUCATION: B.S. in chemistry, Mumbai University

BUILDING ON EXPERIENCE

Outside of work, Sapna "Sona" Patil's friends and colleagues know she's passionate about building things. Woodworking in her spare time, she can craft anything from outdoor tables and chairs to jewelry stands and daybeds. At work, she's also known as a dedicated builder, but of a different sort—building applications and sites for Project Manager (PM) Force Projection—designing the critical infrastructure used by Soldiers in the field.

"They [friends and colleagues] think I have the coolest job. One of our products is developing bridges that can be carried from point to point and then be unfolded to help Soldiers to cross over waters. Without us, those things would never get to the field," she said. "I am genuinely so proud of the work that we do by helping our Soldiers."

As an information technology (IT) specialist, SharePoint administrator and Microsoft developer for the Program Executive Office for Combat Support and Combat Service Support (PEO CS&CSS), Patil maintains, processes and troubleshoots computer systems. She is also a PowerApps and Power Automate developer responsible for analyzing, troubleshooting and evaluating technology issues and working behind the scenes on systems to ensure that design plans and projects become reality. It's basically Patil's job to ensure that all systems are running smoothly so that the Soldiers get what they need, when they need it.

"As a SharePoint developer, I create websites and applications based on the requirements and needs of our user/Soldiers. As part of the Army Acquisition Workforce there are so many different opportunities to learn, knowing that my efforts are supporting Soldiers and the Army," she said.

After Patil's previous IT job required that she relocate to Atlanta, she parted ways with the company and took some time to consider other opportunities. After a couple months and a desire to "get back out there," she came across a SharePoint developer job opening at PEO CS&CSS. The position was offered to her shortly after her interview.

Aside from being a great fit with her skills and experience, Patil said there were some additional reasons why she accepted the position. The warm welcome that she received was a great first impression, and a good indication of what the work climate would be once she became more acclimated to her position. "The people I met through this position were helpful and made me feel welcome," she said. "They helped me with my onboarding, made sure I had lunch with them so I didn't feel left out, and they showed me where Starbucks was located." Patil said that was pretty key, considering Starbucks is her favorite coffee place. Another reason, she said, was because of her son, 1st Lt. Samir Patil, who had joined the Army as an infantry officer. She wanted to be in a related field where she would do her part for the Army, helping to enable Soldier readiness.

One of her first projects after joining the Army Acquisition Workforce was creating a site for an employee portal for CSS. This streamlining effort laid the groundwork

BUILDING FROM SCRATCH

Patil seated at one of her custom woodworking creations—a 9-foot-long wooden farmhouse table with built-in bench seats that she built in January 2022. When she's not at work building Army infrastructure applications, Patil is passionate about woodworking projects like these in her spare time. (Photo courtesy of Sona Patil)

for eliminating more than 200 spreadsheets and back-and-forth emails, boosting efficiency and saving time.

"Prior to this, employee data was not structured. It was all over the site. One of my colleagues asked if we could create a site where employees have all the important information located in one portal." And that's exactly what she did. "This assignment helped me get recognized and show others the potential I had in building, taking up new challenges and seeing them through," she said. "At this point I am pursing what I really like to do—gathering requirements and building websites." She said the tool was first adopted by her organization, and then forwarded to PEO Ground Combat Systems to be implemented by them.

She also became a chief information officer (CIO) mentor, which provided her the opportunity to meet new people and expand her network to the other PEOs. "I got to meet a spectrum of groups with different areas of focus," Patil said. As a mentor, she met with the cyber team and worked with the IT lead on help desk projects. She even took risk management framework training so she could better understand part of what the cyber team does. "Overall, this experience has helped me strengthen my professional network and relationships along with a firsthand understanding of the many aspects of a CIO job through the rotation. I learned a great deal about cross-functional teams and how to effectively manage projects within our organization."

The projects she has taken on, along with valuable training, have built upon her existing experience.

"The latest career program I was involved in was learning Microsoft Power Suites. I started learning it in 2022 using Udemy, which helped me a lot," she said. "The classes I took helped me understand how to create a Power App and Power Automate. I would highly recommend taking courses through Udemy due to the self-paced learning setup. It's a great learning tool." The other program she took was Carnegie Mellon's Artificial Intelligence and Machine Learning course, which motivated her to use Robotic Process Automation (RPA) in a few of the applications she is building. RPA is a process that uses automation technologies to perform repetitive office tasks like data extraction, filling out forms or moving files. "By doing this I was able to eliminate human error and optimize the process," she said.

To Patil, it's all about building on your experience and implementing what you learn along the way, then sharing that knowledge with others. "I was a mentor to an Army Contracting Center user from Alabama, and my main advice to her was to try and learn new tools as much as possible," she said. "The more knowledge you acquire, the more you can help our Soldiers/clients. Other tips I provided were to always use Microsoft One Note to document all the information and new details that you gather. It's always best to have everything easily accessible when you need it." Lastly, she said, never procrastinate: This can result in challenges down the road.

"Respect and communication are the two most important things in any job," she said. "If you do these two things you have almost done 50% of your job." She said she will always respect everyone no matter who they are, and that you should always be learning and bettering yourself as a person. "Just because you know the work well doesn't mean you should stop trying to improve yourself as an employee. Listen to people's opinions, use your own strengths to help them with their projects and problems, and learn what they have to teach you."

—CHERYL MARINO

SIMULTANEOUS INTEGRATION
DevSecSafOps draws parallels with DevSecOps by automating and integrating software safety testing during software development. (Photo by ThisIsEngineering, Pexels)

THE SAFE ADVANTAGE

Rapid software development with DevSecSafOps integrates safety into modern software development practices.

by Franklin J. Marotta, Camille E. Houston and Melissa Reinard Steffen, Ph.D.

Software is at the heart of many warfighting platforms. To meet Army transformation initiatives, software must be capable of being rapidly modified and deployed. The Department of Defense Instruction (DoDI) 5000.87, "Operation of the Software Acquisition Pathway," describes how modern software development practices, such as agile and development, security and operations, or DevSecOps, deliver products at a speed of relevance. However, these development processes do not directly consider safety and can result in unsafe outcomes.

In an Army where autonomous, artificially intelligent and robotic systems operate with minimal human input, the ability of the software to operate safely and to notify users of an unsafe outcome is even more critical. Development, security, safety and operations, or DevSecSafOps, is a new approach for integrating software safety concepts into the DevSecOps process.

Reminiscent to how 'security' was inserted into the development and operations, or DevOps, process to improve the cyber resilience and timeliness of software delivery, DevSecSafOps ensures software impacts to safety are characterized and mitigated during product development. Software is a source of military advantage, a shift to a DevSecSafOps process is vital to keep pace with rapid software fielding timelines.

EVOLUTION OF SOFTWARE DEVELOPMENT

Software development practices have evolved significantly over time. The Waterfall model of the 1980's developed software through linear sequential phases of requirements definition, design, coding, testing and maintenance; a method best used for creating predictable and well-defined software products. One of the disadvantages of this model is that government software testing does not occur until development is complete, resulting in product delivery delays. The Waterfall model also lacks the flexibility and user engagement which is needed to keep up with the pace of change in the defense industry. As a result, Agile principles began to be incorporated into product development in the early 2000s. Agile actively engages the user and allows the requirements, or user stories, to be continually refined throughout product development. Since Agile delivers software in increments, the users can test and provide feedback on functionality and use during development. In the later 2000s, the DevOps software development method applied the Agile concepts of customer engagement during software development to the deployment and maintenance operations that follow product delivery. The DevOps concept removes the barriers between the developers and the deployment teams, ensuring customer feedback is used to improve the product throughout its life cycle. During the 2010s, the expansion of network and cloud-based

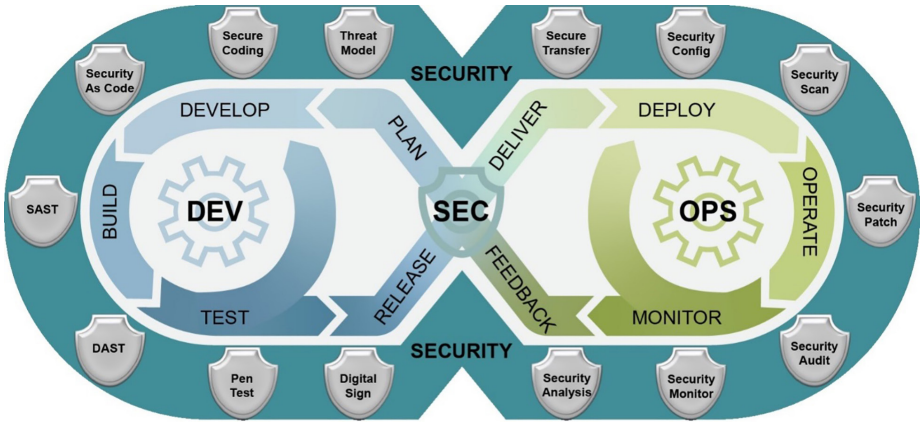
platforms increased the need to incorporate security into software development. However, security testing was executed late in DevOps, causing delays. As a result, the DevSecOps model emerged (Figure 1).

DevSecOps ensures that security decisions are made at the same time as development and operational decisions, and that security testing is automated, improving software deployment. In 2020, the best practices of Agile and DevSecOps were described in the DoDI 5000.87. The DoDI requires capability needs statements, user engagement, value assessments and metrics and iterative delivery of capability to users within a year. The intent of the Software Acquisition Pathway is to deliver effective, resilient, supportable and affordable software solutions to the end user, adhering to safety critical software standards and guidance, ensuring execution at the speed of relevance.

SOFTWARE SAFETY

Software safety presents a parallel challenge to rapid software development as cybersecurity posed to DevOps in the 2010s. Software safety is not directly considered during DevSecOps and testing for safety is executed late in the development cycle or is not executed at all. This can result in significant program delays due to the late discovery of software safety defects, urgent fixes to software safety defects, the need for additional testing, delayed delivery of the software product and elevated risk for hazards as a result of software safety defects. The ability of software to facilitate safe operations is critical, especially as the Army moves toward human-machine integration of autonomous, artificially intelligent and robotic systems operating with minimal human input. Without proper management, software can create safety hazards that impact personnel and infrastructure. For example, software

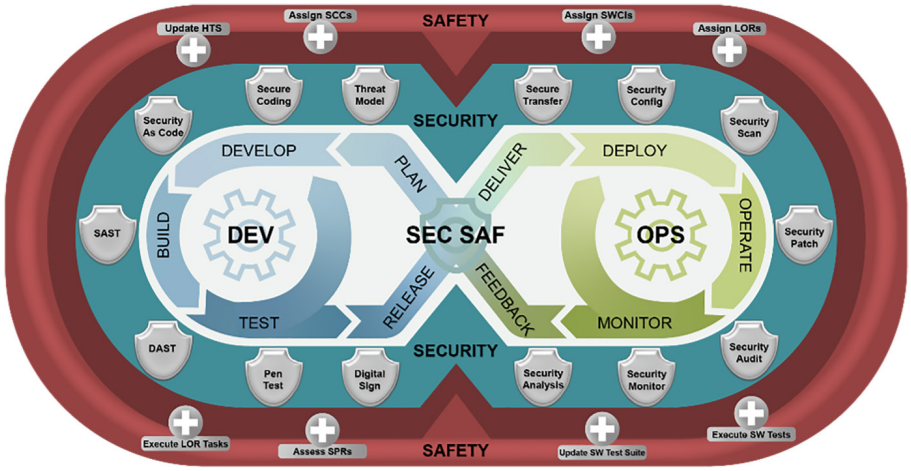
FIGURE 1



COMMUNITY OF PRACTICE

The DevSecOps process aims to unify software development, security and operations. The main characteristic of DevSecOps is to automate, monitor and apply security at all phases of the software life cycle. (Image courtesy of Air Force DevSecOps)

FIGURE 2



SOFTWARE SAFETY ENGINEERING PROCESSES

The DevSecSafOps process builds upon DevSecOps by integrating software safety engineering in the software development process automating safety-significant test cases, implementing continuous safety monitoring during operations and ensuring stakeholder engagement. (Image courtesy of the authors)

BETTER SAFE THAN SORRY

Ensuring software safety risks are identified and eliminated or mitigated early in development will ensure fielding timelines can be met. (Photo by Markus Spiske, Pexels)

safety risks identified late in government developmental testing can limit Soldier involvement in operational test events and result in use restrictions when the software update is fielded. The DoDI 5000.87 requires system safety assessments, safety critical risk assessment and mitigations and safety critical implications as part of the test strategy. Military Standard-(MIL-STD) 882E, DOD Standard Practice System Safety, describes the method to identify and eliminate or mitigate software safety hazards and defines risk in terms of probability and severity. Software that can cause a hazard is considered safety-significant software.

DEVELOPMENT, SECURITY, SAFETY, OPERATIONS

Integrating software safety engineering processes into DevSecOps, or DevSecSafOps, is proposed to reduce programmatic risk for software development while meeting MIL-STD-882E safety objectives (Figure 2). DevSecSafOps draws parallels with DevSecOps by automating and integrating software safety testing during software development. To create the biggest benefit for the program manager, MIL-STD-882E processes must be applied to the initial software configuration to establish a baseline. Safety is evaluated in the DevSecSafOps process when software changes implement new functionality; functionality is modified, removed or disabled; or corrections to software defects are implemented.

Once the scope of a planned software release is defined, the developer's software safety engineer addresses the following questions as derived from MIL-STD-882E:

- Are new hazards introduced by the software changes?
- Are new hazard causes introduced by the software changes?
- Are new hazard mitigations introduced by the software changes?
- Are new mitigation verifications required by the software changes?
- Has the Hazard Tracking System (HTS) been updated appropriately?
- Have Software Control Categories (SCC), Software Criticality Index (SwCI) and Level of Rigor (LOR) tasks been assigned for newly developed or modified software?
- Is there evidence that LOR tasks have been performed?
- Are new safety-significant test cases added to the software (SW) test suite?
- Are new software problems discovered in the software update in the Software Problem Reports (SPR)? If so, do they have safety impacts?

DevSecSafOps ensures that software safety documentation is updated, safety analysis is conducted and necessary test cases are developed and executed as the software is developed and released.

The DevSecOps principle of test case automation is also a key element in DevSecSafOps. All safety-significant software testing cases within the test suite are tagged to be reviewed for their robustness by the developer's software safety engineer and other stakeholders. As new requirements are implemented for a given software release, the automated safety-significant test suite is also updated. Safety-significant test cases that cannot be automated are executed at the system level. Software safety is considered throughout the operations phase through real-time monitoring to ensure ongoing safety assurance during operation. Safety-significant outcomes during operations are automatically collected, reported and analyzed for resolution.

STAKEHOLDER ENGAGEMENT

The successful implementation of a DevSecSafOps environment requires the engagement stakeholders beyond the software developers and software safety engineers. The user, the U.S. Army Test and Evaluation Command (ATEC) and the program manager also play important roles in software safety. The user provides essential feedback on the software's function, helping to identify potential issues and improvements. To ensure Soldiers can safely use the system, ATEC is tasked with developing safety release and safety confirmation documents. Program managers oversee the acquisition process, from development to fielding, ensuring the system meets its contractual requirements and adheres to Army, DOD and industry standards. To enable DevSecSafOps principles during software development, program managers should specify security standards, safety regulations, operational best practices and contractual responsibilities in their contracts. In doing so, they can ensure that vendors adhere to secure, safe and reliable development, testing and deployment practices for their software-intensive systems. By incorporating DevSecSafOps principles early in the development process, stakeholders can gain efficiencies, improve Soldier interactions, reduce programmatic risk and expedite fielding timelines.

CONCLUSION

To maintain a competitive edge on the battlefield, the Army must be able to rapidly develop, upgrade and deploy software to weapons and warfighting systems. Ensuring software safety risks are identified and eliminated or mitigated early in development will ensure fielding timelines can be met. DevSecSafOps combines best practices of Agile and DevSecOps software development processes with procedures for software safety found in MIL-STD-882E, resulting in an efficient software development process that mitigates safety risk, ultimately delivering software at a speed of relevance.

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

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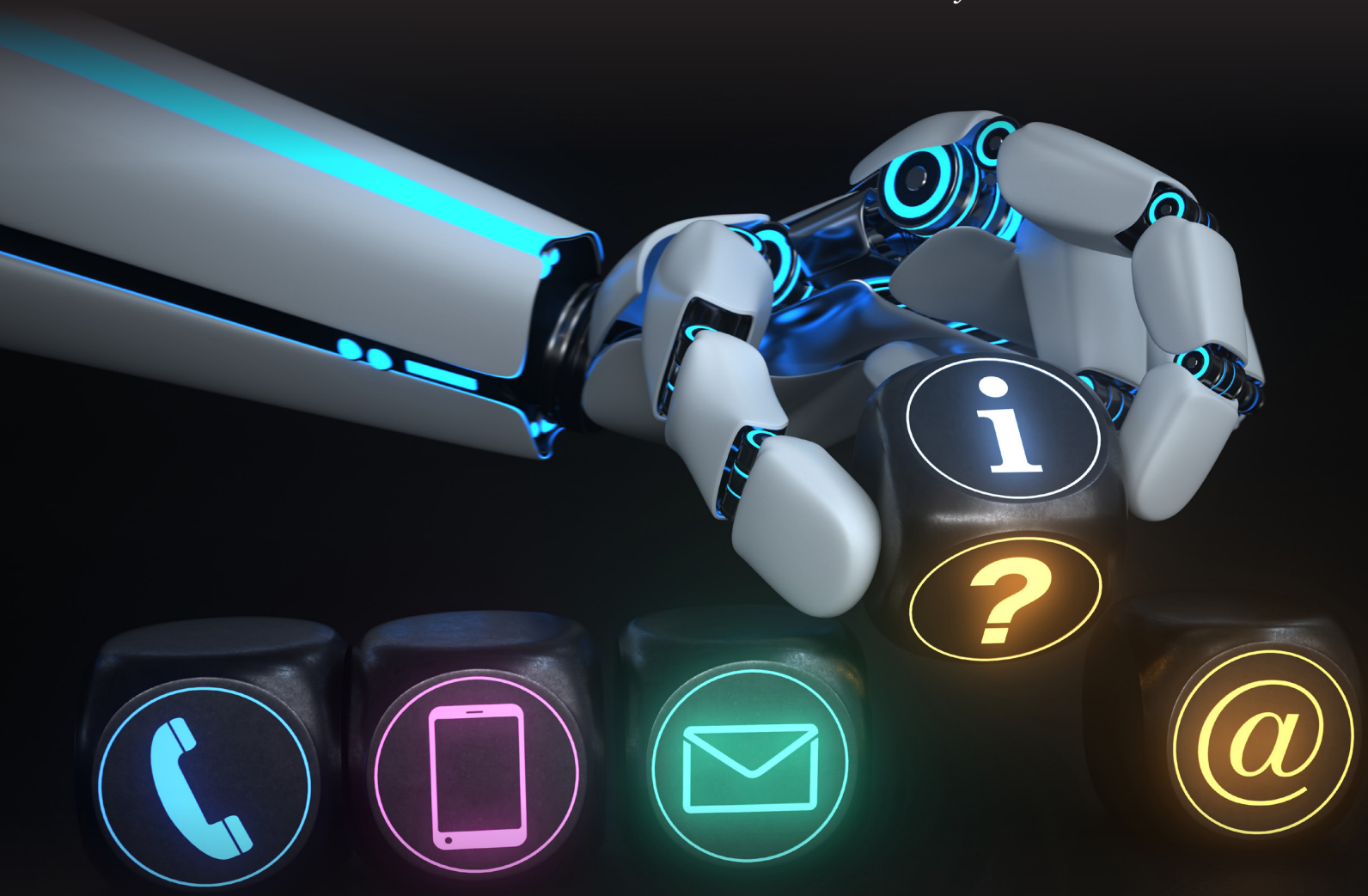
CALL MY AGENT

AI agents collaborate to support Army missions.

by Sunny Zhang, Turhan Kimbrough and Andrew Orechovesky



NEXT-GEN SUPPORT

The latest version of AI, powered by large language models (LLMs), can take a question from a caller, sift through massive back-end sources of information, come up with the most relevant answer, and then relay that answer back to the caller in human-like language. (Photo courtesy of Shutterstock)

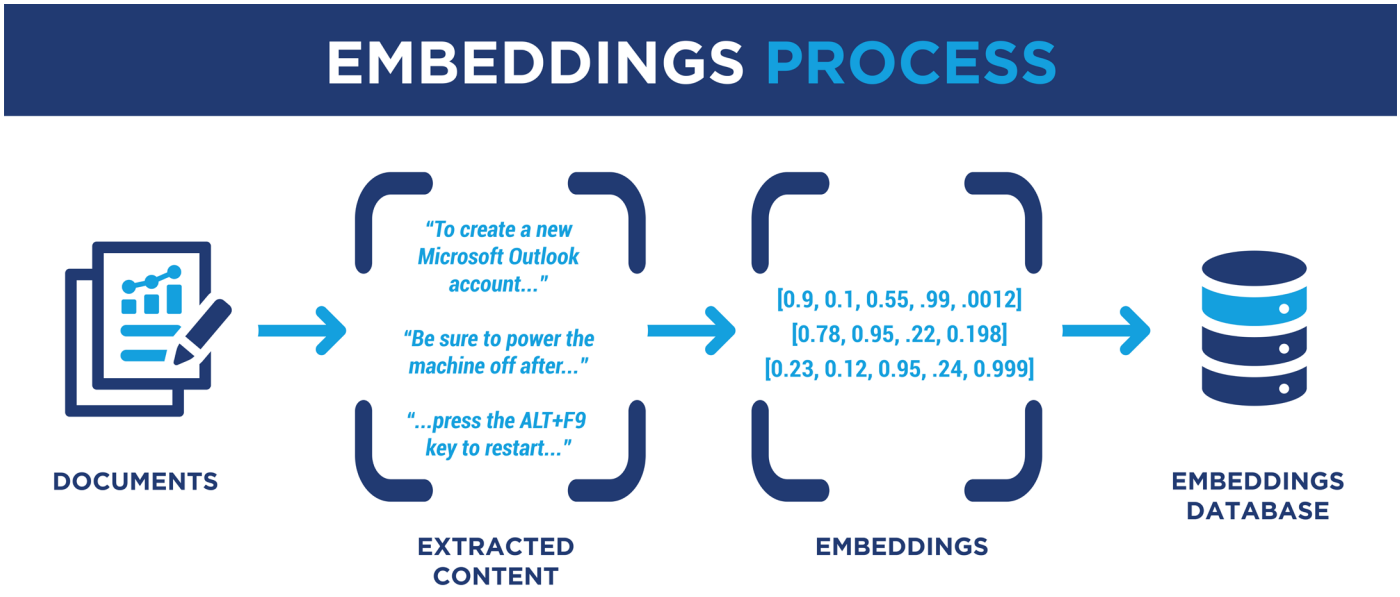
Imagine this: You are out in the field during a training exercise, wrestling with a stubborn equipment issue that has resisted every solution you've tried. Frustrated, you call the help desk, hoping they can guide you to the answer. They answer and, with friendly camaraderie, begin probing your situation before providing a step-by-step walkthrough for your exact issue. Then, much to your surprise, you are asked to rate your interaction with an artificial intelligence (AI) chatbot. Until now, you were under the impression that you were speaking to a human. After all, they sounded and responded exactly like a real person while providing the optimal solution.

AI advancements are progressing rapidly, making this scenario increasingly realistic. What appears to be a single AI entity is actually a team of AI entities working in tandem. These entities, known as AI agents, each specialize in one task and cooperate to provide the best response. One agent gathers information from your speech, another quickly queries thousands of documents to find and rank the best solutions and a third agent uses a powerful language model to generate understandable, accurate and context-rich responses. Like people, AI agents work well in teams, producing greater value than the sum of their parts.

LARGE LANGUAGE MODELS

When you call a company's support hotline, you are often greeted by an automated voice system. While cumbersome, they do a decent job of gathering information from callers and directing them to the appropriate department. These systems may soon see significant upgrades with AI agents powered by large language models (LLMs). Instead of the caller needing to "listen carefully because the menu options have changed" or preemptively pressing "5" for options in Spanish, callers may converse with an AI agent that can respond automatically in a preferred language.

LLMs are also able to sift through huge volumes of text data from sources such as articles, forums and social media platforms to understand and generate human-like language. These models can be fine-tuned for specific tasks. For example, a model trained on software code can learn best coding practices from billions of lines of code. Similarly, a model trained on help desk support can mimic field support representatives or data system engineers and generate relevant remedies to user issues by analyzing a specific collection of documents, such as user manuals and technical documentation. This is especially useful in situations where the availability of human experts is limited.



FIRST THINGS FIRST

Before documents can be read by large language models, they must have their text content extracted and then converted into a series of numerical decimal values, called embeddings. Larger decimal values create more specific embeddings, which can increase the accuracy retrieval. These embeddings are stored in a database specifically optimized for processing these values. (Graphic by Turhan Kimbrough, PEO C3T and USAASC)

BREAKING DOWN THE PROCESS

The process begins with data owners uploading a collection of documents filled with valuable troubleshooting content to a centralized repository. A software toolkit accurately extracts the content from a variety of file formats. Next, the LLM encodes the raw data into a numerical format, known as embeddings, which are then stored in a specialized database and grouped together based on semantic similarity. For example, if a document contains information for setting up a new Outlook e-mail account, this document could be grouped together with other documents containing e-mail procedures.

The first AI agent references the collection of documents to engage with the user, collecting relevant information about the issue at hand. The agent asks questions based on its understanding of common problems and attempts to categorize the issue. Additionally, the agent attempts to discern which steps the user has already tried or skipped. A second AI agent uses the information collected from the first agent to query the embeddings database, retrieving content which is most likely to help solve the troubleshooting issue. The third AI agent, powered by another LLM, uses the retrieved information as context to generate a human-like response back to the user.

AN LLM FOR EVERYONE

The background technology and techniques associated with LLMs have become widely available and accessible in recent years. Several companies and platforms have emerged to provide numerous solutions for consumers to use and experiment with different LLMs. Hugging Face is one such platform that has democratized access to open-source models. Ollama, another platform, allows users to run open-source LLMs on a personal computer offline using only local resources, enabling users to query the LLM without connecting to the Internet or an external cloud. Furthermore, big tech companies have developed significant interest in creating and improving their own LLMs while simultaneously providing them for public use. Some models include Microsoft's Phi-3, Meta's Llama, Mistral AI's Mistral7B and Anthropic's Claude.

AI tools are not without flaws. A major drawback to LLMs is their tendency to confidently provide inaccurate answers when they lack a solution.

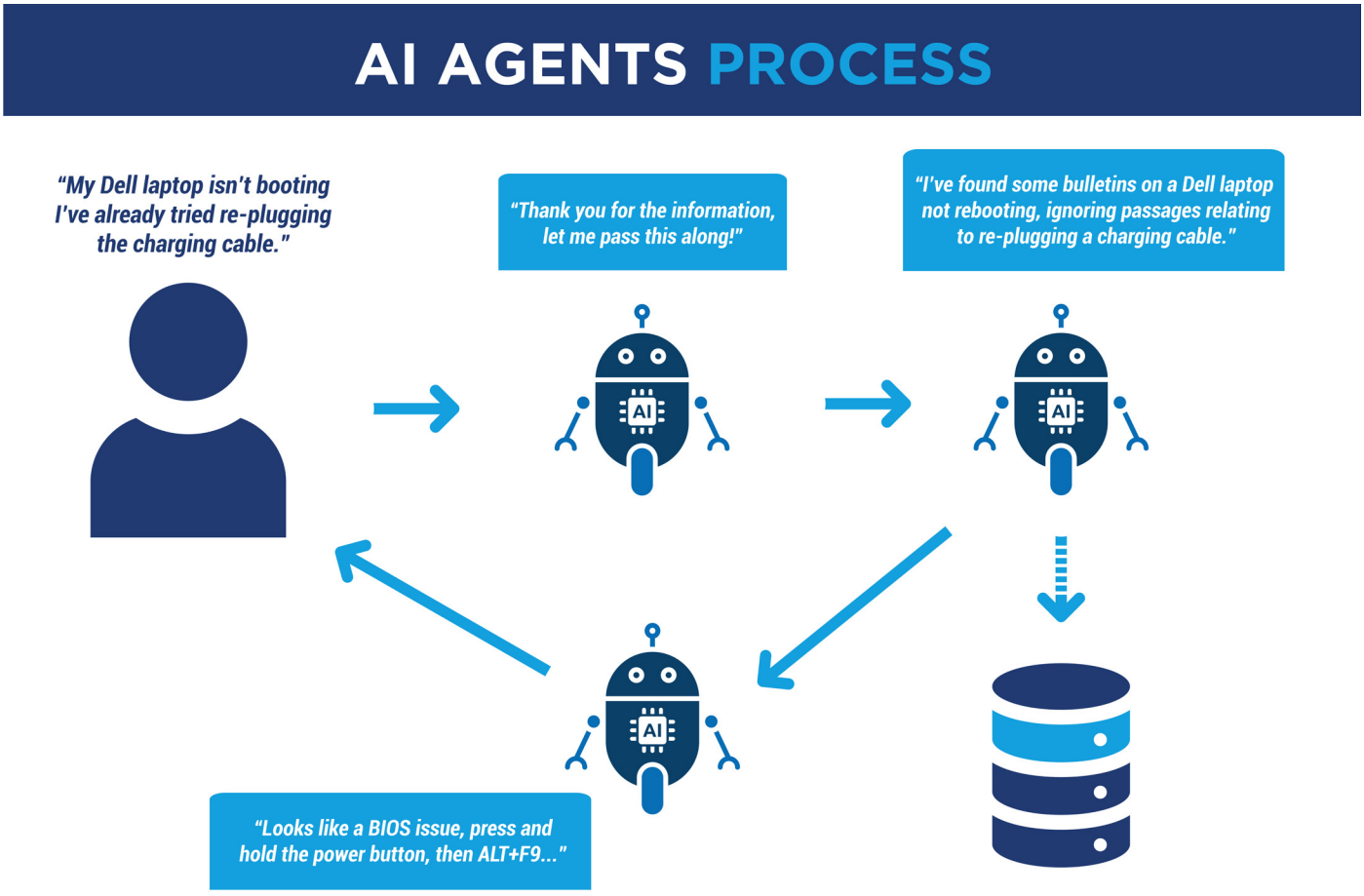
While there has been significant innovation surrounding the development and availability of LLMs, there are still circumstances in which organizations may require specific use cases that necessitate a custom solution. A common use case is the ability to process and reason with a company's internal data. One approach is fine-tuning, where additional training data is provided to a pre-trained LLM to adapt its responses to organization-specific questions. However, this method has a significant drawback as it largely resembles the initial training process, although with less data, and still requires powerful computational resources.

Another more popular and feasible approach being adopted by many organizations is retrieval-augmented generation (RAG), a method that helps LLMs provide more contextually aware responses by sourcing information from a collection of documents, which is the method utilized in our help desk example. RAG comprises two components: a retriever and a generator. The retriever searches a set of documents and returns those most relevant to a user's question. The generator then uses the relevant information obtained from the retriever as context to generate a response.

AI IN THE ARMY

Consumers are beginning to see the effect of AI products in both commercial and common environments, but AI is also becoming widely utilized in the Army. "As an organization, we've been leveraging AI technology to help us write NCOERS [Noncommissioned Officer Evaluation Reports], especially when we encounter difficulties in structuring our thoughts and language," said Sgt. Alfredo Rodriguez, radio communications team lead, 1/150th Cavalry Regiment Headquarters and Headquarters Troop. "Our AI tools enable us to quickly input our written content and receive assistance in correcting grammatical errors and improving overall structure."

Project Manager Mission Command (PM MC) is interested in the role AI will play in the tactical environment, where connectivity is often disrupted, disconnected, intermittent or low-bandwidth (DDIL). The Data Engineering, Architecture and Analysis (DEA2) team within PM MC is developing one such AI tool for DDIL environments that is able to operate with zero network connectivity and has the added benefit of being deployable on a wide variety of devices ranging in computing



IT TAKES A TEAM

To resolve a user's issue, three AI agents work together behind the scenes. The first agent engages with the user to collect information on the problem, the second agent searches a database to retrieve the most relevant information and the third agent uses the information to generate a human-like response back to the user. (Graphic by Turhan Kimbrough, PEO C3T and USAASC)

power. The tool offers LLM and RAG capability to technicians out in the field, reducing the time taken to troubleshoot issues or receive answers. PM MC plans to incorporate LLM technology into its portfolio of products, with the goal of offering valuable capabilities to Soldiers and analysts alike. This includes generating recommendations from operational orders to support mission planning efforts, as well as uncovering insights, patterns and relationships within large and complex datasets for analysis.

Pam Savage-Knepshield, Ph.D., senior human factors engineer with CACI Inc.-Federal, which supports PM MC, is hopeful about the integration of AI tools in the tactical environment. "Not only will LLMs help Soldiers troubleshoot issues encountered during system and network configuration, but they also promise to help those who develop software systems," Savage-Knepshield said. "By creating a diverse library of technical and tactical documents such as Army techniques publications, field manuals, individual critical task lists, test threads, use cases, interface control documents and unit-provided digital standard operating procedures (SOPs), our staff of trainers and user interface, software and requirements developers will have the ability to analyze a rich, trusted dataset to quickly obtain search results to answer questions such as, 'What software functions are needed to ensure coverage of individual critical tasks?' or 'What aspects of user interface design should be customizable based on unit preferences and behaviors as described in digital SOPs?'"

What appears to be a single AI entity is actually a team of AI entities working in tandem. These entities, known as AI agents, each specialize in one task and cooperate to provide the best response.

IMPROVING LLM RESPONSES

The AI agents in this system continue improving in accuracy over time as they interact with users. During the troubleshooting session, the conversation is logged for future analysis to determine which responses gave better results, according to user feedback. Improvements can also be made to both the existing documentation and the host products based on analytics such as frequently encountered issues. Each ticket can be further processed by more AI agents to glean valuable insights on common user issues, problematic AI teams that may require additional support, or usage parameters that require adjustment. Furthermore, as systems undergo development, additional documentation can be created and ingested into the database, providing more context for answer retrieval.

However, AI tools are not without flaws. A major drawback to LLMs is their tendency to confidently provide inaccurate answers when they lack a solution. These inaccuracies, known as "hallucinations," are especially harmful to uninformed users looking for a quick fix—users who are unlikely to immediately fact-check the response from the LLM. One method to combat hallucinations is to utilize RAG, grounding the context within which the LLM can scan for answers. Another method is to prompt, or instruct, the LLM to state that it cannot find an answer. Yet another method is to fine-tune the LLM, modifying and improving the billions of parameters that make up the LLM to make it more accurate, though this is resource-intensive.

CONCLUSION

The integration of AI agents and LLMs into computing systems is revolutionizing the way we interact with technology and obtain support. These advancements are transforming customer service and technical support, making interactions faster, more efficient and surprisingly (even alarmingly) human-like. The combination of specialized AI agents working in harmony and the sophisticated processing capabilities of LLMs ensures that users receive accurate, contextually rich responses almost instantaneously. As this technology continues to evolve, the lines between human and AI interactions will blur even further, opening new possibilities for AI-driven assistance in a variety of fields.

The future of AI is not just about creating smarter machines, but about enhancing our own capabilities, making expert knowledge and support more accessible to everyone. With ongoing innovations and increasing accessibility, AI-driven solutions are set to become an integral part of our daily lives, simplifying complex tasks and providing invaluable support wherever and whenever it is needed.

For more information, contact the Data Engineering, Architecture and Analysis (DEA2) team with Project Manager Mission Command (PM MC) at ***peoc3t.pmmc.tmd.dea2@army.mil****.*

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COMMUNICATIONS CAPABILITIES
Col. Chris Anderson and TGS Product Lead, Kathleen Wilt, PM IS&A, stand next to a PRS 11 (Photos by Dean Hunter, PM IS&A)

KEEP IN TOUCH

Soldier involvement during testing brings value to Army modernization efforts.

by Courtney Savage

Intelligence is critical to any mission. If Soldiers do not know what they're up against, they may be unable to reach their objectives or could suffer physical injury. Getting the most accurate and timely intelligence to units on the ground is paramount—and so is developing an intelligence system that is tailor-made for the Soldiers it will serve.

Involving end-users in an iterative development process helps ensure a system is aligned with their needs and provides valuable insights to validate and inform design decisions and tradeoff analysis. The Army accomplishes this by conducting Soldier touch points (STPs). STPs are conducted early to identify user requirements that need to be met and pain points with currently fielded equipment that need to be redesigned as they are modernized. They are also conducted throughout various stages of development to iteratively refine system design. Post-fielding their conduct identifies system enhancements, new requirements and any missed usability issues. STPs are documented in a program's Human Systems Integration (HSI) Plan in accordance with Army Regulation 602-2, Human Systems Integration in the Systems Acquisition Process.

STP PARTNERSHIP

In selecting participants for STPs, it is critical to have representative end-users to conduct testing. Nearly every state's Army National Guard has a military intelligence unit. Ideally, STPs would be a mixture of Army and Army National Guard members to investigate issues unique to each. To support this methodology, Program Executive Office Intelligence, Electronic and Warfare Sensors' Project Manager Intelligence Systems and Analytics (PM IS&A) is partnering with the 629th Intelligence Electronic Warfare Battalion (IEW BN) from the Maryland National Guard to ensure that Soldiers will be able to effectively use their intelligence ground stations by incorporating Soldier

feedback into the development of the Tactical Ground Intelligence Station (TGS) Lot G—a vehicle-mounted system that is part of the Distributed Common Ground System-Army (DCGS-A). It is used for posting, processing and distributing real-time intelligence, surveillance and reconnaissance information to intelligence analysts and commanders.

The TGS Lot G is a modernization effort of the currently fielded TGS Fleet. The TGS Lot G is leveraging a prototype testbed to test and demonstrate the operational utility of theater command and control with tactical low-Earth orbit and high-altitude long endurance assets with sensor data downlink and dissemination to the warfighter. Additionally, this effort promises to provide enduring capabilities and bridge the modernization gap by addressing sustainability of aging hardware, security, accreditation, maintenance and enhancement of current and future TGS mission requirements; focusing on the system's key infrastructure for data processing, storage and networking hardware; and reshaping the limits of current technology by replacing legacy sensor and communication components with innovative solutions.

These updates are intended to enhance hardware, software applications, tools and communications to address obsolescence within legacy systems and bridge the gap to the Tactical Intelligence Targeting Access Node (TITAN), which is planned to subsume the TGS fleet. In particular, the TGS Lot G will serve as a risk reduction effort for the TITAN Basic variant that will be fielded at the brigade combat team and division echelons. Partnering with industry, PM IS&A has integrated cutting-edge radios, antennas, computers and satellite downlinks in an efficient Humvee-based platform.

There are currently 101 TGS systems fielded across the Army, with 39 of those systems maintained and operated by Army National Guard.

A number of usability issues with the TGS have been captured during STPs. Notable to Army National Guard units is the inclusion of controlled cryptographic items (CCI) and communications security keys. Most National Guard unit home stations have little to no standoff distance, requiring the removal of all CCI between system usage for storage. This makes it logistically difficult for units to properly use and train on their systems.

OVERCOMING OBSTACLES

CW2 Ryan Kriesch, a military intelligence systems technician with the Minnesota Army National Guard, participated in a recent TITAN STP. Much of the qualitative feedback shaping TITAN is directly related to lessons learned from the TGS fleet. Kriesch shared his insights into the unique challenges impacting mission readiness that all National Guard units face with their legacy TGS systems. "Training is a tremendous obstacle in being able to effectively use complex military intelligence systems as most [National Guard] Soldiers will only be afforded 20 days or less of true training hours per year," he explained. "These time constraints are often exacerbated by not having a functioning system for Soldiers to employ their tradecraft."

For units that can get their TGS operationally functional, there are still obstacles to overcome to ensure Soldiers can achieve proficiency on their fielded systems. "With training hours dedicated to set up, emplacing antennas, and tear down, it leaves little if any time to connect into the wider division or brigade architecture," Kriesch said.

Although the current TGS documentation covers internal server and architecture configuration, there are documentation gaps when integrating the DCGS-A software baseline with other programs of record within the TGS, including the Global Broadcasting System, One System Remote Video Terminal and Embedded National Technical Receiver.

Col. Chris Anderson, PM IS&A, understands the importance of fielding usable systems to all Army components. He challenged his team to design the ultimate Humvee-based intelligence ground station that leverages the latest in antenna, data link, radio and compute technology in driving the TGS Lot G design. Not only did his team design it, but they also built a prototype that the 629th Expeditionary Military Intelligence Battalion (E-MIBn) debuted at the request of Col. Michael A. Bryant, 58th Expeditionary Military Intelligence Brigade commander for the Maryland Army National Guard, and successfully showcased to Army senior leaders during the Fulcrum Strike 24 exercise distinguished visitor day. Anderson noted that, "TGS Lot G is a prime example of passionate and dedicated acquisition professionals and our military intelligence Soldiers pushing the art of the possible."

Lt. Col. Joseph Pieper, commander of the 629th E-MIBn, emphasized the importance of adaptability and technical proficiency within the Military Intelligence Branch. "The battalion's collaboration with PM IS&A reflects this vision, as they work together to develop systems that provide revolutionary solutions for commanders' situational understanding in complex environments," Pieper said.

FULLY CAPABLE

Second Lt. Nicholas Dawson and Spc. James Edwards listen to the Fort Cavazos TGS Operator New Equipment Training Geospatial Intelligence Trainer, Giovanni Nieves, discuss the Lot G's quad band on the move capabilities and the satellite communications Ultra High Frequency antenna at Aberdeen Proving Ground, on Aug. 7, 2024.

The battalion's involvement in the TGS Lot G development has not only contributed to the system's technical advancement, but has also fostered a culture of continuous learning and growth among its personnel. According to Pieper, Soldiers are the experts on the dynamics of military intelligence units, further enhancing the battalion's operational effectiveness.

The next major event for the TGS Lot G is a risk reduction event (RRE) and assessment of its capabilities. The assessment will take place with a variety of system configurations which will include using the Mission Command Domain Warfighter Integrated Network-Tactical network infrastructure as a reach-back network and in a stand-alone off network configuration. Army Capability Manager – Foundation or ACM-F and U.S. Army Forces Command, a TGS stakeholder, will support the RRE and assessment. PM IS&A's HSI team is integral to the design of the assessment and for the collection and analysis of Soldier feedback.

During the TGS Lot G RRE and assessment, Soldiers will set up, tear down and operate the system. The HSI team will collect qualitative and quantitative Soldier feedback. Mixed and multiple data collection methods with rigorous human performance metrics will be used during STPs to increase confidence in the reliability of results. For example, during hands-on usability testing, Soldiers perform typical tasks as described above with minimal or no training to increase a system design's intuitiveness and effectiveness. Soldiers rate the ease of use and the cognitive workload experienced when performing the tasks. Test facilitators capture performance bottlenecks, those points where Soldiers "get stuck" and need assistance to continue a workflow for both hardware and software tasks. Tasks and workflows that do not meet a pre-established threshold for human performance metrics will undergo a tradeoff analysis where qualitative feedback tied to those tasks, including Soldier-suggested mitigations, help inform any HSI recommendations made to the TGS team.

CONCLUSION

HSI tradeoff analysis covers seven domains: human factors engineering; manpower; personnel; training; habitability; occupational and health safety; and force protection and survivability. The PM IS&A's HSI and training development experts ultimately inform the human factors engineering, manpower, personnel, training and habitability domains. PM IS&A obtains matrix support from the Defense Health Agency to conduct the Health Hazard Assessment (HHA) to inform the occupational and health safety domain. (For organizations seeking similar support, requests for HHAs can be made at **https://phpubapps.health.mil/HHAR**.) After the RRE and assessment is completed and HSI recommendations are made, the 629th IEW BN will continue to conduct STPs with the TGS Lot G over the next 18 months and the feedback from those events will refine future requirements. PM IS&A's partnership with the 629th IEW BN supporting the development of the TGS Lot G will ensure that Soldiers, especially Army National Guard units, will be able to effectively use their intelligence ground station. This partnership ensures that the U.S. Army and National Guard remains equipped with the tools necessary to maintain a strategic advantage in intelligence operations, now and in the future.

For more information about TGS Lot G assessment, contact Nate Jones at ***nathaniel.jones267.civ@army.mil****.*

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TRIAGE SYSTEM APP

Developed by the U.S. Army MRDC's BHSAI, APPRAISE-HRI consists of an Android app that collects heart rate and blood pressure data received via Bluetooth from a patient's external vital-sign monitor and analyzes the pattern in these data to estimate the patient's potential risk of uncontrolled bleeding. (Photo courtesy of MRDC)

VITAL SIGNS

The first triage system ever cleared by the FDA for assessing hemorrhage risk in trauma patients is powered by AI. How did its inventors ensure it was up to the job?

by Paul Lagasse

Hemorrhage, or uncontrolled blood loss, is the leading cause of preventable death among combat casualties, representing approximately 90% of battlefield fatalities. Analysis of data from the conflicts in Iraq and Afghanistan suggests that between 6% and 24% of those fatalities could potentially have survived if their injuries had been more quickly diagnosed and treated. Given that the median survival time from hemorrhage is just two-to-three hours, the window for identification and treatment is narrow.

Combat medics have long known that hemorrhage is associated with increased heart rate and decreased blood pressure. What they lacked, however, was a way to use that data to assess a trauma patient's hemorrhage risk. A new application developed by the U.S. Army Medical Research and Development Command's (MRDC) Biotechnology High Performance Computing Software Applications Institute (BHSAI) promises to fill that gap with the aid of artificial intelligence (AI).

The Automated Processing of the Physiological Registry for Assessment of Injury Severity Hemorrhage Risk Index, or APPRAISE-HRI, is a smartphone health app that uses AI to quickly assess patients' vital-sign data and assign them to one of three categories based on their risk of experiencing life-threatening blood loss. In April, APPRAISE-HRI received the U.S. Food and Drug Administration's (FDA) first-ever regulatory clearance of an application of its kind, also becoming the first AI-enabled software from the DOD ever cleared by the FDA. The story of how the BHSAI team collected and refined vital-sign data to train the AI algorithm at the core of the APPRAISE-HRI is a fascinating tale of human-computer interaction that has valuable lessons for the future development of AI tools in military medicine.

COLLECTING AND ANALYZING VITAL-SIGN DATA

In 2001, Jaques Reifman, Ph.D., director of BHSAI, first became interested in the problem of whether data collected from the continuous monitoring of vital signs might reveal trends that could be used diagnostically.

"It took time to determine which combination of vital signs we should be using," said Reifman. "We attempted to develop models with all sorts of potential combinations, which was very time consuming. Ultimately, we used high performance computing to identify systolic and diastolic blood pressure and heart rate as the most useful."

The challenge Reifman faced was determining how those vital signs correlated with a patient's hemorrhage state. He proposed training a machine-learning algorithm on data collected from trauma patients to see what trends appeared. With support from the Defense Health Program, the Advanced Medical Technology Initiative, the Henry M. Jackson Foundation for the Advancement of Military Medicine and MRDC's own Combat Casualty Care Research Program, Reifman and his team undertook three independent studies to collect vital-sign data from adult trauma

patients, with associated demographic and clinical data. The BHSAI obtained data from a study conducted by Memorial Hermann Life Flight in Houston, and established collaborative relationships with Boston MedFlight, a hospital-based air medical transportation service and the Massachusetts General Hospital Emergency Department in Boston. Over the course of several years, the team collected diastolic and systolic blood pressure and heart rate data from 2,688 trauma patients, a sufficiently large and varied body of data for them to work with.

Ensuring the data were reliable, consistent and of sufficiently high quality required additional time to develop automated algorithms, including AI algorithms, to flag data that should not be included in the development of the model. For example, the BHSAI team had to filter out-of-range vital-sign data and data artifacts induced by the stress of air-ambulance transport, such as non-physiological changes in heart rates, and confirm that data collected from different models of vital sign monitors were demonstrably consistent. The team also ended up excluding data from 1,029 patients for various reasons. After rigorous analysis and elimination of invalid data, the team ended up with 540 hours of continuous, reliable vital-sign data on which to train the algorithm.

TRAINING THE ALGORITHM TO ASSIGN HEMORRHAGE RISK

"The training of the algorithm didn't take a lot of time in comparison to how long it took to collect the data and develop algorithms to automatically flag invalid data," said Reifman. "We're not talking about billions of data points and mathematical models that have a trillion parameters, like some of the more recent AI technologies."

After the BHSAI team had developed and applied the automated algorithms to flag and discard invalid data, they started experimenting with different AI algorithms to map vital signs into risk levels. The researchers conducted a supervised training on the vital-sign data using a multivariate regression algorithm, which computed the hemorrhage risk-level threshold on a scale of 0-to-1, with 0 representing 100% certainty of no hemorrhage risk and 1 representing 100% certainty that hemorrhage is likely to be present. The algorithm sorted the patients into one of three classes of hemorrhage risk: low (hemorrhage risk (HR) level I, representing a 2-fold lower risk than the average in the test population), average (HR level II, representing the prevalence of hemorrhage in the test population) and high (HR level III, representing a 2-fold higher risk). The results of the analysis showed that the algorithm was capable of stratifying risk to a high degree of reliability with no overlap. When they compared the algorithm's risk assessments longitudinally over time, in more than 70% of the comparisons the risk level remained unchanged.

In its final form, the APPRAISE-HRI algorithm consists of a smartphone app that receives heart rate and blood pressure data via Bluetooth from a patient's vital-sign monitor and runs it through three software modules. The first module conducts pre-processing of the patient's heart rate and systolic and diastolic blood pressures. This involves trimming out unreliable physiological data, making sure that the data used to analyze the state of the patient is valid, timely and of sufficient quantity. The resulting processed heart rate and pulse pressure data are then passed along to the second module, which is the AI portion of the algorithm. It performs multivariate linear regression on the data to assess the likelihood of hemorrhage on a 0-to-1 scale. This assessment is then passed along to the third module, which analyzes the outputs of the AI model and places the results into one of the three risk levels, which is then provided to the first responder for action.

ANSWERING THE FDA'S QUESTIONS

When MRDC develops and tests a military medical product to the point of readiness, the command's Medical Technology Transfer Office seeks partnerships with commercial manufacturers to build and market the device. If the device is regulated by the FDA, it must first be granted a clearance, or an approval to proceed to market. To make the APPRAISE-HRI more appealing to potential commercialization partners, Reifman recommended that BHSAI obtain the FDA clearance rather than passing that requirement along to the manufacturer.

Prior to applying for clearance review, while the device was in the final stages of testing, BHSAI worked with MRDC's Office of Regulated Activities to prepare a pre-submission to the FDA to help anticipate and address issues of concern. The FDA responded with 26 questions related to the rationale for selecting the three vital signs, model development and the need for new, never-before-used data sets to independently validate the APPRAISE-HRI. The BHSAI team answered all of them to the FDA's satisfaction, which Reifman believes accelerated the subsequent final clearance review process.

The FDA's clearance review process takes the form of a risk and benefit analysis, in this case comparing the APPRAISE-HRI's potential for improved quality of care, ease of use and ability to work with FDA-cleared vital-sign monitors against the potential for misinterpretation of the results, algorithm error, data

MAJOR ASSESSMENT

Jaques Reifman, Ph.D., far right, director of U.S. Army MRDC's BHSAI, is with Henry M. Jackson Foundation staff in support of BHSAI who worked with Reifman to develop the APPRAISE-HRI. From left, the staff are Fransico Vital-Lopez, Ph.D., research scientist; Andrew Frock, software developer; and Valmik Desai, software development manager. (Photo courtesy of BHSAI)

corruption and other concerns. BHSAI used funding from MRDC's Medical Materiel Development Activity to conduct another round of validation on the APPRAISE-HRI algorithm, which was performed independently and blindly on vital-sign data from nearly 6,000 patients collected from nine sites, including in-hospital and pre-hospital data. The results of this independent analysis corroborated the algorithm's performance.

In issuing a clearance for the APPRAISE-HRI, the FDA stressed that the device is intended to provide military healthcare providers with "situational awareness" about potentially hemorrhagic patients, not to be used to "diagnose or direct treatment." The FDA concluded that APPRAISE-HRI is "a useful tool to aid in discriminating hemorrhage risk in the trauma population."

CONCLUSION

Reifman says the experience of developing the APPRAISE-HRI algorithm and working with the FDA to approve the device provided valuable lessons for him and his team.

"We have high standards of scientific rigor at BHSAI, but working with the FDA showed me that there are things that I could be even more rigorous about," Reifman said. "Our focus is on developing technologies. But the FDA focuses on risk and how to mitigate it. That's not how scientists usually think about technology. The more I worked with them, the more I understood that their approach is just as scientifically rigorous as ours. I think that alerted me to the understanding that I still have room to grow in terms of my own definition of scientific rigor, as well as how we apply it to the things we do in our organization."

That broader perspective is already being distilled into BHSAI's current practices, Reifman added, and because many of the scientists there are still in the early stages of their careers, he is hopeful that it will permeate BHSAI's institutional culture.

"We have a lot of software development projects, and I encouraged my team to think about how we can incorporate these concepts and processes when we're planning those projects," Reifman said. "For example, now we think about cybersecurity from the start, which is something we wouldn't normally do as part of pure research. All those things that we didn't pay attention to because we didn't think were important, we are now implementing throughout the organization whenever possible to increase the scientific rigor that we apply to every single project."

For more information about the Biotechnology High Performance Computing Software Applications Institute, go to ***https://bhsai.org****.*

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MAJ. STEPHEN MURPHY

COMMAND/ORGANIZATION: Project Manager for U.S. Army Uncrewed Aircraft Systems

TITLE: Assistant product manager for Gray Eagle Weapons and Payloads, Endurance Unmanned Aircraft Systems

YEARS OF SERVICE IN WORKFORCE: 1

YEARS OF MILITARY SERVICE: 11

EDUCATION: Master of Information Technology, Virginia Tech; Graduate certificate in information technology management, Virginia Tech; B.A. in political science, Christopher Newport University

AWARDS: Meritorious Service Medal (2); Army Commendation Medal (2); Army Achievement Medal; National Defense Service Medal; Global War on Terrorism Service Medal; Army Service Ribbon; Overseas Service Ribbon; and the Army Staff Identification Badge

PRIORITIZATION AND PERSPECTIVE

Maj. Stephen Murphy has been a member of the Army Acquisition Workforce for only a short time, but with over a decade of military service, a family with six children and never a dull moment, he already has a well-oiled time management system in place combining two of the most rewarding things he said he's learned in life—prioritization and perspective.

"Prioritizing mission essential over non-mission essential, discerning what is truly urgent from what may simply feel urgent, and understanding which failures may actually provide value from those failures we cannot allow, are some of the lessons I learned from career experience, some are from example, and others are derived from my theological beliefs," he said of how he combines and implements prioritization and perspective methods into a workable construct. "However, people [choose to] learn those two things, they are invaluable in the proper management of people and resources, and for the sanity of those managing them."

As assistant product manager for Endurance Unmanned Aircraft Systems, Murphy helps other product offices integrate new or improved weapons and payloads onto the MQ-1C Gray Eagle Unmanned Aircraft System. "It's a fascinating role where the team is actively working about a half-dozen integration and testing projects, while simultaneously helping explore another half-dozen early stage, cutting-edge concepts," he said. "We have transitioned to a more modular conceptual approach, allowing for quicker integration and a continuous transformation of the vehicle capabilities as demanded by the commanders in the field." With all the long-range payloads the team is integrating, he said there is a collective confidence that the MQ-1C can provide commanders the survivable, "standoff, look in" capabilities the Army needs for near peer, multidomain operations.

By this he means that during U.S. Central Command counterinsurgency operations, MQ-1C was used in very close range to the target of interest. Now, in near-peer potential uses, it needs to be able to stay out of range of adversary air defense (standoff) but still be able to detect beyond that air defense into the adversary-controlled area of operations (look in). "This is where continuously transforming the Gray Eagle is essential," he said. "By integrating long range payloads, pLEO [Proliferated Low Earth Orbit] satellite capability, and CMOSS [Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, Reconnaissance/Electronic Warfare Modular Open Suite of Standards] open architecture chassis, we can create a completely different tool for the multidomain task force and division commanders using the same airframe."

"You learn quickly the value of proactive networking and good time management."

NEW TERRITORY
Murphy, back right, and his family exploring their new home station in Huntsville, Alabama in November 2023. From left, back row is his wife, Heather, and children Evan and Ciara. In front from left is Ashling, Lily, Aidan and Brendan. (Photo courtesy of Stephen Murphy)

One of the most interesting things about this work, he said, is how many program and product offices must work in synchronization to get a payload to the warfighter. "It's not the sole responsibility of a single office, but the collective expertise across multiple offices who excel in various disciplines to get from a requirement to a fielded system."

Although this is Murphy's first acquisition position, he has ten years of experience as a Patriot Air Defense artillery officer under his belt, where he said he acquired most of his valuable time management skills.

In 2021, he was in a broadening assignment as the Fires Personnel Systems staff officer in the Headquarters Department of the Army G1 Military Structures and Plans Division. While in that capacity, he attended dozens of Army Requirements Oversight Council Review Board and Army Requirements Oversight Council Capabilities Board meetings as the G1 representative for anything that fell under the field artillery, air defense artillery, multidomain task force or space portfolios. He said it was from attending those briefs, and having the ability to be involved in managing the development of the technology that Soldiers use, that he became convinced he wanted to become an acquisition officer.

"I was an operations officer and a battery commander in 1st Battalion, 1st Air Defense Artillery in Okinawa, Japan before the HQDA [Headquarters Department of the Army] job in the Pentagon. Being based on Kadena Airbase, everything we did required working with joint and Japanese partners. Before we had a BDE [Brigade] stand up to support, we had to directly plan with USARPAC [United States Army Pacific] and USINDOPACOM [United States Indo-Pacific Command] on multiple exercises where we moved the batteries from Okinawa to all across Japan via air and sea," he said. "You learn quickly the value of proactive networking and good time management."

Murphy recently graduated from the Army Acquisition Transition Course (AATC) in late September 2023. "It was a lot of new information to master in a relatively short amount of time," he said. "While the course familiarizes you with your new field, there is nothing quite like experience to properly understand the concepts. I wish the course was much longer to explore more of the various acquisition pathway programs in detail, but I think the intention is to get you into the field as quickly as possible."

He said he believes he's too new to acquisitions to have given advice to junior personnel, but there are a few good books out there he'd recommend like Defense Acquisition University's "A Guide for DOD Program Managers" that covers all the overarching program management topics in layman's terms. "That particular book was recommended to me by my [then] future product manager, Sean Tynan, and was an excellent supplement to the AATC course load," he said.

Reading is a great resource for Murphy when it comes to the world of Army acquisition, but outside of work, he could probably write a book about family and work-life balance. "Anyone outside of work would know me for being the husband of a great woman [Heather], the father of six incredible children, the adherent of an ever-growing Christian faith, and for being unhealthily obsessed with the fortunes of the Arsenal Football Club," he said. "The lessons I've learned from achieving a balance in my personal life have been equally useful when applied to my professional life. No problem at work can phase someone with six children."

—CHERYL MARINO

MAKING A LIST, CHECKING IT TWICE
Redstone Test Center civilians Chance Graham, outside rear; Blaine Perry, outside front; Charles Packard, back seat; and Patrick Atkins, front seat, conducting installation checks in preparation for a JUONS flight test at Redstone Test Center, Alabama, in January 2016. (Photo courtesy of Blaine Perry, Redstone Test Center)

ATEC'S DIGITAL TRANSFORMATION

Data mesh revolutionizes U.S. Army Test and Evaluation Command's ability to help speed capability to the hands of warfighters.

by Maj. Lucas Gebhart and Blaine Perry

In 2015, the scourge of ISIS swept Syria and the western deserts of Iraq, tearing apart the hard-fought gains from years of Americans fighting in Iraq. The resulting operational environment was confusing and dangerous, with myriad factions of friendly and enemy forces in a nonlinear battlefield complete with widely dispersed high-level threats. Not since the opening days of Operation Iraqi Freedom, before the development of the Common Missile Warning System (CMWS), had Army aviation encountered such a nonpermissive threat environment. Air defense artillery assets—like 57 mm anti-aircraft cannons and the high-rise building structure of Mosul—drove rotary-wing aviation to increased altitudes, while other threats with questionable CMWS effectiveness drove the need to remain low level.

Given the currently fielded aircraft survivability equipment on many rotary-wing airframes, the threat environment was not conducive for safe and effective deployment of the AH-64 aircraft that the Iraqi army so desperately needed over its shoulders to defeat ISIS. U.S. Army aviators needed access to a new aircraft survivability equipment capability. This unforeseen requirement drove a Joint Urgent Operational Needs Statement (JUONS) for fielding of a new critical capability, requiring the expertise of the testing and evaluation professionals at U.S. Army Test and Evaluation Command (ATEC) to conduct a thorough but expedited evaluation.

PLAN AND EXECUTE

ATEC, in direct support of Army Futures Command, is expected to plan and execute rigorous testing of the systems the Army intends to field, gather large amounts of data from those systems, reduce that data into meaningful insights and share the findings with senior leaders. In the general case, these tests can span multiple years of effort, and thousands of hours of labor from the test community over various iterations of testing and data analysis.

JUONS efforts are unique. Though ATEC is still required to plan and execute testing and gather data for reduction into insights, the needs of the community demand that this process be condensed to months versus years. This urgency typically requires 18-hour days and seven-day weeks. Teams would start their days at 4:00 a.m., plan, brief and fly several sorties (planned flights with specific routes and data collection objectives) and hope to begin data reduction at 5:00 p.m.

One line of testing, known as bias and jitter, characterizes the performance of a pointer-tracker on the aircraft in terms of operating power and laser movement on target. It is complex, involving thousands of frames of infrared imagery, aircraft time-space-position information, video processing, and data sizes and complexity exceeding the processing capability of ATEC's tool set.

To make things more difficult, mission requirements dictated testing at multiple test sites across the U.S., most often in areas with limited or no connectivity, meaning that data delivery involved shipping hard drives back and forth across the country. Not only could ATEC not conduct timely processing of data, but it also took weeks to get the data to analysts and evaluators, resulting in months from test event to informed decision. At a time when the Army and ATEC needed an efficient observe, orient, decide, act (OODA) loop, legacy systems failed the evaluators doing everything they could to get capability to the field.

To reduce this cycle and meet the needs of the Army, ATEC needed a more efficient means to transport data to analysts, better systems, tools and processes for analysts to work with data sets rapidly growing in size and complexity and serve evaluations and insights to the acquisition community.

As ATEC struggled through the JUONS cycle, 4-6 Heavy Attack Reconnaissance Squadron (4-6 HARS), 16th Combat Aviation Brigade was finalizing a movement from Fort Carson, Colorado to Joint Base Lewis-McChord, Washington, having deferred many long-term and time-intensive maintenance tasks until after the move. Not yet slated for deployment, but imbued with a

A PATRIOTIC PERSPECTIVE

Then-Capt. Lucas Gebhart, left, and 1st Lt. Matthew DiPinto stand with the American Flag in Erbil, Iraq, in January 2017. Gebhart helped his organization synchronize several years of maintenance with a busy training schedule. (Photo courtesy of Maj. Lucas Gebhart, ATEC)

healthy dose of paranoia, one of the authors, then-Capt. Lucas Gebhart, developed a plan to bring the organization back to a healthy deployable state by synchronizing two to three years of maintenance with a busy training schedule in a 12-month period.

Over the course of that year, 4-6 HARS would accomplish that maintenance, learn of, prepare for and initiate deployment to Iraq and learn of, train on and field the JUONS requirement. This was disruptive to the unit's deployment training plan, requiring tens of hands-on hours per airframe over weeks of downtime per airframe in addition to the already robust maintenance requirements in a unit trying to train and deploy to Iraq. More importantly, from the perspective of the observing aviators, they were giving up a security blanket with over a decade of proven results (the CMWS) in exchange for a system that seemed buggy, hastily fielded and with which they flew precisely zero hours prior to taking off for the first time in a highly contested environment. To put icing on the cake, in addition to the training and maintenance disruptions from JUONS installation, fielding disrupted block leave afforded to Soldiers pending a yearlong rotation to Iraq.

ATEC's data is a weapon and a force multiplier.

AN INFLECTION POINT

In early 2022, recognizing the shortcomings of its data analysis and delivery capability, ATEC hired a chief data officer, with the mandate to digitally transform the way that ATEC conducts the core of its mission. Bringing together a group of experts, and leveraging environment and technical assistance from U.S. Army Futures Command, ATEC set out to design and implement the ATEC Data Mesh. A data mesh collates data along logical business lines, while maintaining access control at the data owner level, leveraging robust governance and cataloguing to enable federated search across the full data corpus. By November 2023, ATEC brought the data mesh from ideation to authority to operate, the core requirement for use of an information system in the DOD, allowing ATEC to onboard its user base and begin to transform data use across the command.

The ATEC Data Mesh seeks to resolve both technical and bureaucratic hurdles to efficient operational conduct, with the ATEC Cloud Enablement Team providing the infrastructure, technical support, funding and managed services to the entirety of ATEC. The construction includes continuous integration, continuous deployment pipelines to emulate a robust commercial environment within the security required by DOD. Taking the "Field of Dreams" approach, designing and delivering world-class capability for any interested party in ATEC, the cloud team built and deployed data domains encapsulated in ATEC's authority to operate for each of ATEC's subordinate elements. After onboarding, users will find a robust set of database servers (e.g., SQL, SMI, Mongo, PostGres), data analytics tools (e.g., Databricks, Synapse, Function Apps) and an Azure Virtual Desktop pool (a virtualized computer infrastructure) complete with the software tools that ATEC's professionals use on a day-to-day basis (e.g., Python, R, JMP, MatLab). The cloud team's objective is to enable any analyst, any data, anywhere.

The core of the ATEC Data Mesh is the common reference model (CRM), an application program interface (API) infrastructure that seeks to link to root authoritative sources of data throughout the Army, while exposing the root authoritative data for test and evaluation. The CRM will enable reuse of this root data in applications and software within ATEC and the Army, allowing developers to form applications without risk of the underlying data becoming stale or incorrect. ATEC's portion of the CRM is the ATEC Enterprise Framework, a systems modeling language model of the entire ATEC enterprise, its capabilities and its business processes. Expanding on this work, ATEC is building an evaluation framework that seeks to standardize measures of

WHAT'S A DATA MESH?

A data mesh makes data more readily available to stakeholders by storing data in a common location with separation along logical business lines, while enabling data owners to control access. The ATEC Data Mesh breaks data down into data domains based on test mission areas, appends appropriate metadata and catalogues data at upload to enable federated search.

When fully implemented, stakeholders will no longer need to scour discs, hard drives or unformatted file architectures to find data for a system under test—they will be able to find all related data via a single search utility.

ANY QUESTIONS?
Maj. Lucas Gebhart, ATEC deputy chief data officer, leads a white boarding session on the CRM at Aberdeen Proving Ground, Maryland in May 2024. (Photo courtesy of Maj. Lucas Gebhart, ATEC)

performance and effectiveness used to evaluate a system's performance against the root requirements document—the source of truth for what constitutes "passing the test." In the end, the CRM, the ATEC Evaluation Framework and the ATEC Data Mesh will enable ATEC to digitally link an acquisitions program all the way from the requirements document to the test data and evaluation of each requirement. With all of the test data for a program residing in their common home in the ATEC Data Mesh, digitally linked via the CRM, ATEC can drastically improve both the efficiency and effectiveness of ATEC's test and evaluation mission.

In less than two years since ideation, ATEC developed and deployed a capability to its workforce and finds itself in the nascency of adoption. While there is much to do in terms of executing the vision of the future outlined above, the ATEC Data Mesh is currently capable of executing its any analyst, any data, anywhere mission.

ATEC'S FUTURE: DATA AS A WEAPON

Because of the ATEC Data Mesh, the ATEC of today and tomorrow is no longer restricted to the systems and processes that have inhibited our ability to deliver capability at the pace of need. In the past, because of the timing and locations of testing, we struggled to access the computing resources or data storage that we required. Today, we have the full capability of a Microsoft Azure cloud environment and have worked to bring together teams of government and commercial technical experts to revolutionize the way that ATEC does business.

To highlight those capabilities and show the ATEC community that very complex problems can be solved using the new tools

At a time when the Army and ATEC needed an efficient OODA loop, legacy systems failed the evaluators doing everything they could to get capability to the field.

available, ATEC's chief data officers initiated several data pilots, including development on the bias and jitter problem. Redstone Test Center created an application in the ATEC Data Mesh that would automatically ingest raw video files, locate the laser on the target board and calculate its position error. In the past, each two-hour sortie required an average of 10 hours to curate files, trim video and extract information—a process that analysts could not start until the data arrived. Over the course of the JUONS effort, ATEC completed dozens of sorties. Today, after three weeks of effort by Redstone Test Center's data scientists, a user can load an entire sortie's video data directly to the ATEC Data Mesh from the field site via our data upload utility HERMES. The application will automatically identify files, conduct bias and jitter processing, and produce results in minutes. Importantly, that data can be shared with all ATEC's partners instantly from anywhere as soon as the automated processing is complete. The ATEC Data Mesh can decrease the turn time of the bias and jitter testing from months to hours. Relevant, timely information to senior Army leaders is a core part of achieving ATEC's mission. The ATEC Data Mesh has redefined these terms, enabling us to provide more relevant data at speeds that were never possible.

This is not the end for the ATEC Data Mesh: ATEC's data is a weapon and a force multiplier. In the case of the JUONS, just one additional month to view the JUONS test data and to ask questions would have meant so much to the confidence of a Soldier being sent into harm's way, entrusting their lives in a system with which they have never flown. Extending this problem set to weapons and munitions, master gunners and technical experts in formations would make use of trustworthy and accessible data to expand the lethality of their fighting formations.

CONCLUSION

The future of warfare relies more heavily on data than ever before. Artificial intelligence, machine learning, and more, all require enormous amounts of high-quality data—the kind of data that the ATEC community produces today. In the past, Gebhart would not have had access to this data, but with the ATEC Data Mesh, he can. In turn, ATEC can make this data descriptive, predictive and prescriptive, telling Soldiers not just what happened in a test, but describing what might happen in other environments, and how to gain an advantage by using the systems to their maximum extent. By reducing its OODA loop, ATEC can enable Soldiers in the field to reduce theirs.

For more information, contact Maj. Lucas Gebhart at ***lucas.c.gebhart.mil@army.mil.***

MAJ. LUCAS GEBHART is the ATEC deputy chief data and analytics officer. He holds an MBA from Harvard Business School and a B.S. in operations research from the U.S. Military Academy at West Point. During his career, Gebhart has deployed four times to Iraq and Afghanistan, most recently as a troop commander of the AH-64E Apache troop supporting the Iraqi army in regaining control of the city of Mosul in 2016-2017.

BLAINE PERRY is the chief data and analytics officer at the U.S. Army Redstone Test Center. He holds an M.S. in business intelligence and data analytics from Carnegie Mellon University and a B.S. in aerospace engineering from the University of Alabama. In 2020, he was selected as a member of the inaugural cohort of the U.S. Army Artificial Intelligence Scholars program, where he spent two years with the U.S. Army Artificial Intelligence Integration Center in Pittsburgh learning how best to leverage artificial intelligence and machine learning within the U.S. Army.

INCREASED COMMS

Staff Sgt. Devin Sasser, network communications systems specialist for the Maneuver Combat Advisor Team 2310 with 2nd Security Force Assistance Brigade, configures a satellite terminal to increase tactical communication to support exercise African Lion 2024 in Dodji, Senegal in May 2024. (Photo by Sgt. 1st Class Nicholas J. De La Pena, U.S. Army Southern European Task Force, Africa, U.S. Army Reserve)

MULTIPLE PATHS LEAD TO NETWORK RESILIENCY

Army agencies work to improve satellite communications increasing network capabilities and ease of use for all Soldiers.

by John Anglin and Amy Walker

Headlines of recent global conflicts continue to underscore the critical need for secure resilient network communication options on the battlefield to enhance survivability and lethality. The Army fully expects any future adversary to use every means at their disposal to jam or corrupt the network. When units can't pass the data that commanders need to make rapid informed decisions, both the mission and lives are at risk.

To enhance the network for future large-scale combat operations, the Army is in a state of continuous network transformation, with one eye on shifting battlefield tactics, and the other on emerging commercial and military technologies that could potentially help to combat them.

One way the Army is enhancing network resiliency is through agnostic transport diversity by increasing the number of network communication pathways available to units. The more signal pathway options that exist for data to travel through, the more resilient the network becomes, keeping Soldiers and their commanders connected, informed and lethal.

The Army's network transformation includes the ability to simultaneously and automatically communicate across numerous frequency bands, satellite orbits and line-of-sight and beyond-line-of-sight systems. To be successful on complex future battlefields against sophisticated enemies, the Army will need to use more of the planet's spacescape, expanding beyond the traditional geosynchronous Earth orbit (GEO). This signal pathway diversity includes multiple frequency bands and high throughput, low latency (HT/LL) multi-orbit network transport, leveraging low Earth orbit (LEO), medium

Earth orbit (MEO) and advanced GEO satellite communications (SATCOM).

Being able to simultaneously use all network transport options will significantly enhance units' primary, alternate, contingency and emergency communications plans, enabling Soldiers to use the best available transport option at any given time, and having plenty of backups to be prepared for every potential operational scenario, location or attack. Bandwidth can also be aggregated and optimized across multi-orbit capabilities to ensure network connections in denied, disrupted, intermittent and low bandwidth network environments.

At the end of the day, the Soldier will not have to worry about which signal path he or she is taking, it will be automatic. They can be more confident that essential data and communications are making it to the point of need and providing commanders the information they need to defensively react to threats and offensively become one.

MANY BECOME ONE

Currently, the Army is forced to use separate systems to leverage different frequencies and satellite constellations in different orbits. However, the Next Generation Tactical Terminal (NGTT) will combine all these capabilities into one system, significantly reducing logistical size, weight and power burden, as well as cognitive burden, so Soldiers can focus on the fight. NGTT will simultaneously leverage current and future HT/LL LEO, MEO and GEO constellations and services, as well as multiple frequency bands, and high-capacity terrestrial capabilities—with a single terminal, at-the-halt, at-the-quick-halt or on-the-move—to deliver the real-time data that commanders need to make rapid informed decisions. If one link or pathway goes down, Soldiers won't have to switch frequency bands or change out any hardware; the switch to different transport options is automatic and seamless to the user.

Project Manager Tactical Network (PM TN), assigned to the Program Executive Office for Command, Control and Communications-Tactical (PEO C3T), manages and fields the Army's tactical network transport systems. To date, the PM TN portfolio includes approximately 12,000 on-the-move and at-the-halt satellite terminals in the field globally, supporting units from home station to harsh dispersed operational environments at the edge of the battlefield. Once NGTT transitions from the science and technology community to PM TN, the system will become part of the PM TN's SATCOM Family of Terminals, an innovative acquisition approach that reduces the variety of different terminals in the PM TN's portfolio, providing fewer but more versatile terminal variants in standard sizes. The Family of Terminals approach combats the sheer volume and diversity of the PM TN's vast portfolio, helping to overcome challenges from every angle—including cost, complexity, logistics, sustainment and the never-ending need for continual network modernization and integration to retain advantage over the enemy. (See "SATCOM Streamline" in the Spring 2023 issue of Army AL&T.)

The Army's science and technology community—specifically the Command, Control, Communication, Computers, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center, an element of the U.S. Army Combat Capabilities Development Command, U.S. Army Futures Command—has been developing the on-the-move NGTT solution. On the current timeline, the Army expects the initial single-band NGTT solution to transition from science and technology to PM TN in 2025 and a multiband NGTT solution to transition in 2027. NGTT's ability to operate on-the-move in contested and congested environments will significantly enhance tactical network satellite communications and network resiliency, increasing the survivability and lethality of U.S. forces.

PM TN and the C5ISR Center are also collaborating with the U.S. Navy to share information, incorporate lessons learned and ensure unity of effort across DOD. The Navy is using the same NGTT technology in its equivalent effort, known as the Satellite Terminal (transportable) Non-Geostationary, or STtNG, which provides a multiband, multi-orbit SATCOM capability to ships.

MULTIPLE MEANS TO RESILIENCY

NGTT is just one of several means the Army is using to reach its large-scale combat operations network goals. For instance, the Multi-Orbit Modem (MOM)—a multiband, multi-orbit, multi-constellation capable modem—will be able to "talk" to numerous multi-orbit military and commercial satellites constellations simultaneously. MOM supports a Modular Open Systems Approach design, enabling plug-and-play configurations to tailor capabilities to the needs of each echelon. On the current timeline, the Army expects to transition MOM from science and technology to PM TN in fiscal year 2027.

To support large-scale combat operations from a business tactic, the Army is also exploring a lease-versus-buy model—known as SATCOM as a managed service, or SaaMS—for acquiring and delivering scalable commercial satellite communications. PM TN manages this effort for the Army and will wrap up a global SaaMS pilot at the end of fiscal year 2024 informing

GLOBAL SIGNALS
Spc. Ahlijah Madison, assigned to the 44th Signal Expeditionary Battalion, conducts communications check over a tactical satellite during the joint exercise African Lion 2024 in Tunisia in April 2024. (Photo by Sgt. Lukas Sparks, U.S. Army Southern European Task Force, Africa)

future implementation decisions. Instead of having to procure, field, sustain and modernize equipment on its own for every unit and every mission, SaaMS will enable the Army to lease these capabilities at the point of need. This business model would be scalable to expand or contract as missions change, helping to reduce on-hand inventory, satellite airtime and cost. SaaMS would ensure bandwidth is allocated at the right place and time to support data exchange in a wide variety of mission sets.

CONCLUSION

It can't be overstated that underpinning all the Army's efforts to increase network capability, capacity and resiliency is the need to increase simplicity, since more and more Soldiers going to the battlefield are not signal trained. Their primary mission is to shoot, move and communicate. Balancing the need for increased capabilities with the need to reduce complexity is a difficult job, but as commercial technologies continue to evolve and mature, the Army will continue to partner with industry to ensure capabilities become simpler to use.

*For more information, contact the PEO C3T Public Affairs Office at 443-395-6489 or **usarmy.APG.peo-c3t.mbx.pao-peoc3t@mail.mil**. Go to **https://go.usa.gov/xMSNz** for the 2021 Army Unified Network Plan or follow PEO C3T at **http://peoc3t.army.mil/c3t** and **https://www.facebook.com/peoc3t**.*

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MOVE ON THROUGH
Humvees and other equipment are loaded onto a train at the port of Livorno, Italy, to begin their trip to Eastern and Northern Europe. The EDA program transfers previously used, excess equipment from U.S. units to America's foreign partners and allies. (Photo by Elena Baladelli, Training Support Activity Europe)

MAKE ROOM *FOR* MODERNIZATION

The Excess Defense Articles program saves millions of taxpayer dollars complementing the Army's modernization and divestiture goals.

by Adriane Elliot

The speed at which the U.S. Army modernizes is key to its success. The U.S. military must sprint—not stroll—to outpace adversaries whose armed forces grow stronger by the day. But even when America's next generation technology is ready to be delivered, Army units must first dispose of its current gear to make room for the new.

After two decades of fighting in Iraq and Afghanistan, the U.S. Army has a multibillion-dollar mountain of excess equipment. Moving that mountain falls to the Army Materiel Command (AMC) which, in 2020, stood up 14 modernization displacement and repair sites (MDRSs) across the United States. MDRSs are one-stop shops where Army units can dispose of aging and excess equipment, quickly and efficiently. But quick isn't quick enough when hundreds of units are moving thousands of items across an institution as vast and complex as America's 249-year-old Army.

To expedite equipment transfers at MDRS locations, AMC fielded the Rapid Removal of Excess (R2E) program earlier this year. Equipment that previously had to be operational before turn-in can now be accepted "as-is." Equipment conditions ranging from non-mission-capable to excellent is turned over to the MDRS, then repaired at a depot, turned over to the Defense Logistics Agency for disposal, or snatched up by the U.S. Army Security Assistance Command (USASAC) for foreign military sales (FMS).

USASAC manages FMS and security assistance programs for the Army. Its FMS programs provide partner nations with American-made defense articles, military training, sustainment and other defense-related services by grant, loan, credit or cash sales in support of U.S. foreign policy objectives. A distinct component of the FMS mission is its Excess

Defense Articles (EDA) program, which transfers previously used, excess equipment from U.S. units to America's foreign partners and allies. The excess equipment that makes its way into USASAC's FMS stream saves millions of taxpayer dollars.

The EDA program is a natural complement to the Army's modernization and divestiture goals, Lem Williams, chief of the U.S. Army Security Assistance Command's Mission Support Division, G3, who manages the EDA program said, as it is able to scoop up excess equipment at MDRS locations and transfer it to partner nations before the Army incurs massive transportation, storage and disposal bills. In the past, when equipment was declared excess, it was transported to a depot where it would be stored for years, or decades in some cases, awaiting demilitarization or destruction. According to Williams, these costs were astronomical.

"And that bill doesn't account for the additional costs of prepping equipment for storage—draining fluids and disposing of hazardous materials," Williams said. "It's hard for most people to truly realize the full scope of these types of expenses, but it literally takes tens of thousands of dollars for some types of equipment, particularly the larger ones. So often the decision to demilitarize a family of vehicles comes with a multimillion-dollar bill." That is a tremendous amount of money that could be spent elsewhere on training and equipping tomorrow's Army.

For over a decade, Williams has seen billions of dollars in Army equipment transfer from U.S. to partner nation property books. But current world events, and the fact that America's military readiness hinges on the speed and success of ongoing modernization and divestment operations, makes this a pivotal moment in history and a challenge for the EDA program.

WHAT'S WHAT?

MDRS: Modernization Displacement and Repair Sites—supports expediated redistribution and divestiture of equipment from Army units. MDRS-Cavazos, the Army's first MDRS facility, received and processed more than 6,700 pieces of equipment in its first four months of operation beginning in November 2020, with 4,000 items alone coming from the 1st Cavalry Division.

R2E: Rapid Removal of Excess—allows units to turn in excess equipment at the MDRS and Logistics Readiness Centers with or without disposition instructions. COMPO 1 transfers in "as is" condition and COMPO 2 and 3 in 10/20 condition. During the pilot of R2E at Fort Liberty and Fort Stewart in early 2024, units processed more than 37,000 pieces of equipment for turn-in over an eight-week window. Since early June, units on Joint Base Lewis-McChord, Washington, have turned in over 14,000 pieces of equipment, totaling $150 million.

SAS(2): USASAC's Security Assistance Storage Sites—Where equipment is temporarily stored as it cascades out of Army units awaiting transportation to Allied Partners. Transportation storage and demilitarization cost avoidance is saving the Army millions of dollars and valuable man-hours.

READY TO ROLL

U.S. Army Humvees staged at Mihail Kogalniceeanu, a U.S. Base in Romania, are being transferred to Moldova as part of an EDA FMS case. (Photos courtesy of USASAC)

The EDA program is a natural complement to the Army's modernization and divestiture goals.

"We're in the midst of the largest and most successful modernization campaign since the Cold War," said Williams. "Keep in mind that during the Cold War, we only had the Soviet Union to contend with. Today, we are up against larger and more powerful adversaries, a more diverse and technologically advanced group of rivals who are trying to outpace us not only on traditional battlefields, but on the new frontiers of space and cyberspace.

"This is not the time to not get this right," he said. "The Army cannot afford to waste time or resources that are needed to keep us ahead of the competition."

GROWING CAPABILITY

In order to support modernization and divestiture efforts, Williams said his EDA team has established security assistance storage sites (SAS2) at MDRS locations and plans to add more sites within the U.S. to support Army National Guard and Army Reserve as well as overseas sites to support the U.S. European Command and U.S. Indo-Pacific Command.

"At security assistance storage sites, as quickly as a unit can sign items off their books, we can transfer it to the partner, who starts paying the bill," Williams said. "There are no storage and preparation fees to pay. We've already done the legwork. Based on combatant command goals and partner requests for their areas of operation, we know materiel is needed." It's an extremely proactive approach that began saving the Army and partners millions of dollars over the last few years, even before MDRS and R2E were piloted.

The program is growing. Williams added, the EDA team has been working with the National Guard, Reserves and sister services to address Army shortages and fulfill partner nation requirements. The State Partnership Program is taking on a much broader and more relative role, as demonstrated in recent North Carolina National Guard and Moldova cases. Excess small arms, tactical vehicles and trailers obtained from the North Carolina National Guard will be transferred to Moldova as part of a USASAC EDA case that will be completed sometime this year. Moldova and North Carolina have been partners for 28 years.

The National Guards of all 54 states and territories participate in the State Partnership Program, linking the Guard with partner nation's military, security forces and disaster response organizations in a cooperative, mutually beneficial relationship.

"From our perspective, proactive and predictive EDA and the SAS2 initiative is one of the most important things that's being done to win the "war on excess," Williams said.

CONCLUSION

During the mid-June Army Modernization and Equipping Conference (AMEC), updates on the EDA mission set and its alignment to Army force modernization and divestiture were presented. The AMEC is held semiannually at Redstone Arsenal and allows senior leaders from the four major Army commands and Headquarters Department of the Army staff to review equipment fielding and synchronize distribution and displacements with Army priorities. At the most recent AMEC, leaders also discussed how the Army could better pair EDA with current Presidential Drawdown Authorities actions to provide more flexibility on timing and cost impacts.

"Our goal is to run in the background, leveraging opportunities for viable equipment to build partner capacity while saving the Army time and money," Williams said. "Now more than ever, time and money are resources we can't afford to waste. Every item we obtain allows Soldiers to focus on their readiness responsibilities, like fielding and training on new equipment and doctrine."

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

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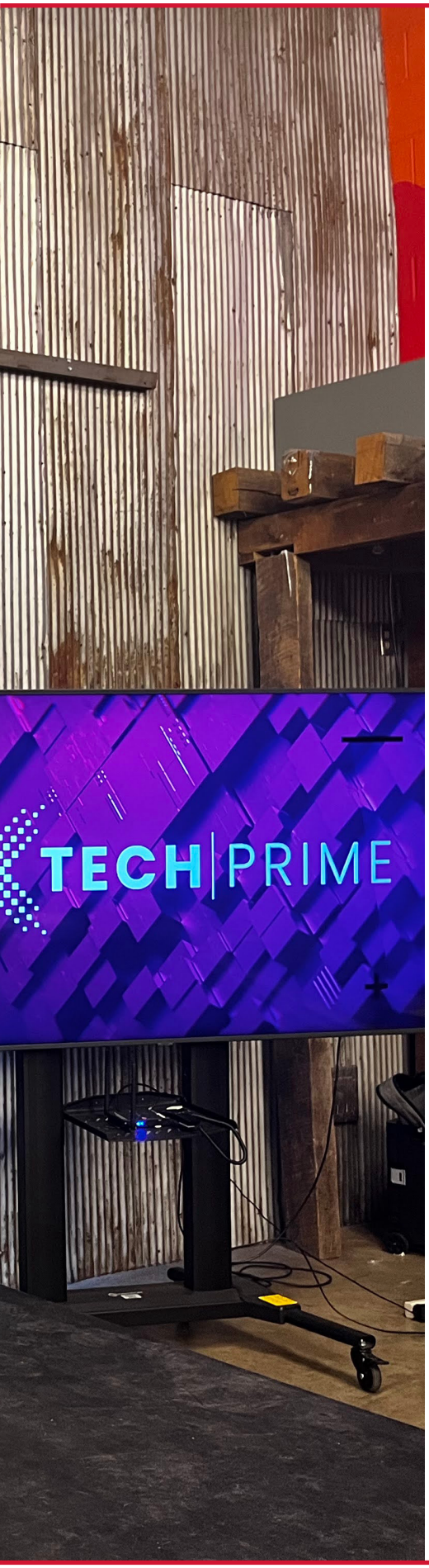
TAKING FIRST PLACE
Matt Willis, Ph.D., left, director of Army Prize Competitions and Army SBIR Program, awards Steve Cameron, Enveil, Inc. chief of customer service, a first-place award for xTechPrime's Project Linchpin topic area. (Photo courtesy of U.S. Army xTech Program)



ACCELERATING THE ARMY'S AI STRATEGY

Army SBIR and xTech prize competitions are partnering with Project Linchpin to scale artificial intelligence solutions.

by Anna Volkwine and Steven Lusher

The development of advanced artificial intelligence (AI) solutions from industry provides the Department of Defense with opportunities to enhance and strengthen its strategic edge in national defense. As these technologies evolve, the U.S. Army Small Business Innovation Research (SBIR) and xTech Programs play a vital role in delivering these innovative AI solutions to the Army.

Led by the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology, the programs offer innovators research and development funding to tackle critical challenges. Via the Army SBIR Program, the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) offers small businesses opportunities to demonstrate solutions that show technical merit, feasibility and commercial potential. The program invests over $350 million per year in small businesses across the country in non-dilutive funding—funding that does not require a business to give up equity of the company—to transition technologies to Soldiers.

The xTech Program uses a prize competition model to foster collaboration between the Army and nontraditional innovators including small businesses, academia, international innovators and more. XTech competitions offer non-dilutive cash prizes, along with feedback, mentorship and networking opportunities with Army customers. XTech competition winners may also receive opportunities for follow-on contracts, such as Army SBIR awards.

When it comes to AI, Army SBIR and xTech are just the tip of the spear for identifying and integrating cutting-edge solutions. The programs continuously optimize partnerships with other innovation-driven Army organizations, including Project Manager

Intelligence Systems and Analytics (PM IS&A), which focuses on AI delivery via Project Linchpin. PM IS&A is responsible for critical Army modernization initiatives such as Army Intel Data Platform and Tactical Intelligence Targeting Access Node, and falls under Program Executive Office Intelligence, Electronic Warfare and Sensors (PEO IEW&S).

PM IS&A partnered with Army SBIR and xTech to develop the operational data, policies and trusted infrastructure to deploy and field AI applications via Project Linchpin. The collaboration seeks to deliver game-changing AI technologies across the PEO IEW&S portfolio.

"Project Linchpin is building an operational pipeline of trusted AI solutions, aligning with the Army's broader AI implementation," said Col. Chris Anderson, project manager, PM IS&A. "This plan aims to deliver a coherent approach to AI across the Army, with specific execution windows for integrating complex AI efforts."

COMBINING FORCES

Capitalizing on the unique strengths of the Army SBIR and xTech Programs, Project Linchpin accelerates the research and development of innovative AI technologies for defense applications. As an Army transition partner, PEO IEW&S and its project managers, including PM IS&A, benefit from access to innovative solutions from the private sector. Meanwhile, the Army SBIR and xTech Programs provide a pathway for transitioning technologies into the Army's operational framework.

"Collaboration between Army programs is critical because it looks at solving Army challenges very holistically," said Matt Willis, Ph.D., director of Army Prize Competitions and the Army SBIR Program. "The adoption of AI requires an end-to-end perspective that will enable the Army to do this expeditiously, while navigating around associated risks."

SMALL BUSINESS CONNECTIONS
Enveil Inc., a winner of xTechPrime for the Project Linchpin topic area, attended the xTech Collider in Austin, Texas in August 2023, where technology integrators had the opportunity to network with small businesses from the xTechPrime competition. (Photo courtesy of U.S. Army xTech Program)

Willis' sentiment rings true for Project Linchpin and ASA(ALT)'s innovation-centric programs. Project Linchpin focuses on the infrastructure, standards, governance and processes behind AI adoption. Combined with the flexibility and creativity of nontraditional innovators through Army SBIR and xTech, the Army seeks to lead in AI implementation with options to accelerate funding and technology transition.

For example, in fiscal year 2024, Army SBIR invested nearly $10 million in five small businesses aligned to Project Linchpin thrust areas. For fiscal year 2025, this number is projected to increase. Army SBIR estimates $45 million in contract awards for Project Linchpin, out of an estimated $114 million in awards for Army SBIR's larger artificial intelligence/machine learning (AI/ML) portfolio, which focuses on solicitations aligning to other potential transition partners on top of Project Linchpin's thrust areas.

Part of this funding stems from current and future Army SBIR awards made via

xTech competitions that have Project Linchpin-specific focus areas, putting innovation into action for the Army.

"Through the Army SBIR and xTech Programs, Project Linchpin serves as a cornerstone for the Army's efforts to harness AI at scale, ensuring that the solutions are secure, trusted and effectively integrated into military applications," Anderson said.

At the heart of the programs lies the ultimate commitment to support the Soldier.

INNOVATION IN ACTION

Launched in spring 2023, xTechPrime served as a unique competition model that combined the flexibility and ingenuity of small businesses with the resources and expertise of technology integrators. XTechPrime is an example of how the Army can tailor their competition models so that PEOs and program managers can accelerate the development of technologies through Army SBIR and xTech.

Fifteen xTechPrime winners received $40,000 in cash prizes and submitted a Direct to Phase II Army SBIR contract worth up to $2 million. The competition addressed various topics that impact Army readiness; notably, PM IS&A supported a Project Linchpin topic to provide small businesses a chance to showcase their innovative technology solutions.

Latent AI and Enveil, Inc., alongside their respective technology integrators, Booz Allen Hamilton and RTX Corporation, won for the Project Linchpin topic. This win facilitated crucial Army connections, cash prizes and an Army SBIR Direct to Phase II contract award to prove the technology feasibility for its Project Linchpin application. "Project Linchpin leverages xTech and Army SBIR Programs to explore innovative technologies from small businesses, and does so in a very focused, rapid manner," said Sek Chai, Ph.D., Latent AI co-founder and chief technology officer. "XTechPrime, for example, is structured to consider how technology is evaluated and integrated into current infrastructure and workflow."

Ellison Anne Williams, founder and CEO of Enveil, Inc., noted that nontraditional innovators are leveraging the power of transformative capabilities without compromising mission interests.

"Project Linchpin is dedicated to advancing the Army's AI/ML efforts in a secure, trustworthy, sustainable way, and we are proud to be working in support of this initiative by delivering capabilities that showcase the broad, mission-enabling impact of privacy enhancing technologies," she said.

In addition to xTechPrime, xTech launched two additional AI-specific competitions in fiscal year 2024. In late 2023, Young Bang, ASA(ALT) principal deputy, requested that Willis and his team utilize the prize competition structure to seek solutions from small businesses to defend against adversarial AI threats. XTechScalable AI launched in December 2023, and xTechScalable AI 2 launched quickly thereafter in March 2024 to continue fueling the Project Linchpin pipeline of tools and services. The range of solutions received from these competitions highlights how ASA(ALT)'s vision can pair with Army programs to nurture scalable, commercial AI solutions from small businesses.

"Project Linchpin plays a pivotal role in the Army's efforts to scale AI capabilities, particularly through the collaboration with the Army SBIR and xTech Programs," Anderson said. "For instance, the xTechScalable AI 2 competition aligns to Project Linchpin's core needs and has provided a range of commercial solutions that each have the potential to be a critical part of the Army's strategy to deliver trusted AI." Anderson concluded by noting that as AI innovation continues to evolve, Project Linchpin hopes to further partnerships with Army SBIR and xTech to grow its portfolio of possibilities.

Looking ahead, the Army plans to launch more AI-focused competitions in fiscal year 2025. These competitions consist of multiple Technical Grand Challenges, as well as open-topic Army SBIR solicitations, to continue driving AI innovation. The Technical Grand Challenges, directed by ASA(ALT), are associated with Project Linchpin and the open-topic competitions are designed to explore the "realm of the possible" and include AI-specific focus areas or solutions.

CONCLUSION

The Army SBIR and xTech Programs remain committed to partnerships that span innovation ecosystems, support Army organizations buy down risk and discover what is possible within industry's innovation ecosystem. To match the speed and flexibility of small and nontraditional businesses, the programs find

SHOWCASING AI CAPABILITIES

Small business Latent AI was a winner in the U.S. Army xTechPrime competition for the Project Linchpin topic area. Honson Tran, left, developer experience lead at Latent AI, met with Young Bang, ASA(ALT) principal deputy, at the 2024 GTC AI conference in San Jose, California in March 2024, to demonstrate the winning Latent AI Efficient Interference Platform. (Photo courtesy of Latent AI)

and mature transformative technologies—providing an agile pathway to integration into critical Army systems where larger processes struggle.

At the heart of the programs lies the ultimate commitment to support the Soldier. Army organizations with the same commitment can leverage the programs to reduce risk, tap into the innovation ecosystem and utilize a fast-tracked acquisition strategy. By transitioning innovative and emerging technologies into practical applications, these collaborations equip the Soldier with cutting-edge capabilities that bring a strategic advantage to the battlefield.

Army SBIR and xTech aim to achieve the possible. Partnerships with decisive Army partners, such as PM IS&A and Project Linchpin that are driving innovation, are an example of what possible can look like. Now is the time to consider what future innovation could look like for other Army partners.

For more information on the Army SBIR Program, go to ***www.armysbir.army.mil****. To learn more about the xTech Program, go to* ***www.xtech.army.mil****.*

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XTECH FINALISTS MAKE SCALABLE AI AN ARMY REALITY

The U.S. Army xTech Program launched two AI-specific prize competitions in fiscal year 2024, supported by the PM IS&A and its modernization initiative, Project Linchpin. Matt Willis, Ph.D., director of Army Prize Competitions and Army SBIR Program, and his team launched xTechScalable AI in December 2023 for small businesses to develop comprehensive, scalable models capable of defending against universal AI threat vectors. The competition offered a total prize pool of $370,000 and up to $8 million in follow-on Army SBIR contract awards to small businesses across the U.S.

XTechScalable AI 2 launched just months later in March 2024, with three topic areas in support of Project Linchpin, including: scalable tools for automated AI risk management and algorithmic analysis; scalable techniques for robust testing and evaluation of AI operations pipelines; and scalable techniques for center of mass and course of action analytics for intelligence preparation of the battlefield. The second iteration offered up to $603,000 in cash prizes and opportunities to submit proposals for a Phase I or Phase II Army SBIR contract valued at up to $250,000 or $2 million, respectively.

Read on to meet the competitions' 24 finalists and get a glimpse into xTech's world of innovation.

THE TOP 8: XTECHSCALABLE AI FINALISTS

The program announced the xTechScalable AI winners in July 2024. Head over to the competition page of the xTech website to see who made the final cut.

Ad hoc Research: *Adaptive AI Testing and Transparency: Unveiling DarkStax, the Future of Digital Twin Simulations in Military AI:* Enhances AI systems' resilience against cyber threats by simulating and testing AI behaviors in diverse scenarios, ensuring robustness and reliability.

BlueRiSC, Inc.: *AI Defense in Depth Architecture:* Addresses threats in AI-based systems with modules for both prevention and detection, resulting in a comprehensive solution.

dMetrics: *Transparent, Customizable and Traceable Information Extraction from Large Textual Sources:* Learning platform built for non-technical experts, removing the need for coding or technical personnel and empowering analysts to read at scale through their own lens.

Eduworks: *Lorica: AI Agent Microservices for Federated Data Security:* Protects sensitive data and ML pipelines using a cluster of scalable, task-specific AI micromodels that can be deployed to detect adversarial attacks.

Expression Networks, LLC: *TRUST-Large Language Model Operations (LLMOps) for the Army:* Provides a data-, model- and vendor-agnostic solution to the challenges of LLMOps securely unleashing data intelligence at speed and scale.

Infleqtion: *Secured AI for Positioning at the Edge, Navigation and Timing:* Defends AI/ML systems against adversarial AI attacks, specifically targeting positioning, navigation and timing vulnerabilities, by fusing diverse data sources to identify and react to attacks.

Latent AI: *Composable Hybrid Ensembles for Rapid AI Adaptation:* Empowers developers with easy-to-use recipes to rapidly adapt AI models that are optimized and secured to address unknown attacks and vulnerabilities.

Quartus Engineering: *Quartus Data Audit Tool:* Enhances the data labeling and dataset management process, utilizing ML Zero-Shot technology to confirm datasets are reliable and recommend adjustments for faulty labels.

THE TOP 16: XTECHSCALABLE AI 2 FINALISTS

The xTechScalable AI 2 finals event will be held at the Association of the United States Army 2024 Annual Meeting and Exposition in October, and the winners will be posted to the xTech website shortly thereafter.

Anaconda, Inc.: *Rasterizing Large Datasets for Course of Action (CoA) Support:* Allows large data sets to be rendered directly onto the screen by aggregating data points per pixel on the display device, providing complete context for decision makers choosing CoA in the field.

Cenith Innovations LLC: *AI-Enabled, Automated CoA Generation and Threat Visualization for Intelligence Preparation of the Battlefield (IPB):* Provides faster and more accurate IPB, empowering leaders to understand the terrain, routes and plans necessary for complex obstacle breaching.

ColdQuanta, dba Infleqtion: *Consolidating Locations of Enemy Unit Symbols with AI in Real Time for Visualization:* Creates a concise, common operating picture, capitalizing on the widespread availability of computing resources to deliver physics-based map solutions to Soldiers.

Credo AI: *The Credo AI Governance Platform to Enable Army Adoption of an AI Risk Management Framework:* Purpose-built for AI governance, providing a command center for end-to-end Governance, Risk and Compliance for AI systems.

DynamoFL: *Scalable AI Testing to Identify and Mitigate Generative AI Model Vulnerabilities:* Assists in incorporating secure, private and compliant AI into operations, including AI system evaluations, model enhancement, risk remediation and system guardrails development with real-time observability.

Latent AI: *Battle-Management of Edge AI T&E:* Supports automated testing and evaluation of data, training labels, model training, and AI runtime deployment, enabling fast and robust fielding time of model updates.

Next Tier Concepts Inc.: *Nights Watch: Protecting the Army's AI while the Army Protects America:* Serves as a test harness and monitoring system to assess AI models robustness to natural and adversarial phenomena prior to model deployment.

Phoenix Operations Group: *Center-of-Mass (CoM) and CoA Validation Analytics:* Provides Intelligence Preparation of the Battlefield analytics for CoM calculations and CoA validation, using ML techniques implemented with open-source libraries and will integrate with existing technology stacks.

Protopia AI: *Privacy Enhancement and Data Protection for Gen AI and LLMs using Stained Glass Transform:* Protects data and preserves privacy by allowing AI algorithms to operate accurately without exposing raw sensitive information, unlocking the data-secure development and deployment of AI systems to enhance security.

Pytho AI: *Intelligent and Interactive Battlespace Visualizations Powered by Mixture of Experts AI System:* Reduces cognitive burden as an interactive battlespace visualization and analytics platform, with disruptive intelligence models and an intuitive user interface.

R-DEX Systems, Inc.: *Wayfarer: Real-time Data Drift and Out of Distribution (OOD) Detection Package:* Streamlines the process of keeping ML models aligned with production data by focusing on OOD samples, minimizing the labeling workload for analysts and ensuring models remain accurate over time.

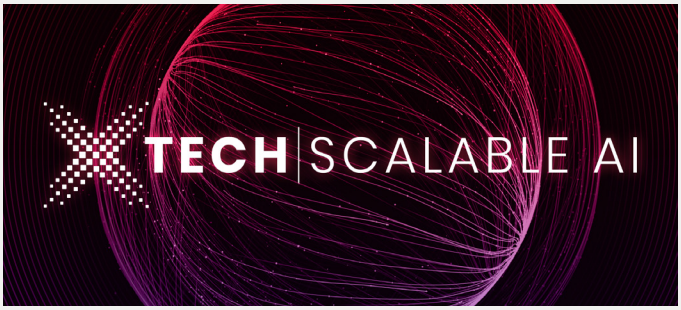
Senix Robotics LLC: *Multi-Layered AI Approach for Scalable Battlefield Intelligence and Decision Making:* Addresses data overload and inefficient manual processes, using advanced ML and generative AI to process sensor inputs, cluster data and provide strategic analysis.

Striveworks: *Valor: A Platform- and Model-Agnostic Evaluation Store:* Simplifies and standardizes T&E, making it easy to measure, explore and rank model performance, working with any dataset, model or metadata.

Trail of Bits: *ModelInspector: Detecting AI/ML Model Weaknesses via Bill-of-Materials (AIBOM) Based Analysis:* Creates, maintains and assesses a system's AIBOM for weaknesses, and creates AIBOMs for systems and then analyzes them to detect data drift, data leakage risks and susceptibility to adversarial threats.

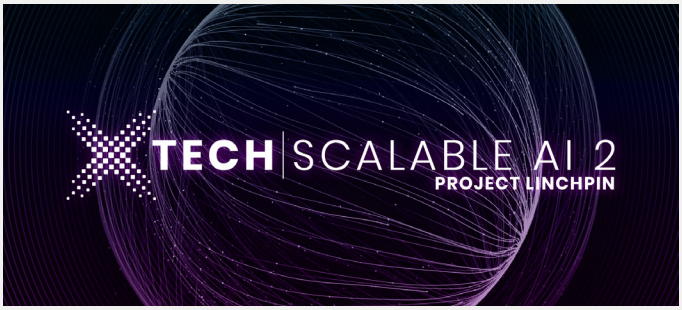
Valkyrie Intelligence: *Robust AI Operations Testing Suite for Defense Applications:* Assesses data integrity, monitors data label accuracy, and evaluates model robustness for various AI/ML pipelines while detecting, alerting and remediating adversarial attacks.

Walacor Corporation: *Walacor:* Built on blockchain/distributed ledger technology, improves MLOps by ensuring provable data immutability, auditability and element-level encryption.



SCALABLE AI

XTechScalable AI launched in December 2023 to better understand the spectrum of commercial solutions that could enhance the Army's security capabilities in AI and ML. (Images by U.S. Army xTech Program)



SCALABLE AI 2

XTechScalable AI 2 launched in March 2024 as the follow-on competition to xTechScalable AI, with focus areas aligned to Project Linchpin.

LET'S TALK AI

Small businesses have entered the conversation on AI innovation via the xTechScalable AI and xTechScalable AI 2 prize competitions. With the first iteration underway, xTech and Project Linchpin leadership announced xTechScalable AI 2 at the SXSW conference in Austin, Texas in March 2024.

MASTER SGT. PAYTEN E. REDFEARN

COMMAND/ORGANIZATION: Army Contracting Command

TITLE: G-3/5 Strategic Concepts noncommissioned officer in charge

YEARS OF SERVICE IN WORKFORCE: 10

YEARS OF MILITARY SERVICE: 21

DAWIA CERTIFICATIONS: DOD contracting professional

EDUCATION: MBA in finance; B.S. in business administration, both from Post University

AWARDS: Meritorious Service Medal (3 oak leaf clusters)

IT'S ALL ABOUT BALANCE

In the contracting world, where things can get tough, and deployments happen—making sure family comes first isn't always easy. But after 20 plus years of lessons learned throughout his Army career, solid support from mentors, his wife and a great deal of teamwork, Master Sgt. Payten E. Redfearn can honestly say he's achieved a pretty great work-life balance.

"Handling work challenges while taking care of family, has been a constant learning experience," he said. "Putting these lessons into action means more than just knowing it; it means actively trying to find the right balance. Figuring out when work or personal life needs more attention has been key to keeping things in check."

This is paramount for his position as the G-35 Strategic Concepts Division noncommissioned officer in charge for the Army Contracting Command, where Redfearn plays a crucial role in shaping the future contract force. By providing mission support to various commands and organizations, he contributes to the readiness and effectiveness of the Army's contracting capabilities.

One of the most recent projects his section has worked on is the Army Contracting Command Supplement to Army Techniques Publication 4-71, which is still in staffing, but once approved it will detail how contracting support brigades deploy in support of Army operations (including large scale combat operations). "This will be a huge step forward in how we support operations worldwide and will ensure that we're better prepared to deploy in all environments," he said. "I joke all of the time that our section is focused on 'good ideas'. Taking the lessons we've learned from being in the field and creating policies and updating regulations to better support our contracting professionals that are still out there."

When Redfearn joined the Army Acquisition Workforce in 2014, it was with a strong commitment to addressing critical logistical gaps for Soldiers in the field.

"My journey began as a contract specialist at Army Contracting Command, Aberdeen Proving Ground (ACC-APG). In this role, I had the invaluable opportunity to learn the intricacies of contracting, while benefiting from the mentorship of my civilian counterparts at ACC-APG. Their guidance and willingness to coach me through the nuances of contracting were instrumental in my professional development," he said. "Additionally, during my time at ACC-APG, I deployed to Iraq to contribute to the Contract Administration Services (CAS) mission, further deepening my understanding of the vital role contracting plays in supporting our military operations. This hands-on experience solidified my dedication to shaping the future of the contracting force and ensuring the best possible support for our Soldiers."

He said the two most pivotal moments in his career within the Army Acquisition Workforce were his assignment in the 409th Contracting Support Brigade (CSB) from 2017-2020 and his role in designing the Mission and Installation Contracting Command (MICC) Master Gunner Program in 2022.

"Handling work challenges while taking care of family has been a constant learning experience."

"My time at the 409th CSB was transformative as I served as a warranted contracting officer, working across various offices in Europe, including Kosovo, Romania and Poland. This experience allowed me to support Soldiers in garrisons and field exercises across 18 countries, providing me with a comprehensive understanding of how contracting operations can positively impact commander's missions across the warfighting functions," he said. "The exposure to diverse environments and operational scenarios broadened my perspective and equipped me with valuable insights into the dynamic nature of contracting support."

Following his assignment with the 409th CSB, Redfearn played a crucial role in the team responsible for creating the MICC Master Gunner Program. A program, which he said has proven invaluable for contracting leaders as it trains noncommissioned officers and Department of the Army civilians to evaluate individual members of contracting organizations from a technical perspective.

"The Master Gunners, working in collaboration with their sergeant major and commander, develop training strategies to ensure each contracting professional is prepared to provide support across the spectrum of operations," he said. "This initiative not only enhances the technical proficiency of our contracting workforce, but also reinforces our commitment to delivering effective support in various operational contexts."

Redfearn said he consistently offers three key pieces of advice to junior acquisition professionals. First find a mentor. "Mentorship is integral to development in this career field. A seasoned mentor brings valuable experience, helping mentees make informed career decisions, navigate challenging situations and provide a sounding board for ideas," he said. A good mentor is instrumental in fostering professional growth.

Next on the list, he said, is seek challenging assignments. "In the diverse landscape of the Army contracting community, it's easy to become confined to a specific type of contracting. Whether it's handling simplified acquisitions for base life support or engaging in systems contracting for program offices, the acquisition field offers a multitude of experiences. I encourage junior professionals to actively seek out diverse assignments to broaden their skill set and knowledge base."

Last: Question the status quo. "Embracing the principle that doing the same thing yields the same results, I advocate for always questioning 'why'," he said. "New contracting professionals should consistently ask why certain processes or procedures are in place. This not only deepens their understanding but may also lead to improvements in existing processes. Throughout my career, I've experienced instances where challenging the status quo led to the discovery of more efficient approaches, showcasing the importance of asking why."

Outside of the professional sphere, Redfearn said he is recognized for various aspects of his life that define his "identity beyond the workplace."

"Family holds a central place in my priorities, evident in the time spent supporting my three daughters in their music lessons, dance classes and coaching my youngest daughter's soccer team," he said. "This commitment to family and active participation in their interests mirrors a parallel theme between my personal and professional life—a desire to support the lives of those around me."

Furthermore, he said, the unique intersection of his personal and professional life is exemplified by his spouse, Alaina, who also serves as an acquisition professional at Army Contracting Command Redstone Arsenal.

"Our shared experiences and insights from our respective roles create a dynamic understanding of the intricacies within the acquisition field," he said. "Fostering a collaborative and mutually supportive environment both at home and in our professional endeavors."

"In simple terms, work-life balance isn't just an idea for me; it's a rule I live by in my career. It's about knowing how personal and work life mix and realizing that a happy personal life makes me better at my job," he said. "This important lesson has not only changed how I do things but has set up a strong base for long-lasting success, thanks to the solid support and teamwork with my wife."

—CHERYL MARINO

PACK OUT

An Iowa Army Ammunition Plant employee prepares 155 mm rounds for load, assemble and pack, May 15, 2024. (Photo by Dori Whipple, Joint Munitions Command, Public and Congressional Affairs)

DELIVERING AT SPEED

Joint Munitions Command plays integral part in aid to Ukraine.

by Brig. Gen. Ronnie Anderson Jr.

The U.S. Army's Joint Munitions Command (JMC) has played a vital role in providing support to Ukraine amidst its ongoing conflict with Russia.

JMC is responsible for the production, storage, distribution and demilitarization of conventional munitions for the U.S. Department of Defense. JMC's contributions—mainly 155 mm artillery rounds—have been crucial in bolstering Ukraine's defensive and offensive capabilities and reflects a broader commitment to international security and strategic partnerships.

SCALING UP PRODUCTION

In response to the heightened demand, JMC, along with Joint Program Executive Office Armaments and Ammunition (JPEO A&A) and industry partners, has undertaken substantial efforts to increase production levels of 155 mm rounds. Before the conflict, production rates were relatively modest, with only 9,000 rounds produced monthly between 2009–2017 at the Scranton Army Ammunition Plant (SCAAP). Now, 15,000 rounds per month are being produced at SCAAP, reflecting the immediate need to support Ukraine's military efforts.

SCAAP, a government-owned, contractor-operated (GOCO) site, manufactures large-caliber metal projectiles—including 155 mm—for the joint warfighter. The Iowa Army Ammunition Plant (IAAAP), also a GOCO, loads, assembles and packs medium- and large-caliber rounds, including 155 mm. IAAAP and SCAAP are two of more than a dozen subordinates of JMC.

"We couldn't have ramped up production without the tireless efforts of our workforce. Their skilled labor, adaptability and commitment were crucial in meeting the increased demand during these critical times," said Rich Hansen, the commander's representative at

SCAAP. "Our workers' ability to quickly adopt new techniques and maintain high-quality standards have helped ensure that SCAAP could efficiently produce the necessary ammunition.

"We are proud of the work our employees do day in and day out," Hansen added. "They consistently demonstrate dedication and a commitment to excellence that drives our success."

MODERNIZATION OF THE OIB

The sharp increase in production has been facilitated by ongoing modernization across JMC's organic industrial base (OIB). These efforts are part of a comprehensive 15-year OIB modernization plan the Army has implemented to enhance the efficiency and capacity of its munitions production facilities.

"This collaboration has led to faster delivery times, increased reliability and enhanced readiness."

Key aspects of this modernization include advanced manufacturing technologies, supply chain optimization and infrastructure upgrades.

At SCAAP, modernization efforts include the refurbishment and addition of multiple long stroke vertical hydraulic forge press lines, more than 100 hydraulic tracer and Computer Numerical Control lathes, multiple automated paint lines and multiple heat treat furnaces for steel. At IAAAP, the Army is creating a new Future Artillery Complex where digital manufacturing will be included in the design of the complex. Additionally, IAAAP has a coal elimination strategy that will result in resilient and efficient decentralized boiler systems for steam production. Steam production is used during the manufacturing process and as comfort heating for the building. Last October, ground was broken for a state-of-the-art metrology laboratory at IAAAP. The laboratory is essential for the correct calibration of measurement instruments for their effective use on the artillery production line. This assures that all items are manufactured to the same standards.

WELL-SUPPLIED

Storage of 155 mm projectiles at the IAAAP, May 15, 2024. (Photo by Dori Whipple, Joint Munitions Command, Public and Congressional Affairs)

"We are transforming how we operate to meet the demands of a rapidly changing environment," said Lt. Col. John Dunlapp, IAAAP's commander. "The changes we have made and have planned enable us to enhance our efficiency. By updating our processes, we ensure relevance and resilience and equip ourselves to adapt and to better serve our stakeholders."

ORDERS FULFILLED AT SPEED OF RELEVANCE

Without partnerships and support from other commands within the Army, such as U.S. Transportation Command (USTRANSCOM) and JPEO A&A, as well as private industry, JMC wouldn't be able to provide ammunition at the current volume and velocity necessary to support Ukraine.

Around $50 billion in military aid has been provided by the U.S. to Ukraine since Russia's full-scale invasion in February 2022. JMC has requested more

than 7,000 Transportation Protective Service trucks through USTRANSCOM and Military Surface Deployment and Distribution Command, the Army's service component command to USTRANSCOM, to deliver munitions from eight installations—Anniston Munitions Center, Blue Grass Army Depot, Crane Army Ammunition Activity, Hawthorne Army Depot, Letterkenny Munitions Center, McAlester Army Ammunition Plant, Tooele Army Depot and IAAAP—to six airfields and one seaport for shipment in support of Ukraine.

With assistance from rail and trucking partners, JMC distributed an additional 6,311 containers (59,105 short tons) of munitions—3,757 containers by rail and 2,554 by truck—to port terminals.

Through special assignment airlift missions, or SAAMs, JMC executes orders at the speed of relevance. JMC's yearly average of SAAM execution is typically 80 per year, but in the past 12 months it has executed over 430 SAAMs of ammunition in support of Ukraine.

READY TO GO
An employee prepares 155 mm projectiles for distribution at SCAAP, March 26, 2024. (Photo by Henry Villarama, Headquarters Department of the Army)

The normal planning timeframe for a SAAM is approximately 45 days from receipt of requirement to SAAM departure, but JMC and the Defense Travel System enterprise have reduced it to five days. The normal timeframe for a sustainment vessel is approximately 135 days from identification of requirements to final delivery to the seaport of embarkation, and the enterprise has been able to execute this process in as little as 11 days through extraordinary coordination to meet emerging requirements.

"Thanks to a collective team effort across the OIB and with our partners, we have been able to streamline processes and improve resource management," said Gina Ward, JMC's munitions logistics director. "This collaboration has led to faster delivery times, increased reliability and enhanced readiness."

CONCLUSION

JMC executes orders at the speed of relevance, and the command's vision is to ensure excellence in munitions readiness and sustainment through continual innovation and modernization.

JMC will steadfastly and resolutely continue to provide essential ammunition to the brave and valiant soldiers in Ukraine, ensuring their safety and empowering them to defend their homeland. This effort upholds our unwavering international commitments to peace, freedom and stability in the region.

JMC's actions reflect the enduring spirit of solidarity, patriotism and dedication to democratic values that define the nation.

For more information about JMC and its mission, go to ***https://www.jmc.army.mil****. For more information about U.S. support to Ukraine, go to* ***https://www.defense.gov/Spotlights/Support-for-Ukraine****.*

BRIG. GEN. RONNIE ANDERSON JR. assumed the duties of Commander of JMC on June 1, 2023. He was commissioned as an Ordnance officer from Purdue University in 1996. He holds an M.S. in strategic studies from the Marine Corps University, an M.S. in logistics management from the Florida Institute of Technology and a B.S. in industrial management from Purdue University.

BHARAT C. PATEL

COMMAND/ORGANIZATION: Program Executive Office for Intelligence, Electronic Warfare & Sensors, Project Manager, Intelligence Systems & Analytics

TITLE: Product lead for Project Linchpin, Sensors Artificial Intelligence

YEARS OF SERVICE IN WORKFORCE: 11

YEARS OF MILITARY SERVICE: 4

DAWIA CERTIFICATIONS: Practitioner in engineering

EDUCATION: B.S. in computer science, Rutgers University; Graduate certificate in systems engineering, Johns Hopkins

AWARDS: Civilian Service Achievement Medal (2021)

THE FUN HAS ONLY BEGUN

A commonality across the Army Acquisition Workforce is that one's greatest satisfaction is knowing that the work they do directly supports the warfighter. And so is true for Bharat C. Patel.

Patel is responsible for Project Linchpin, the first Army program of record focused on delivering trusted artificial intelligence and machine learning (AI/ML) capabilities. He is the product lead for Project Linchpin and sensors AI at Project Manager for Intelligence Systems & Analytics (PM IS&A) under the Program Executive Office for Intelligence, Electronic Warfare & Sensors (PEO IEW&S).

In Summer 2022, Patel pitched an idea to Army senior leaders on how PEO IEW&S can affordably deliver AI/ML capabilities across their portfolio. "The idea was informed by the many years of lessons learned working with DOD and the intelligence community on AI/ML projects, managing my own AI/ML projects through the science and technology (S&T) community," he said. In collaboration with Army Research Lab and Army Futures Command's AI integration hub, the idea moved swiftly from concept to program of record in around 12 months, entering Project Linchpin into the Software Acquisition Pathway in November 2023.

"I have been able to create a program that will deliver AI responsibly, affordably and effectively to the warfighter," he said. "The capabilities we plan to deliver will significantly reduce Soldiers' cognitive burden and increase their productivity."

Patel's first acquisition position, following four years of service in the Navy, was at a MITRE-Operated Federally Funded Research and Development Center supporting PEO IEW&S headquarters in Fort Monmouth, New Jersey in 2007.

"My first task as a young new employee was to improve technology transition. Yes—I had to figure out how to fix the valley of death," he said. So, he took introductory acquisition classes which helped him with simple terminology and definitions. He studied the basics of acquisition strategy, systems engineering plans, budget activity 6.1 (basic research) and 6.2. (applied research), the role of sustainment etc. "When people would say something in the meeting I would write it down, look it up, learn. I was constantly listening," he said, as he learned the PEO IEW&S portfolio.

"I immediately jumped into supporting the S&T portfolio trying better to integrate S&T, requirements and acquisition. I started working on 30-year plans (before they were called

"No one has the right to tell you 'no, that's not a good idea' or 'no, you can't do that.' "

IDEAS IN FLIGHT

Patel, center, on a military plane briefing an update on Project Linchpin to Young Bang, left, principal deputy of ASA(ALT), and Dr. Alexander Miller, chief technology officer for the Office of the Chief of Staff of the Army in 2022 flying to the Army's AI Integration Center in Pittsburgh, Pennsylvania. (Photo courtesy of Bharat Patel)

LIRA [long-range investment requirements analysis] and SPAR [strategic portfolio analysis review])." Within four months he was presenting to leaders across the portfolio, explaining the role of science and technology in their acquisition strategy and process, identifying technology needs, how to leverage S&T to accelerate technology and the basics of S&T integration. "I became the 'MITRE technology guy' at the PEO," he said.

Patel transitioned to an Army civilian in 2016 to Project Manager (PM) for Distributed Common Ground System – Army (DCGS-A), today known as PM IS&A. "I was hired to take on the technology manager, chief technology advisor, industry lead, lead engineer … whatever the PM needed," he said, adding that he learned not only about major source selection and process, but a lot about acquisition law. In 2017, when the Office of the Under Secretary of Defense for Intelligence & Security initiated the Algorithmic Warfare Cross Functional Teams, known as Project Maven, a major DOD initiative to accelerate AI adoption, DCGS-A was assigned. "I ended up being the Army's technical manager for various AI operational pilots. I learned a lot about operationalizing AI and all of the challenges from technical, cost and schedule perspective," he said. Noting that it was also key to figure out how to work the acquisition system, requirements process, and use his vast network of friends across DOD, the intelligence community, Army and other services.

It was based on everything he had learned through his career, starting back to his early days at Fort Monmouth, that enabled him to have the knowledge to pitch the idea for Project Linchpin, by "understanding the role of S&T, innovation, integration into acquisition strategies, working on early concepts informed by operational users and requirements owners, transitioning to a civilian managing millions of dollars to accelerate innovative technologies into the Army, working with major non-traditional defense partners and learning the challenges operationalizing AI," he said.

"The fun has only begun!" he said.

Through it all, the most important point in his career has been "working with some of the best people," Patel said. "I learned so much with every interaction." He also has enjoyed being assigned projects with little-to-no direction which have challenged him to just "figure it out." How he goes about figuring it out is one thing people typically find interesting about his career, he said. In his role, Patel has the flexibility to be creative and he can use anything available in the "acquisition toolbox" to get something done. That includes being able to interact and engage with major technology hubs across the United States, "being able to find my own path and network," he said.

The most important lesson he has learned is, "No one has the right to tell you 'no, that's not a good idea' or 'no, you can't do that.' " Patel said. "I just need to figure out how to work within the system and continue moving the conversation forward … I will find a way if there is a way."

—HOLLY DECARLO-WHITE

PUTTING AI TO THE TEST

Soldiers assigned to the 6th Squadron, 8th Cavalry Regiment, and the Artificial Intelligence Integration Center, conduct drone test flights and software troubleshooting during Allied Spirit 24 at the Hohenfels Training Area, Joint Multinational Readiness Center, Germany, March 6, 2024. (Photo by Spc. Micah Wilson, Joint Multinational Readiness Center)

COMMODITIZING AI/ML MODELS

An approach through Agile development and model quality simulation.

by Capt. Hannah Fairfield, Capt. Dylan Hyde and Capt. John T. McCormick

The concept-development and acquisition communities have long treated artificial intelligence and machine learning (AI/ML) as speculative future technologies for next generation military systems, but the Army can no longer ignore the problems of procuring and supplying AI/ML models in current military systems. As military transformation expert, Peter W. Singer, noted in his April 2024 article, "The AI Revolution is Already Here," that "The battlefield applications of AI are quickly expanding from swarming drones to information warfare and beyond." Though the U.S. Army has already started awarding contracts for AI, most of these contracts are for large monolithic platforms and unified systems such as Palantir Foundry, reported on by Lindsay Clark in her article "Palantir wins U.S. Army contract for battlefield AI," in March 2024. These systems do serve an essential purpose for the enterprise as a whole, but they also leave a critical gap in the acquisition of individual AI/ML models for narrowly scoped systems. The war in eastern Europe is revealing that the pace of adaptation in contemporary large-scale conflicts will require the rapid development and procurement of modular AI-enabled systems, such as first-person view drones and tactical dashboards, as described in Mick Ryan's February 2024 article "Russia's Adaptation Advantage."

Based on our experience developing and deploying Griffin Analytics, a maintenance management and predictive logistics application currently employed by Army Aviation, we advocate two forward thinking research and development processes that together will enable affordable and adaptable procurement of AI/ML systems. First, the Soldier-led Agile software development being pioneered by the Army Artificial Intelligence Integration Center (AI2C) and the Army Software Factory produces Army owned code that can integrate AI/ML models, while avoiding the vendor lock of monolithic systems. Second, the model-quality simulation framework being developed by cadets and faculty at the United States Military Academy Department of Mathematical Sciences enables AI/ML performance metrics to be translated into operational terms and establish specific benchmarks for individual models. Together, these processes would allow the procurement of AI/ML models to be more like ordering parts or components that improve existing Army processes, than the purchase of major end items.

ARMY ARTIFICIAL INTELLIGENCE INTEGRATION CENTER

As a direct report to Army Futures Command (AFC), AI2C plays a pivotal role in integrating AI/ML technologies into Army operations, driving innovation and adaptability. AI2C executes the Soldier-led Agile software development process, which is crucial for several reasons:

- **Army-Owned Code:** By developing software in-house, AI2C ensures the Army retains ownership and control over its codebase. This reduces reliance on external vendors and mitigates the risk of vendor lock-in, which can limit the military's flexibility in adapting to new technologies or changing operational needs.
- **Modular AI/ML Systems:** The Agile development approach enables the creation of modular AI/ML solutions that can be integrated into various military systems. This flexibility allows the Army to deploy AI/ML models that are narrowly scoped to specific tasks, such as predictive analytics or decision support, facilitating rapid response to evolving challenges.
- **Agile Response:** The Soldier-led Agile development model promotes iterative and incremental improvements, allowing AI2C to refine its solutions based

on real-time feedback from Army Soldiers, noncommissioned officers and officers. This continuous feedback loop ensures that the solutions remain relevant and effective, addressing the immediate needs of those on the ground.

Griffin Analytics is one of AI2C's flagship prototypes and exemplifies the success of the Soldier-led Agile processes and is currently employed by XVIII Airborne Corps, Army Reserve Aviation Command and CENTCOM to facilitate better tracking and management of rotary wing assets.

Griffin is an aviation maintenance management application that uses AI/ML algorithms to predict maintenance needs and logistical requirements for Army Aviation assets. This proactive approach minimizes downtime, ensures mission readiness and reduces costs associated with unexpected repairs or delays. The application provides real-time, data driven insights into the performance and condition of aviation assets, allowing personnel to make informed decisions. These insights can be used to optimize resource allocation, manage maintenance schedules and improve overall operational efficiency. Griffin's modular design allows it to integrate data from other military systems, incorporate new AI/ML models and be hosted on Army platforms from the tactical edge to the enterprise cloud.

Use of AI/ML models have the potential to impact units' budgets, storage space in Supply Support Activities as well as national supply chains.

Despite the success of the prototype, one persistent issue that the development team has identified is the lack of consistent requirements for Army software—particularly the predictive components of AI-enabled systems. The system's modular design

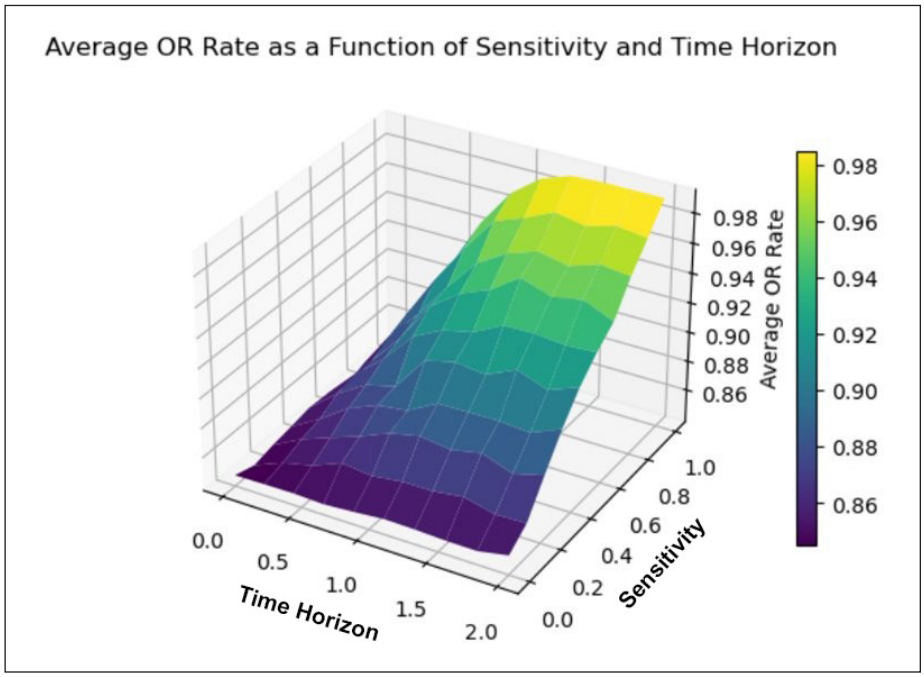
MAINTENANCE MISSION

Sgt. Joshua Inman, 1st Battalion, 150th Assault Helicopter Regiment, New Jersey Army National Guard, performs maintenance on a UH-60M Black Hawk at the Army Aviation Support Facility on Joint Base McGuire-Dix-Lakehurst, New Jersey, Nov. 7, 2023. Griffin uses AI/ML algorithms to predict maintenance needs. (Photo by Spc. Michael Schwenk, U.S. Army National Guard)

has made it easier to incorporate new AI/ML models, but without strict criteria and a connection between operational results and model quality it was initially unclear what level of predictive accuracy the new models would require. The ongoing research collaboration with faculty and cadets at West Point have helped start to address this gap through model-quality simulations and operational impact assessment.

WEST POINT DEPARTMENT OF MATHEMATICAL SCIENCES

Currently, cadets and faculty at West Point are researching ways to translate model quality to the Army's vernacular through the perspective of unit predictive maintenance. If an AI/ML model can predict when a part breaks with a sensitivity of 90%, then what does that mean from the perspective of a maintenance officer? It is tempting to assume that if this model is utilized, the unit's operational readiness rates will rise to at least 90%, but this is not generally a true statement. Therefore, model sensitivity is a component that needs to be considered when translating an AI/ML model to operational readiness rates, but it is not the only metric. For example, if a model is 90% sensitive but can only predict one operating hour in the future, then it provides almost no benefit to operational readiness, especially if parts are not on hand.



OPERATIONAL READINESS RATE VS. SENSITIVITY AND TIME HORIZON

The output of the model that shows the predicted operational readiness rates given specific specificity and time horizons for AI/ML models. The model is using notional maintenance data. (Graphic by Lt. Col. Jonathan Paynter, Maj. Thomas Mussman, Capt. Dylan Hyde and Hannah Ball, United States Military Academy West Point)

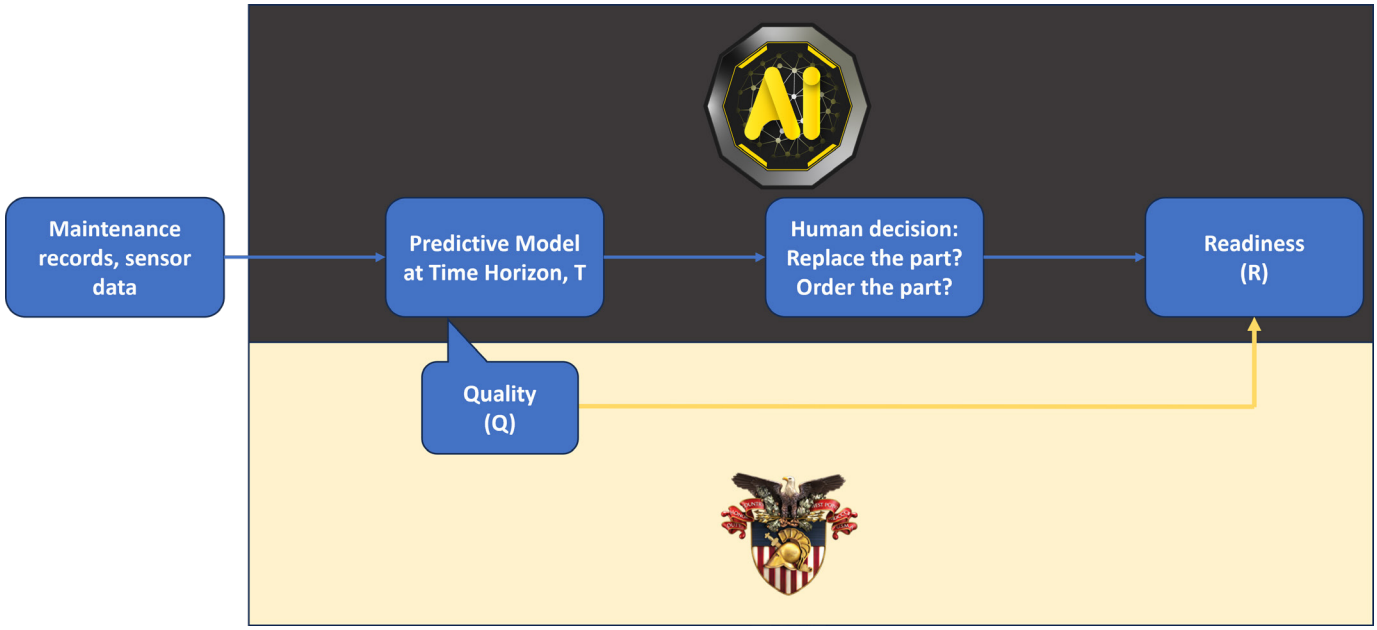
The framework for mapping an AI/ML model's quality to a unit's operational readiness rate has been developed by cadets and faculty at West Point. To create this model quality to readiness map, historical information is needed about the vehicle and its components, such as number of vehicles in the fleet and general information about how often components of each vehicle fail. Given this information, a simulation maps the model quality to expected average operational readiness rates for a fleet of vehicles. Currently, model quality is represented by the sensitivity and the amount of time in the future the model can predict out to.

For example, in a fictional situation where a unit's average operational readiness rate is 80%, historical data could be used to set the parameters of the simulation. Once these parameters are established, the simulation can identify the sensitivity and how far out an AI/ML model would need to predict in order to increase that unit's average operational readiness rate to any given rate, such as 90%. This information can then be used to set the requirements for procuring an AI/ML model.

Further work on this framework will need to implement metrics for inventory management. Use of AI/ML models have

What is Sensitivity?

Sensitivity is a quality metric that measures how well a model is correctly making a relevant selection. In our predictive maintenance case, it is the number of times a model correctly predicts that a part will break, divided by the total number of times that the part actually breaks.



PREDICTIVE MAINTENANCE, AREAS OF RESEARCH
While AI2C is working with the AI/ML models, West Point is researching the quality that those models need to have to achieve the desired outcome. (Graphic by Hannah Ball, West Point Class of 2024)

the potential to impact units' budgets, storage space in Supply Support Activities, as well as national supply chains. Because of this, it will be crucial to understand the impacts of AI/ML models on these areas prior to any large-scale implementation for the Army.

CONCLUSION

The transition from physical industrial products to digital software applications has led to major challenges for military technology development and acquisition. The integration of AI/ML models into these algorithmic tools will only exacerbate these challenges—not only because modern AI/ML is contingent on software, but also because the stochastic (randomness or chance) nature of these models makes it difficult to determine what impact they will have on Army organizations and processes. Moreover, the state of the art for both software and AI/ML moves much faster than traditional technology for military products. As such it will become increasingly important to maintain flexibility and adaptability in procuring AI/ML models. Additionally, while developing those models it will be equally important to determine the level of performance required to achieve the desired operational impacts. The research and development approach addresses both these challenges and can serve as a model for elsewhere in the Army Acquisition enterprise.

The Agile software development methodologies being leveraged by AI2C, the Army Software Factory, and in other AFC organizations offer a paradigm shift in military technology development. Army development teams, consisting of Army personnel with minimal contractor support, can create modular systems that are model agnostic, allowing for seamless integration of different AI/ML models as technology evolves. The AI2C Sustainment team has proven that iterative development with continuous employment by operational units is both possible and effective at delivering incremental value as models and technologies develop. Moreover, modular systems built on agile principles are inherently flexible, enabling rapid customization and reconfiguration to meet specific mission needs. By leveraging in-house Agile software development, defense acquisition can overcome the challenges posed by the dynamic nature of AI/ML technologies, ensuring that military systems remain adaptable, responsive and future proof.

In parallel, leveraging model quality simulations offers a strategic approach to determining the performance requirements for the AI/ML model. The research underway by the West Point Department

These processes would allow the procurement of AI/ML models to be more like ordering parts or components that improve existing Army processes, than the purchase of major end items.

of Mathematical Sciences validates this concept by developing performance benchmarks for individual AI/ML models, allowing AI2C to commoditize the predictive maintenance models being deployed by Griffin. As this collaboration matures, developers in AFC can continue to maintain the holistic AI-enabled systems while contracting out individual machine learning components, enabling the procurement processes to transition from acquiring end systems to purchasing modular AI/ML. Just as components in traditional manufacturing undergo stringent quality testing, AI/ML can be evaluated against predefined performance benchmarks defined in both machine learning and operational terms. By establishing clear requirements for individual AI/ML models using quality simulations, defense acquisition can ensure that AI-enabled systems deliver immediate value and meet the demands of future battlefields, all while streamlining the procurement process and avoiding vendor lock.

DISCLAIMER: The views expressed herein are those of the authors and do not reflect the position of the United States Military Academy, the Army Artificial Intelligence Integration Center, the Department of the Army or the Department of Defense.

For more information on our research and development collaboration, go to ***https://www.westpoint.edu/academics/departments/mathematical-sciences****.*

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CAPT. DYLAN HYDE is a logistics officer currently serving as an instructor at the United States Military Academy Department of Mathematical Sciences. He has an M.S. in applied mathematics from the Naval Postgraduate School, an M.A. in international relations from the University of Oklahoma and a B.S. in information technology from the United States Military Academy.

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A MORE AGILE APPROACH TO TRAINING THE AAW

By now the workforce is familiar with the changes that impacted the defense acquisition workforce as part of "Back-to-Basics." Back-to-Basics was the first major overhaul to the Defense Acquisition Workforce Improvement Act (DAWIA) in 30 years, and it was long overdue.

The Army successfully implemented this framework in February 2022. But a lot has happened since we began that transition in the fall of 2020.

We experienced a pandemic.

New DOD Instructions 5000.66 and 5000.02 were published.

International conflicts.

After only a few years we were already asking ourselves if the adjusted requirements from Back-to-Basics still meet the mark.

THE NEED FOR AGILE

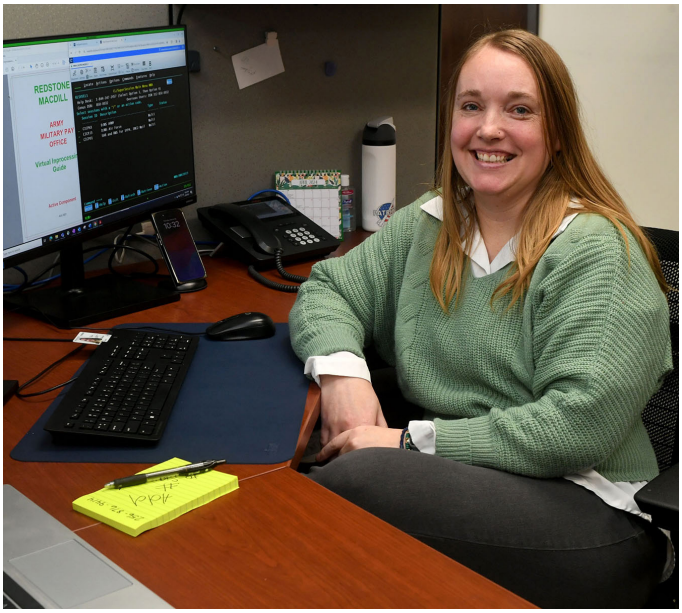
The word "agile" is used a lot when talking about what is required for continuous transformation. The need for agile testing, agile development and agile processes. "Agile" methodology, which allows for rapid development, timely adaptation and accelerating delivery, is important in training and keeping our workforce relevant too.

The previous DAWIA framework, as acknowledged by DOD leaders, was a "one size fits all" construct, and requirements ballooned over time to include excessive requirements and limited flexibility.

The desired outcome with Back-to-Basics, as outlined by the Honorable Ellen M. Lord, the former undersecretary of defense for acquisition and sustainment, was that "each Functional Area includes achieving streamlined and restructured certification requirements, identifying prioritized credentials and providing for continuous learning."

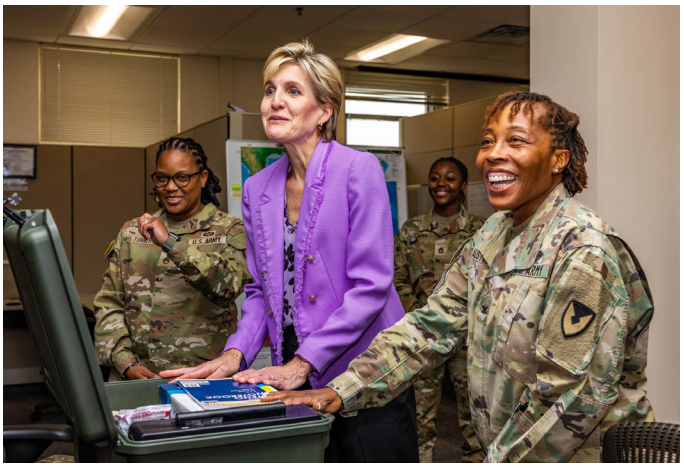
Bottom line: There's increased commitment to experiential learning; flexibility to add, remove and tailor training opportunities based on current and evolving needs; and recognition that acquisition leaders, supervisors and their employees are empowered to choose the training path that meets their individual, team and organizational needs.

At the DOD level and across the services, acquisition functional area leaders are leveraging this autonomy to ensure required training is fundamental to each and every



YOU ARE THE KEY

When it comes to career development, you are the best person to select a path. Whitney Hartwell, military pay technician, at Redstone Arsenal, Alabama, March 2024. (Photo by Eric Schultz, U.S. Army Financial Management Command)



A CORE CATEGORY

Contracting is one of the six major functional areas in the Back-to-Basics framework. Col. Daphne Austin, right, 410th Contracting Support Brigade commander, takes Megan Dake, middle, the deputy assistant secretary of the Army for Procurement, Office of the Assistant Secretary of the Army for Acquisition, on a tour of the 410th facilities in September 2023, at Fort Sam Houston, Texas. (Photo by Spc. Joshua Taeckens, U.S. Army South)

acquisition position regardless of grade or project, and that a wide variety of continuous learning is available based on the uniqueness of each objective.

The best person to develop your career is you.

EMPLOYING COMPETENCIES

Competencies are sets of knowledge, skills, abilities, behaviors and other characteristics that individuals need to perform jobs within their acquisition functional area. It's important that the training we take time to develop, and ultimately require, is based on identified needs that are reviewed and validated.

To accomplish this, we have functional integrated teams (FITs) that execute a periodic review of functional competencies. The FITs circulate the competency model for comment and often go line-by-line to ensure viewpoints are heard from service and 4th Estate representatives—all the agencies and field activities in DOD that are not affiliated with a miliary branch or combatant command. This collaboration is critical in providing each service and the 4th Estate the opportunity to comment on the validation process, and ultimately ensures the competencies are applicable across DOD.

The Defense Acquisition University (DAU) is also a big part of this process, ensuring functional area certification training aligns with these competencies.

DAWIA certification training requirements contain competencies that are core competency elements across each functional area, while competencies deemed to be "specialty" are often left for continuous learning, credentials or assignment specific training. While the DAWIA required training provides for a strong baseline, it is incumbent upon each workforce member to work with their supervisor to identify additional training that may be needed taking into account new acquisition authorities, pathways, agile methodology, digital transformation and real-world events.

The COVID-19 pandemic forced us to look at how we manage and share information, and also how we contingently plan for supply chain issues.

The DoD Instruction 5000.02—updated in 2022—implemented the Adaptive Acquisition Framework, which enables us to deliver effective, suitable, survivable, sustainable and affordable solutions to the end user in a timely manner. This framework impacts everyone across the acquisition community and necessitates broad understanding.

The recent conflicts, such as the one in Ukraine, are another example of our workforce needing to pivot. Within a year, the Army provided thousands of pieces of equipment to Ukraine and, in turn, had to quickly replace those items. These lessons learned demonstrate our need to train the workforce how to accelerate the purchasing and delivery of systems.

We're also looking to incorporate more systems and digital engineering training across functional areas. What we've seen over just the last few years are the rapid changes to system integration, testing, etc., and it impacts all acquisition positions in some way. It's important that all Army Acquisition Workforce members are competent in these areas; not necessarily a certified expert but to have a basic level of understanding.

The COVID-19 pandemic forced us to look at how we manage and share information, and also how we contingency plan for supply chain issues.

WORKFORCE ACQUISITION
Sabrina Thomas, a talent acquisition specialist with the U.S. Army Corps of Engineers (USACE) Little Rock District, speaks with potential candidates about opportunities with USACE during a whole Army career fair in April 2024. Agile methodology helps keep the acquisition workforce relevant. (Photo by Richard Bumgardner, USACE)

CONCLUSION

Thankfully, we have an agile, adaptive process in place with the FITs that allows our acquisition functional leaders to discuss and make critical updates so that our workforce can remain trained and ready. While DAWIA certification remains your bus ticket, it's not the final stop at your destination.

As I've mentioned in previous DACM columns, the best person to develop your career is you, in collaboration with your supervisor. My office will make sure you have the basic skills required to do any job within your functional area, but self-awareness and taking advantage of additional training and education opportunities are what will make you successful in that job. DAU Credentials and the various leader development programs available to you can take you from the fundamentals to expert.

DID YOU KNOW?

The competencies for each Acquisition Functional Area are listed on the USAASC website at **https://asc.army.mil/web/dacm-office/functional-areas/#functionalareas**.

ONE TEAM
The AAW HCSP defined development efforts in three core components: training and education, action learning, coaching and mentoring. (Photo by Polina Zimmerman, Pexels)

BUILDING ON SUCCESS

Updated Human Capital Strategic Plan shifts priorities to support evolving Army policy and the strategic environment.

by Rebecca Wright

The Army Acquisition Workforce (AAW) has the imperative duty of providing Soldiers with the knowledge and expertise that they need to be successful. These needs vary across a wide spectrum of requirements from designing and building weapons to information technology to financial management and purchasing.

To strengthen the workforce in these efforts, the Army Director for Acquisition Career Management (DACM) Office implemented the AAW Human Capital Strategic Plan (HCSP), a five-year strategy that establishes the framework for AAW professionals to meet the needs of the Army. The initial HCSP was published in October 2016, and then subsequent revisions were released in October 2020 and 2024. The HCSP maps out a pathway that invests in the development of over 33,000 Army acquisition professionals—both military and civilian—to ensure that they have the required skills to provide Soldiers with the equipment and services needed to accomplish their missions.

"In the Army, we're all about people," said Ronald R. Richardson Jr., director of the U.S. Army Acquisition Support Center and the Army DACM. "It's my job as the director for acquisition career management to ensure our people—the civilians, officers and NCOs [noncommissioned officers] that make up our Army Acquisition Workforce—are trained and have the tools and support they need to get their job done in support of the Soldier."

FIGHTING FOR TALENT

In July 2024, the DACM Office announced the most recent revision to the HCSP. The latest update is a result of evolving operational needs and strategic goals, adjusting priorities to meet mission requirements and the inclusion of additional enhancements that better align with the Army People Strategy and the Civilian Implementation Plan.

The Army People Strategy outlines an objective to build teams that are ready, professional, diverse and integrated. These cohesive teams will pursue four lines of effort defined in the HCSP derived from the Army People Strategy. These lines of effort are acquiring, developing, employing and retaining talent. To achieve these objectives, the DACM Office is focusing on training and certification to develop AAW personnel, engaging in career fairs to network with and potentially acquire talent, using expedited hiring processes and offering incentives to employ and retain talent.

"Recruiting is an area where we have expanded our efforts that we had not previously focused on since the Army People Strategy and the Civilian Implementation Plan came out. And it was a great thing for our team to see where Army was going and then an opportunity for an area that the DACM Office hadn't emphasized," said Scott Greene, the strategy and communications division chief with the DACM Office. "That is probably the biggest area where we've shifted our focus since the inception of the Army People Strategy and that's within recruiting, mostly on the civilian side, but the military as well."

While it is a general understanding that the federal hiring process can be lengthy, the HCSP encompasses multiple initiatives that can assist in accelerating the hiring process such as direct-hire authority (DHA) and the Rocket Hire Initiative. DHA provides agencies with the flexibility to use expedited hiring procedures for specific job positions by bypassing some of the traditional processes such as rating applicants and applying limits to the number of applications received.

The Rocket Hire Initiative is a pilot program introduced by Army Materiel Command to expedite the Army civilian hiring process by performing background checks and screening applicants in real-time. The Rocket Hire Initiative has already significantly increased the number of tentative job offers. In one case, the initiative was piloted at the BEYA (Becoming Everything You Are) science, technology, engineering, and mathematics (STEM)

FAST-TRACKING FUTURES

Morgan Hood, right, a prospective employee, speaks with Idia Osaghae, a division chief with Aberdeen Proving Ground Army Contracting Command, during the 38th Annual BEYA STEM Conference in Baltimore in February 2024. (Photo by Hannah Miller, Aberdeen Proving Ground Public Affairs Office)

career conference in Baltimore, Maryland in February 2024. Rather than a potential candidate scheduling an appointment for preemployment vetting and waiting for the results of a background check (which may take weeks), security personnel were present at the conference to prescreen candidates and issue tentative job offers.

"Not only were they prescreening candidates and issuing tentative job offers—should they meet the right candidate—but they had security there to do fingerprinting and begin that process on the spot," said Aaron Hutson, the strategy and policy branch chief with the DACM Office. "There was one case where there was already an active Army employee there. They were able to issue a start date at the career fair. So, this is just an opportunity to streamline that; have the HR [human resources] side present with the CHRA [Civilian Human Resources Agency] and the screeners, making sure the individual is qualified, bringing on the security side as well and expedite the time to hire in the process," Hutson said.

The HCSP also suggests leveraging programs that bring in collegiate students, such as the Defense College Acquisition Intern Program (DCAIP), to extend awareness of acquisition job opportunities in DOD. The DCAIP is a paid 10-to-12-week internship for second- and third-year college students enrolled in an undergraduate program that provides hands-on experience in a wide variety of skills and career fields within the acquisition workforce.

CONTINUING ON THE KNOWLEDGE PATH

The HCSP structure provides the AAW a continued path toward focusing on education, training and upskilling. The AAW HCSP has defined the development line of effort with three core components: training and education, action learning, coaching and mentoring. This includes the implementation of the Back-to-Basics framework. Back-to-Basics was launched in February 2022 to provide tailored training to code acquisition-coded personnel in their specific functional area versus using uniform training across all personnel regardless of their position. By implementing Back-to-Basics, AAW professionals can access training that is specific to their job, eliminating unnecessary courses that are unrelated to their profession. (Read more about Back-to-Basics in "Navigating Elective Learning" in the Winter 2024 issue of Army AL&T.)

SEEK AND FIND

Army Medical Logistics Command Human Resources Director Kenneth Daniels discusses career opportunities with a potential candidate at the BEYA STEM Conference in February 2024 in Baltimore, Maryland. The annual event attracts thousands of job seekers primarily in the fields of science, technology, engineering and math. (Photo by Ellen Crown, U.S. Army Medical Logistics Command)

The HCSP structure provides the AAW a continued path toward focusing on education, training and upskilling.

Along with Back-to-Basics, the DACM Office launched the MOREin'24—a campaign to enhance digital expertise and promote ongoing skill development among AAW personnel. By promoting continuous digital learning courses (offered through Udemy), acquisition-coded employees can obtain the Digital Foundations certification while also enhancing their professional development and digital proficiency. (Read about MOREin'24 in "Serving the Digital Entrée" in the Summer 2024 issue of Army AL&T.)

In addition to upskilling and education, the HCSP focuses on employee retention through various other initiatives. These include the Talent Based Career Alignment program, which offers career stability and incentives for high-performing officers, and the Student Loan Repayment Program which may offer eligible employees financial assistance to repay their educational debt. These incentives not only cultivate a culture of learning but also assist in retaining current talent within the workforce.

CONCLUSION

The HCSP continues to build upon the core components established in previous versions. Further accomplishments include establishing the Recruitment and Sustainment Center of Excellence (now the Army Acquisition Workforce Civilian Human Resources Service Center), which has reduced time-to-hire and implementing competency assessments to identify and address skill gaps. Additionally, the expansion of the Training With Industry Program and the introduction of the Acquisition Leader Assessment Program have both further bolstered leadership development.

"Some of my favorite outcomes of the Human Capital Strategic Plan over the last eight years have been largely through the sharing of best practices," Greene said. "Some of those include our new Army Acquisition Workforce onboarding training. Another one includes a focus on centralized recruiting efforts. Finally, the kind of earliest notable outcome was an emphasis on focusing on the reduction of time-to-hire and seeing that come to fruition, not only for the Army Acquisition Workforce, but I think that largely led to help for the overall Army."

Through an ongoing commitment to skill development, staff motivation and focusing on and investing in knowledge, the HCSP continues to strengthen and empower a talented and loyal AAW. "This is a team effort—one that will require everyone to play their part, from our most senior acquisition leaders to our supervisors to the workforce member. A strong workforce is critical to making sure our Soldiers are never in a fair fight," Richardson said. "As our operating environment continues to rapidly evolve, it's more important than ever that we are deliberate in our human capital planning. We must be agile to adapt quickly to new trends and we must take proactive measures to ensure our workforce remains ready, professional, diverse and integrated. The latest iteration of the AAW Human Capital Strategic Plan is designed to frame these efforts and set actionable and measurable objectives that my office, as well as our stakeholders across the Army acquisition enterprise can leverage to strengthen the workforce."

By consistently monitoring and adjusting mission priorities as needed, maintaining a high level of expertise and accomplishing the goals set forth by the HCSP, the AAW can support Soldiers in a way that enables them to accomplish current missions and be ready for the ones in the future.

For more information, go to ***https://asc.army.mil/web/hcsp*** *or email* ***usarmy.belvoir.usaasc.mbx.usaasc-aaw-hcsp@mail.mil****.*

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 14 years of experience writing and editing for DOD and the U.S. Department of Justice.

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ALBERT "AL" KLOBCHAR

COMMAND/ORGANIZATION: Project Manager Combat Ammunition Systems

TITLE: Acquisition manager

YEARS OF SERVICE IN WORKFORCE: 18

DAWIA CERTIFICATIONS: DOD Contracting Professional

EDUCATION: M.S. in management, Florida Institute of Technology; B.S. in communications, Indiana University of Pennsylvania

AWARDS: Civilian Service Achievement Medal (2024); PM CAS Leader of the Year Award (2022); PM CAS Excellence in Contracting (2021, 2016); Commander's Award for Civilian Service (2014)

EMPOWERED TO WIN

Albert "Al" Klobchar is the acquisition manager for Project Manager Combat Ammunition Systems (PM CAS) within Joint Program Executive Office Armaments and Ammunition (JPEO A&A). He is responsible for overseeing Acquisition Category (ACAT) I-IV program acquisition planning and contract execution for conventional and precision 155 mm artillery ammunition, propellants, mortar ammunition and weapon systems, as well as associated equipment. He provides strategic leadership in his role through managing a portfolio, he explained, that contains approximately 300 active contracts for more than 100 programs.

In fiscal year 2023, he led a branch of 12 acquisition professionals who successfully completed procurement planning activities for more than seven million artillery and mortar end-items comprising of many component contract actions for a total value of more than $4.5 billion. "The PM CAS teams are leaders in conventional artillery and mortars for the U.S. Army. It's very satisfying to be a part of this process that enables the Army and allies to provide overmatching capability and ultimately save lives," Klobchar said.

Like many young college graduates, Klobchar said he had no idea what he wanted to do for a living. He "desperately" needed an internship to finish his degree and he applied to be a summer hire at Army Contracting Command – New Jersey (ACC-NJ) as a contract specialist.

"My goal was to put in my time for three months, graduate and head south for warmer weather and beaches. But, when I arrived, I found the ammunition products to be very interesting; how they are developed, procured, manufactured and perform," he said. "I also quickly found mentors and saw a direct path for growth, so I decided to 'extend my internship' for another 18 years and counting."

Much of Klobchar's early contracting and acquisition experience was in precision munitions, to include initial variants of the Precision Guidance Kit and the 155 mm Excalibur projectile. "When I explain how these products utilize GPS at extended ranges to guide projectiles to precise targets, my family and friends are genuinely shocked," he said. "It's a great testament to the brilliant engineers at PM CAS and I'm proud I get to continue to oversee the acquisition process for these munitions and other important products."

"Throughout the duration of my career, I've been very lucky to work with senior leaders that empower me and provide me with the opportunity to perform to my fullest potential," he said. For instance, when the Army Acquisition Executive, the Honorable Douglas

"I quickly found mentors and saw a direct path for growth."

STAYING ACTIVE
Klobchar with his sons at a ropes course while on vacation in Myrtle Beach, South Carolina. He makes a point to be involved with his two sons' activities while also trying new things. (Photo courtesy of Albert Klobchar)

R. Bush, challenged PM CAS with awarding the first multiyear procurements for 155 mm munitions, he said his senior leaders trusted him to lead, manage and execute these complex acquisition efforts and, he said, they only intervened when he elevated resource constraints or the need to adjust priorities.

"After collaborating with the outstanding and talented teammates from ACC-NJ, the outcome was that five multiyear contracts were awarded, providing stable production and cost savings over $60 million," Klobchar said. "Being trusted and empowered to plan and execute projects is the most important thing to me as an acquisition professional."

In his role, Klobchar leads a branch of "awesome acquisition professionals" and, he said, he is so proud of their dedication to the mission and their accomplishments. As he mentors, coaches and works with junior acquisition personnel, his advice to them is "just to focus on the next step and what can be done today to make a project better."

"The DOD acquisition process can be long and complicated, especially for complex artillery programs, and looking at the process as a whole is frankly overwhelming," he said. "However, if we can always do our best to get to the next step in the process, we're going to find success often. The small wins are just as important as the major accomplishments."

Over time, Klobchar said he has also learned to better accept things when they don't go as well as he wanted them to. "I used to beat myself up when things did not go perfectly," he said. "Acquisition management to procure and deliver complex ammunition and weapon systems is a challenging job. If it was easy, it would not require hundreds of team members and stakeholders across multiple organizations working towards a common goal. I've learned that getting overly stressed out when you don't meet perfection is just a distraction and does not help efficiency or progress on a collective goal."

Klobchar is currently taking the Civilian Education System Advanced course, which is a required leadership development program for all supervisors. "I found value in the areas of building strong teams, trust and decision-making approaches," he said, adding that "it is always good to pause for a moment and be able to assess yourself as a leader, acknowledge any areas to improve, and grow both personally and professionally."

For those who know him outside of work, he has been told that some find humor in the spontaneity of what he is doing next. While he said he makes a point to be involved with his two sons' activities, for example, coaching their travel soccer team last fall where he said he "may have had the best time of his life," he also enjoys trying new things as much as he can. "I was able to take a week off from work recently, so I woke up one morning and spontaneously decided to go indoor rock climbing. Now I'm hooked," he said, adding he brings that same energy into his work when he gets the chance.

"I often look for new ways to be innovative or streamline the acquisition process, whether it be multiyear procurements, new statutes or using temporary authorities. If there is a new approach that can be used to procure and deliver faster, I try to be one of the first ones to use it in an attempt to shape its implementation."

—HOLLY DECARLO-WHITE

CAREER NAVIGATOR

LET'S *BE REASONABLE*

Reasonable accommodations remove barriers and encourage work-life balance.

by Jacqueline M. Hames

Balancing work, social lives, family lives and other miscellaneous parts of life can be difficult, even for the most well-organized, healthy and economically comfortable individuals. Average employees spend roughly eight hours a day, five days a week, performing their jobs and interacting with their co-workers before returning their attention to their home life. That's a large amount of time spent at work with co-workers—it's no wonder that a few rough days on the job can throw off the balance of home life.

Achieving that work-life balance can be even more difficult for some people with disabilities than it is for their counterparts, simply because the world at large does not always cater to the full range of different abilities. Providing reasonable accommodations for individuals with disabilities can help reduce stress by working around limitations or barriers that interfere with accessibility and performing job duties.

"As we all encounter various difficulties and barriers in our personal and work lives, stress can result," said Rosemary Salak, the disability program manager for the Equal Employment Opportunity Policy and Programs directorate under the deputy assistant secretary of the Army for Equity and Inclusion. Her focus is on Army programs and policies that provide for equitable and inclusive employment of people with disabilities and govern accessibility for job applicants and employees.

"Reasonable accommodation is all about removing barriers," Salak said.

In a January 2023 article, the Partnership for Public Service reported that federal employee engagement and satisfaction scores for people with disabilities were 6.7 points lower than their counterparts. "This group has an overall different experience working in the federal government than their peers," the article said.

Those results aligned with similar research on the private sector workforce conducted by Global Disability Inclusion and Mercer. More than 12 million employees with disabilities in the United States are "more subject to micromanagement, which deters employee innovation, and receive less recognition than their peers without disabilities," the report stated.

THE RIGHT TOOLS

Out of the general federal employee population, "one in four government employees report very often or always feeling burned out at work," a Gallup article from March 2024 said. Gallup identified five work experiences that contribute most to that feeling:

STRENGTH IN COLORS
A red ribbon represents people with physical disabilities, in the same way a pink ribbon denotes breast cancer awareness. Other ribbon colors include gold, white, blue and green; all various disabilities. The Army aims to provide reasonable accommodations for those with disabilities such as assistive technology, modified work schedules or removal of physical barriers. (Photo by Sarah Ridenour, U.S. Army Sustainment Command)

Unfair treatment at work; unmanageable workload; unclear communication from managers; lack of managerial support; and unreasonable time pressure. Gallup also notes that how employees experience their workload has a stronger influence on burnout or stress than the actual number of hours worked.

To reduce occurrences of job burnout, Gallup recommends three strategies: Ensure that employees are engaged at work; ensure the organization actively supports employee well-being; and ensure that employees are surrounded by a culture that celebrates each person's strengths.

Supporting employee well-being includes providing employees the tools they need to do their job. Standard tools include desks, computers, policies and work schedules.

"Some individuals may need different tools, or modifications to policies, the work environment or the manner or circumstances under which a job is usually performed," Salak said. For example, these accommodations can include assistive technology, sign language interpretation, modified work schedules or removal of physical barriers.

She explained that reasonable accommodation policies are governed by three laws:

- The Rehabilitation Act of 1973, which governs accommodations for people with disabilities.
- The Pregnant Workers Fairness Act of 2021, which governs accommodations for pregnancy, childbirth or medical conditions related to pregnancy and childbirth.
- Title VII of the Civil Rights Act of 1964, which governs accommodations for sincerely held religious beliefs or practices.

Effective accommodations mitigate or work around any physical, cognitive or other limitations that individuals may have, enabling them to "apply for a job or enabling an employee to successfully perform the functions of the job held or desired," she said.

LET'S TALK

Representatives from Peak Performance, a nonprofit that helps job seekers with disabilities find careers, speak with attendees during the annual Technology Fair on September 14, 2023, at the Fort Cavazos Community Center. The Army supports employees with disabilities by providing equitable and inclusive employment. (Photo by Samantha Harms, Fort Cavazos Public Affairs)

Primary reasonable accommodation resources for managers and employees are:

- The disability program manager in the agency's servicing Equal Employment Opportunity office.
- The DOD Computer/Electronic Accommodations Program (CAP).
- The Job Accommodation Network (JAN).
- The Employer Assistance and Resource Network (EARN) on Disability Inclusion.
- The Equal Employment Opportunity Commission (EEOC).
- The Army's Equity and Inclusion Agency.

First-level supervisors are usually responsible for authorizing accommodations, but they must consult with the servicing legal advisor and with the disability program manager in their local Equal Employment Opportunity office before denying a request. It is also worth noting that medical information and information associated with reasonable accommodations is confidential and, as such, should only be shared with those who have a need-to-know, Salak explained.

To receive accommodations for limitations imposed by a disability, employees or applicants must have a disability as defined by the Americans with Disabilities Act Amendments Act of 2008, Salak explained. Employers can only provide accommodations for "known" physical and mental limitations, and medical documentation can be requested when the limitations experienced are not obvious—such as people with a chronic, invisible illness, or neurodivergent individuals with low support needs.

However, supervisors "can and should implement interim, temporary reasonable accommodations while awaiting receipt of necessary medical information—if there is sufficient information to believe it is reasonably likely that an employee will be entitled to accommodation," Salak said.

CULTURE CHANGE

"More than 25% of U.S. adults have a disability," Salak said. "Anyone can become a person with a disability, temporary or permanent, at any time."

Some barriers that people with disabilities encounter include the perception that reasonable accommodations—from accessible parking lots to tailored working environments—are special treatment, but that is not the case. "The premise is equal access, not special treatment," Salak

"Reasonable accommodation is all about removing barriers."

explained. "The goal is to accommodate the needs of people with disabilities to 'level the playing field'—not to provide unfair advantage."

Supervisors and managers can help improve workplace culture by modeling inclusive behaviors, by addressing stereotypes, stigmas and myths and by increasing awareness. "Normalizing disabilities and accommodations and providing a respectful, supportive environment for everyone can help remove stigma associated with disabilities," Salak explained.

Currently, Salak said the Army supports its employees with disabilities in several ways: The reasonable accommodation program; objectives and tasks outlined in the Civilian Implementation Plan that increase opportunities for people with disabilities; initiating employee resource groups; special hiring authorities for people with disabilities; and the Veteran Appointment Authority for veterans rated at 30% or more disability.

In addition, the Army encourages civilian employees to voluntarily update their disability status using the Defense Civilian Personnel Data System MyBiz+self-service portal. This helps not just employees with disabilities but also the larger Army mission. "Accurate data supports decisions regarding resources and programs to employ and retain talented workers with disabilities," she explained.

CONCLUSION

"The disability community is an often-untapped community of talented individuals who want to work and serve our nation," Salak said. "The Army welcomes them and supports them with a robust reasonable accommodation program providing the tools individuals need to accomplish the mission."

Reasonable accommodations can alleviate not only physical stress but also mental stress in those that need them, providing physical ease and inclusivity. If you feel that an accommodation may benefit you, talk to your supervisor—and achieve a better work-life balance.

RAISING AWARENESS

The U.S. Army Corps of Engineers, Buffalo District, marked National Disability Employment Opportunity Month in October 2023 by wearing the various colors representing disabilities. The month raises awareness for those with disabilities having an equal opportunity for employment and advancement, and steps that organizations can take to support those with disabilities. (Photo by Ryan Campbell, U.S. Army Corps of Engineers, Buffalo District)

For more information about reasonable accommodations, go to ***https://www.opm.gov/policy-data-oversight/disability-employment/reasonable-accommodations/****.*

JACQUELINE M. HAMES is the senior editor at Army AL&T magazine. She holds a B.A. in creative writing from Christopher Newport University. She has more than 15 years of experience writing and editing news and feature articles for publication.

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OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY FOR ACQUISITION, LOGISTICS AND TECHNOLOGY

FIRST ARMY ACQUISITION CORPS CIVILIAN COMMISSION

Chris Young made history by becoming the first civilian to receive a direct commission into the Army Acquisition Corps during a commissioning ceremony held August 16, 2024, at Fort Moore, Georgia. This landmark achievement signals a transformative shift in how the Army is expanding its talent pool. The ceremony was conducted by **Lt. Col. Wilford Garvin**, 3rd Battalion 11th Infantry Regiment commander, who commissioned Young alongside his class of 105 direct commission candidates.

Young's direct commission is part of an innovative initiative by the Army to create specialized pathways for commissioning in various job fields. The National Defense Authorization Act for Fiscal Year 2019, signed into law on August 13, 2018, empowers the DOD with enhanced authority to grant constructive service credit. This authority facilitates the direct commissioning of officers up to the rank of colonel, across all branches and functional areas, reinforcing the Army's commitment to attracting top-tier, civilian talent.

The direct commission program is a highly selective and rigorous process. Young will embark on a rigorous training path that includes the Direct Commission Course, the Signal Basic Officer Course and the Signal Captain Career Course. After completing this training, he will transition to a Functional Area 51, where he will likely take on an acquisition program manager role within a program executive office.

Young has 20 years of diverse experience in the civilian sector, where he excelled in various roles, including manufacturing engineer, operations manager and even a company CEO. This multifaceted background equips Young with a unique perspective that will undoubtedly enhance the Army Acquisition Workforce. He is eager to bring industry experience to the Army and committed to remaining at the forefront of innovation and operational excellence. Outside of his professional commitments, Young resides in Arizona with his wife and four children. His journey serves as an inspiration to other civilians considering this noble path. (Photos by Maj. Brad Mcpherson, USAASC)


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PROGRAM EXECUTIVE OFFICE COMMAND CONTROL COMMUNICATIONS-TACTICAL

1. NEW DEPUTY PROGRAM EXECUTIVE OFFICER

Brig. Gen. Kevin Chaney was appointed to the position of deputy program executive officer for Command, Control and Communications – Tactical (PEO C3T) in June 2024. Chaney previously served as program manager for Future Attack and Reconnaissance Aircraft at Program Executive Office for Aviation. (Photo by U.S. Army)

2. ASSUMPTION OF CHARTER AT PDM COMMUNICATIONS SECURITY

Derek Harberts, left, accepts the charter for the newly activated Product Manager Communications Security (formerly Product Lead Communications Security) from **Michael Badger**, right, during a change of charter ceremony hosted by **Dennis Teefy**, center, project manager for Tactical Radios, May 23, 2024, at Aberdeen Proving Ground, Maryland. (Photo by Ryan Myers, PEO C3T)

3. CHANGE OF CHARTER AT GENM-A

Lt. Col. Reginald Gholston, right, accepts the charter for Global Enterprise Network Modernization – Americas (GENM-A) from **Lt. Col. Xkoshan Arnold**, left, during a change of charter ceremony hosted by **Col. Justin "Jay" Shell**, center, July 11, 2024, at Fort Belvoir, Virginia. (Photo by Ryan Myers, PEO C3T)

4. CHANGE OF CHARTER AT GENM-O

Michael Van Buskirk, right, accepts the charter for Global Enterprise Network Modernization – OCONUS (outside the continental U.S.) from **Thomas Dunaway**, left, during a change of charter ceremony hosted by **Col. Justin Shell**, center, project manager for Integrated Enterprise Network, May 22, 2024, at Fort Belvoir. (Photo by Ryan Myers, PEO C3T)

5. CHANGE OF CHARTER AT PDM HELICOPTER AND MULTI-MISSION RADIO

Lt. Col. Candice Hughes, right, accepts the charter for Product Manager Helicopter and Multi-Mission Radio from **Jerry Harper,** left, during a change of charter ceremony hosted by **Dennis Teefy**, center, project manager for Tactical Radios, July 25, 2024, at Aberdeen Proving Ground. (Photo by Ryan Myers, PEO C3T)

6. RETIREMENT AND CHANGE OF CHARTER

Lt. Col. Derrick Hopper, right, accepts the charter for Product Manager Handheld Manpack and Small-Form Fit from **Lt. Col. Rustin Jessup**, left, during a change of charter ceremony hosted by **Dennis Teefy**, center, project manager for Tactical Radios, August 2, 2024, at Aberdeen Proving Ground. Jessup accepted his certificate of retirement after 21 years of service. (Photo by Ryan Myers, PEO C3T)

7. PDM NETWORK INTEGRATION AND MODERNIZATION CHARTER

John Crone, right, accepts the charter for Product Manager Network Integration and Modernization from **Lt. Col. Jonathan Judy**, left, during a change of charter ceremony hosted by **Jack Wilson**, center, project manager for Interoperability, Integration and Services on June 21, 2024, at Aberdeen Proving Ground. (Photo by Ryan Myers, PEO C3T)

8. NEW CHARTER FOR PM I2S

Jack Wilson, right, accepts the charter for Project Manager Interoperability, Integration and Services from **Matthew Maier** (not pictured), during a change of charter ceremony hosted by **Mark Kitz**, left, PEO C3T on May 16, 2024, at Aberdeen Proving Ground. (Photo by Ryan Myers, PEO C3T)

9. CHANGE OF CHARTER AT PDL COMMON HARDWARE SYSTEMS

Leslie Hosein, right, accepts the charter for Product Lead Common Hardware Systems from **Raymond "Mike" Hartley** (not pictured), during a change of charter ceremony hosted by **Matthew Maier**, left, project manager for Interoperability, Integration and Services on May 9, 2024, at Aberdeen Proving Ground. (Photo by Ryan Myers, PEO C3T)

10. CHANGE OF CHARTER AT PM TACTICAL RADIOS

Dennis Teefy, right, accepts the charter for Project Manager Tactical Radios from **Mike Hedley**, left, during a change of charter ceremony on May 17, 2024, at Aberdeen Proving Ground, while **Sgt. 1st Class Joshua Dewitt**, center right, looks on. Hedley will return to his role as deputy for PM Tactical Radios. (Photo by Ryan Myers, PEO C3T)

11. CHANGE OF CHARTER FOR PDM NETWORK MODERNIZATION

Lt. Col. Clarke Brown, center right, accepts the charter for Product Manager Network Modernization from **Robert Tisch**, center left, during a change of charter ceremony hosted by **Col. Stuart McMillan**, left, project manager for Tactical Network, July 25, 2024, at Aberdeen Proving Ground, while **Maj. Giancarlo Rindone,** right, looks on. (Photo by Ryan Myers, PEO C3T)

12. CHANGE OF CHARTER AT PDL E-ICAM

John Shotwell, right, accepts the charter for Product Lead Enterprise-Identity, Credential and Access Management from **Kyle Tucker, Jr**., left, during a change of charter ceremony hosted by **Jack Wilson**, center, project manager for Interoperability, Integration and Services on June 27, 2024, at Fort Belvoir. (Photo by Ryan Myers, PEO C3T)

13. CHANGE OF CHARTER FOR PD BECS

Joseph Wieland, right, accepts the charter for Product Director Base Emergency Communications System from **Ernest Wasikowski**, left, during a change of charter ceremony hosted by **Col. Justin "Jay" Shell**, center, project manager for Integrated Enterprise Network, July 25, 2024, at Fort Belvoir. (Photo by Ryan Myers, PEO C3T)


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PROGRAM EXECUTIVE OFFICE FOR ENTERPRISE INFORMATION SYSTEMS

1. IPPS-A CHANGE OF CHARTER

Col. Matthew Paul, left, new project manager for the Integrated Personnel and Pay System – Army project management office at PEO EIS is congratulated by outgoing **Col.(P) Robert J. Mikesh, Jr.** during a change of charter ceremony on April 24, 2024, at Fort Belvoir. Mikesh has since assumed the role of deputy program executive officer at PEO EIS. (Photo by Cecilia Tueros, PEO EIS Strategic Communications)

2. NEW AHRS PRODUCT DIRECTOR

Gina Whitaker, left, assumed the role of product director for Army Human Resource Systems (AHRS) at an assumption of charter ceremony, July 9, 2024, at Fort Belvoir. **Col. Melvin Mitchell**, project manager for Enterprise Business Systems – Convergence, hosted the ceremony and presented her with the charter. Whitaker previously served as deputy product director of AHRS. (Photo by Cecilia Tueros, PEO EIS Strategic Communications)

3. ADP CHANGE OF CHARTER

Cassandra Reilly, left, incoming product manager for the Army Data Platform (ADP) product office, receives the colors from **Brian Raftery,** center, project manager for Army Data and Analytics Platforms at PEO EIS, while **Scott Tyler**, center right, Deputy Product Manager, Army Data Platform observes. Reilly replaced **Lt. Col. Laura-Jane (LJ) Freeland**, right, as the ADP product manager at a change of charter ceremony, July 11, 2024, at Fort Belvoir. (Photo by Laura Edwards, PEO EIS Strategic Communications)

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

NEW CHARTER AT JPM CBRN SENSORS

Timothy Tharp, right, incoming joint project manager (JPM) for Chemical, Biological, Radiological and Nuclear (CBRN) Sensors awaits receipt of the flag during the Changing of the Colors tradition at a change of charter ceremony, July 8, 2024, at Aberdeen Proving Ground. **Col. Robert Carter III**, center left, outgoing JPM, passed the JPM CBRN Sensors flag to **Darryl Colvin**, left, joint program executive officer for CBRN Defense to pass to Tharp, while First sergeant **John Binot** of the 20th CBRNE Command, center right, looks on. During the ceremony, Carter was also presented with the honorable Order of the Dragon. (Photo by Matthew Gunther, JPEO-CBRND Public Affairs Office)

U.S. ARMY COMMUNICATIONS-ELECTRONICS COMMAND

CECOM IPT WINS DASHBOARD DESIGN AWARDS

A U.S. Army Communications-Electronics Command (CECOM) integrated product team won the award for Data and Analytics Dashboard Design (Power BI) at the Army Materiel Command Data and Analytics Summit held on July 24, 2024, at the Tobyhanna Army Depot. The team comprised of experts from CECOM's Software Engineering Center, Integrated Logistics Support Center, and G3, the Army's staff division responsible for operations and planning. The development of the Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Equipment Readiness Common Operating Picture earned recognition for the best overall dashboard design. (Photo by Kevin Deegan, CECOM SEC)

U.S. ARMY SECURITY ASSISTANCE COMMAND

1. CHIEF OF STAFF RETIRES

Col. Stephanie Barton, left, U.S. Army Security Assistance Command (USASAC) chief of staff, retired after 28 years of dedicated service during a ceremony at the command's Redstone Arsenal headquarters in Huntsville, Alabama on June 21, 2024. Her wife, Mandy Barton, right, and sons, Payton and Cade (not pictured), joined her for the ceremony. (Photo by Terri Stover, USASAC)

2. RELINQUISHMENT OF COMMAND

Brig. Gen. Brad Nicholson, commanding general of USASAC, relinquished command during a ceremony hosted by Army Materiel Command, July 26, 2024, at Redstone Arsenal. Nicholson served as USASAC's 32nd commanding general and will transition to his next assignment this fall. (Photo by U.S. Army)

GENERAL OFFICER ANNOUNCEMENTS

Secretary of Defense Lloyd J. Austin III has announced that the President has nominated:

Brig. Gen. Francisco J. Lozano for promotion to the grade of major general. He is currently serving as program executive officer for Program Executive Office Missiles and Space, at Redstone Arsenal, Alabama.

Brig. Gen. Christopher D. Schneider for promotion to the grade of major general. He is currently serving as program executive officer for Program Executive Office for Soldier, at Fort Belvoir, Virginia.


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THEN & NOW
1969 & 2024

SEND IN THE DRONES

From humble surveillance to formidable battlefield assets, drones are reshaping modern warfare with advanced capabilities.

by Cheryl Marino

SHOULDERING THE BURDEN
Sgt. Elijah Tovar with the 2nd Squadron of the 3rd Cavalry Regiment Fox Crew, prepares to launch an RQ-11 Raven drone to conduct surveillance in the training area and locate possible targets during Freedom Shield 24, March 14, 2024, in South Korea. (Photo by Spc. Victoria Morgan, 100th Mobile Public Affairs Detachment)

An unusual object streaks across the sky, sparking curiosity from the ground. Not a bird, not a plane—but it might be a drone.

Today, commercial drones are spotted everywhere it seems. Hovering high above trees and open fields for recreational use, photography or agricultural maintenance. Or for official means, floating overhead for the management of traffic, public events or crowd monitoring.

For the military, drones—more commonly referred to as unmanned aerial vehicles (UAVs)—soar strategically above the battlefield and beyond for use in surveillance and reconnaissance, combat support, force protection, electronic warfare, precision strikes, training and testing.

These UAVs evolved from basic reconnaissance tools to versatile, lethal weapons over several decades, with significant advancements in the late 20th and early 21st centuries. The integration of artificial intelligence and machine learning (AI/ML), enhanced navigation systems, anti-jamming capabilities and advanced satellite communications enable today's drones to execute missions with unprecedented accuracy and stealth, while ensuring operational safety in increasingly contested spaces.

"We are learning from the battlefield—especially in Ukraine—that aerial reconnaissance has fundamentally changed," said Gen. Randy A. George, Army chief of staff, in a February 2024 press release. "Sensors and weapons mounted on a variety of unmanned systems and in space are more ubiquitous, further reaching and more inexpensive than ever before. I am confident the Army can deliver for the Joint Force, both in the priority theater and around the globe, by accelerating innovation, procurement and fielding of modern unmanned aircraft systems [UAS], including the Future Tactical Unmanned Aircraft System [FTUAS], launched effects [small drones] and commercial small, unmanned aircraft systems."

A UAS includes not only the UAV or drone, but also the person on the ground controlling the flight and the system in place that connects them both, making the UAV a component of the UAS.

The progression of UAVs in warfare highlights a shift towards intelligent and autonomous systems capable of decisive actions in critical moments. But where did these strange suspended flying machines come from, and how did they evolve to become versatile weapons of war today and beyond?

EARLY BIRDS

The first UAV traces its origins back to early 18th century France with the emergence of the hot-air balloon, which did not require a human pilot. The concept militarily led to the (ineffective) balloon bombings used by Austrian forces to besiege Venice in 1849, and a decade later, to the first UAV hot-air balloon camera and aerial photograph in 1858—sadly lost in history.

In the U.S., the Kettering Bug, a pilotless biplane designed by Charles F. Kettering of Dayton, Ohio and developed by the U.S. Army Signal Corps during World War I for

delivering explosives to enemy targets, has been cited as one of the earliest examples of a UAV.

The U.S. Army aircraft board, in 1917, tasked Kettering with designing a weapon that could strike enemy positions from a distance without risking human pilots' lives, so he invented an unmanned aerial torpedo, nicknamed the "Bug," launched from a four-wheeled dolly that ran down a portable track, with a system of internal pre-set pneumatic and electrical controls that stabilized and guided it toward a target. Kettering's design, formerly called the "Kettering Aerial Torpedo," later became known as the Kettering Bug, a flying machine capable of striking ground targets up to 75 miles from its launch point while traveling at speeds of 50 miles per hour.

Despite some modest success, the "Bug" was never used in combat due to reliability concerns so by the time the war ended, only 45 Kettering Bugs had been produced.

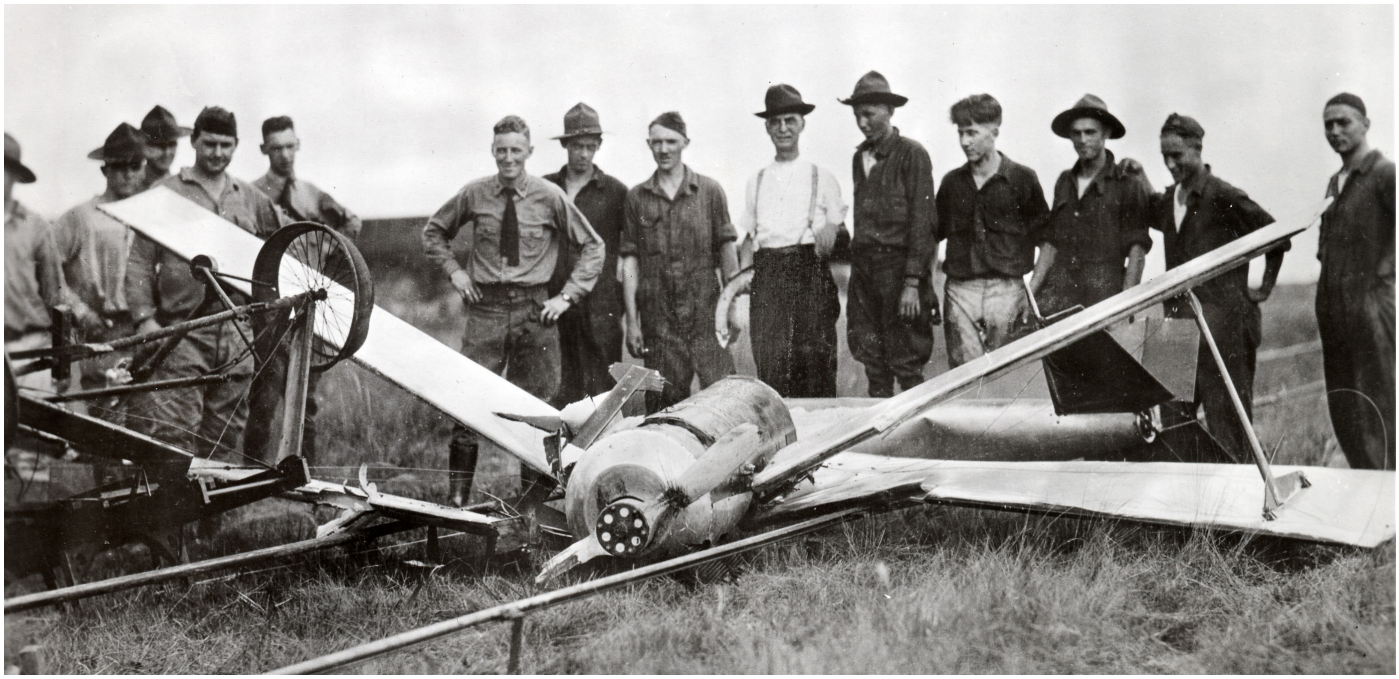
In World War II, a small radio-controlled aircraft designed by engineer Walter Righter was further developed as the Radioplane OQ-2 by actor and inventor Reginald Denny, becoming the first mass-produced UAV during the early 1940s. Initially intended for use as a target drone for training anti-aircraft gunners during the war. The simple aircraft, powered by a two-cylinder two cycle piston engine, led to a series of similar (but improved) variants during the war with nearly 15,000 Radioplane drones manufactured.

During the Cold War era the Ryan Firebee, a high-speed, jet-powered aerial target took things a bit farther. Primarily used for reconnaissance and target practice, it marked a shift towards more sophisticated UAVs capable of enduring longer flights and carrying various intelligence gathering sensors. This target drone was so successful that variants are still in service today.

GOOD, BUT COULD BE BETTER

The development of these early drones laid the foundation for the advanced UAVs used today in modern military operations.

By the 1980s, seeing Israel's success with its Scout drone—a small, difficult to shoot down UAV that could transmit real-time video images through a television camera in its central turret—the U.S. Army, Navy and Marines acquired more than 20 of Israel's RQ-2 Pioneer drones (later replaced by the RQ-7B Shadow) in 1986. The Pioneer contained some of the same foundational technology developed for the Scout drone, with significant advancements and enhancements making it a more capable and versatile UAV.



IT BEGAN WITH A BUG

The 1917 Kettering Aerial Torpedo "Bug" was an unmanned aerial torpedo launched from a four-wheeled dolly that ran down a portable track. (Photo courtesy of the National Museum of the United States Air Force)

The RQ-2 Pioneer became the first small inexpensive UAV in the modern American military forces.

Significant advancements in drone technology continued through the 1990s, particularly with the development of the RQ-1 Predator, by General Atomics Aeronautical Systems, which was capable of flying over dangerous areas for extended periods. Originally designed for reconnaissance, the Predator was equipped with surveillance capabilities, and the introduction of satellite communication links allowed for remote piloting and real-time data transmission over long distances.

SKY'S THE LIMIT LETHALITY

While the potential for UAVs has been recognized for decades, the 21st century marked the significant transformation of drones into formidable tools of warfare.

In 2002, the RQ-1 Predator was fitted with AGM-114 Hellfire missiles, transforming it into the MQ-1 Predator, capable of conducting precision strikes. Its use played a crucial role in targeted strikes in conflict zones like Afghanistan, Iraq and Pakistan during the Global War on Terror.

But perhaps one of the most widely recognized military drones is the MQ-9 Reaper, known for its long endurance, high-altitude operations and ability to carry a variety of weapons. The Reaper is a larger and more heavily armed version of the MQ-1 Predator and is often referred to as a hunter-killer drone. Its primary use is for attacking time-sensitive targets, but it's also used for intelligence, surveillance and reconnaissance.

While the Predator's role is to focus on targets and provide situational awareness for pilots, the RQ-Global Hawk provides much broader systematic surveillance using high resolution synthetic aperture radar and long-range electro-optical/infrared sensors. The Hawk, technically a UAS—equipped for safe and efficient operation without direct human intervention in or on the aircraft—can hover at altitudes of 60,000 feet over target areas for long periods of time (greater than 30 hours), in all kinds of weather, and can survey as much as 100,000 km^2 a day—an area three times the size of Maryland.

REAPING BENEFITS

A remotely piloted MQ-9 Reaper from the 163rd Attack Wing sits in a 178th Wing hanger on Springfield-Beckley Air National Guard Base, Ohio, March 12, 2024. (Photo by Staff Sgt. Thomas Moeger, U.S. Army National Guard)

In contrast, the RQ-11 Raven, manufactured by AeroVironment, Inc. is a small, portable, hand-launched UAS designed for rapid deployment and high-mobility mostly for military operations like low altitude reconnaissance, surveillance and autonomous operation.

The Raven provides forward deployed units with real-time, up to date and over-the-horizon views, and delivers color or infrared video via three cameras in its nose section without having to put Soldiers in harm's way. It has a flight time of 80 minutes and an effective range about 10 km (or 6.2 miles) and can even stand by itself. AeroVironment claims Raven to be "the most widely used UAS in the world today, with over 20,000 units sold."

SIGN OF TRANSITORY TIMES

As a sign of the changing times, in 2008, the New York Air National Guard 174th Attack Wing became the first fighter unit to transition to entirely unmanned combat, trading their F-16 cockpits for air-conditioned trailers in the desert, where they remotely piloted MQ-9 Reapers—as depicted in the 2015 movie "Good Kill," starring Ethan Hawke as an Air Force drone pilot.

The MQ-9 Reaper is slated to be replaced by 2030 with the developmental MQ-20 Avenger (formerly Predator C) or at least

SHADOW CASTING

An RQ-7 Shadow UAV is launched by U.S. Army Soldiers of the 104th Brigade Engineer Battalion, 44th Infantry Brigade Combat Team, New Jersey Army National Guard, at McGregor Base Camp, New Mexico, Feb. 19, 2024. The FTUAS will replace the currently fielded RQ-7B Shadow in ground brigade combat teams. (Photo by Staff Sgt. Bruce Daddis, New Jersey National Guard)

its technology, which has been around since the early 2000s but is not yet ready for active duty. It is, however, advanced enough for use as a test platform for other technologies. Unlike predecessors MQ-1 Predator and MQ-9 Reaper drones, the Avenger is powered by a turbofan engine and its design includes stealth features like internal weapons storage and S-shaped exhaust for reduced infrared and radar signatures. It can also fly up to 18 hours, reaching speeds of 400 mph and altitudes up to 50,000 feet. Its main mission is combat, as it carries an assortment of bombs and missiles attached to its six external hardpoints or inside the weapons bay that can hold up to 3,500 pounds.

COMPETING CAPABILITIES

In 2018, the Army began considering the replacement of the Textron RQ-7B Shadow (which replaced the RQ-2 Pioneer) drone, a widely used, yet accident-prone, unmanned aerial system developed in the early 2000s. The Shadow included four aircraft, two vehicle-mounted ground control stations, a generator and backup equipment and took more than two dozen Soldiers to operate.

The FTUAS "will replace the currently fielded RQ-7B Shadow in ground brigade combat teams, with a low to medium altitude aircraft with modern datalinks, electro-optical/infra-red sensors, intra-red/laser pointer/laser designator/laser range finder, data

"We are learning from the battlefield … that aerial reconnaissance has fundamentally changed."

encryption, manned-unmanned teaming capabilities and the ability to operate autonomously," according to a Program Executive Office (PEO) for Aviation press release in 2020. "Designed with a Modular Open Systems Approach, FTUAS payloads will be easily interchangeable. The FTUAS will be readily deployable using Chinook helicopters and provide commanders more flexibility on the battlefield."

In 2022, the Army awarded an $8 million contract to AeroVironment, Inc. to provide its Jump 20 drone for the first increment of FTUAS, and, in the following year, tapped Griffon Aerospace and Textron Systems for the next phase of its rapid prototyping program.

"FTUAS provides the brigade with an organic capability to conduct reconnaissance and surveillance operations that collect, develop and report actionable intelligence, allowing the warfighter to maintain dominance during multidomain operations," the Army stated in an April 25, 2024 press release. Meaning FTUAS provides transformational capabilities including VTOL, or vertical takeoff and landing, for runway independence, on-the-move command and control, Soldier-led field level maintenance and enables rapid capability insertions, "further allowing the system to keep pace with technology."

The first two options included evaluations of system performance, the modular open systems approach, cost, schedule and program risk, culminating in a preliminary design review and critical design review, the press release stated.

Option 3 includes flight demonstrations from Textron's Aerosonde Mk 4.8 HQ, and Griffon's Valiant, modular open systems approach third-party verification as well as Soldier touch points and testing of key systems characteristics such as vertical takeoff and landing. Production representative prototypes will be delivered during Option 4 and will culminate in a production readiness review. "Exercising FTUAS Options 3 and 4 simultaneously allows for the execution of a thorough and deliberate development test plan," according to PEO Aviation. With "first unit issued" set for 2025.

An Abbreviated Capabilities Development Document was approved on May 17, 2024, setting up a prototyping development plan for the capability. Due to funding limitations for an accelerated fielding timetable, investments are being made in fiscal year 2025 to purchase prototypes to be flown over the next few years to evaluate their sensors and other features and determine the best options.

CONCLUSION

From hot-air balloons and early reconnaissance to lethality and MQ-9 Reaper readiness, the slow, but steady, evolution of drones through the decades highlights significant advancements in aerial technology.

The future of drones is in autonomy, with developments focused on reducing human intervention and increasing operational efficiency. Autonomous drones equipped with artificial intelligence algorithms can analyze data in real-time, make decisions and adapt to highly contested environments. These advancements, along with continued enhancements in drone technology, will be essential for the Army of 2030 to maintain superiority in modern warfare.

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. Prior to 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.

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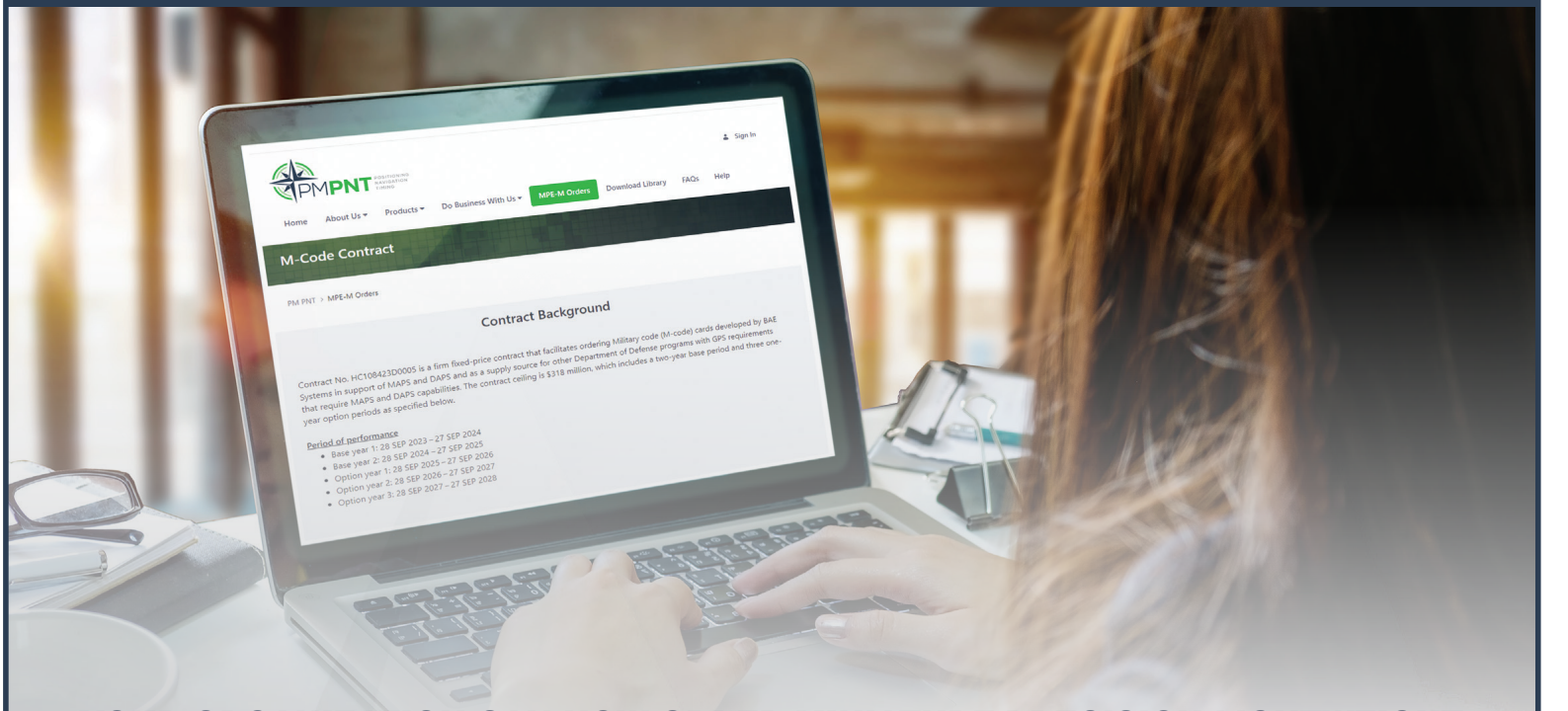

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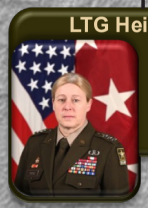

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"This is an exciting time for those of us in the acquisition community because materiel modernization is an essential part of the Army's broader continuous transformation effort."

—The Hon. Douglas R. Bush
Army Acquisition Executive and Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT))

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